STATE OF NEW JERSEY
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF LAND USE REGULATION
Mail Code 501-02A, P.O. Box 420, Trenton, New Jersey 08625-0420
Telephone: (609) 777-0454 or Fax: (609) 777-3656
www.state.nj.us/dep/landuse

PERMIT

In accordance with the laws and regulations of the State of New Jersey, the Department of Environmental Protection hereby grants this permit to perform the activities described below. This permit is revocable with due cause and is subject to the limitations, terms and conditions listed below and on the attached pages. For the purpose of this document, "permit" means "approval, certification, registration, authorization, waiver, etc." Violation of any term, condition or limitation of this permit is a violation of the implementing rules and may	Approval Date OCT 2 3 2017 Expiration Date OCT 2 7 2022

Permit Number(s):	Type of Approval(s):	Enabling Statute(s):
0000-17-0013.1 WFD170001 0000-17-0013.1 WFD170002 0000-17-0013.1 FWW170001	IP In-Water IP Upland FWGP6	NJSA 12:5-3 et seq. WFD; NJSA 13:9B et seq. FWPA; NJSA 58:10A-1 et seq. WPCA;

Permittee:	Site Location:
Poseidon Transmission LLC c/o Clark Bruno 401 Edgewater Place Suite 680 Wakefield, MA 01880	Block(s) & Lot(s): [24, 7 & 8] Municipality: South Brunswick Twp., Middlesex County Block(s) & Lot(s): [94, 44] Municipality: Borough of Keyport, Monmouth County

Description of Authorized Activities:

This permit authorizes the following activities, as shown on the plans/diagrams referenced on page 8.

Filling of 520.6 square feet (0.012 acres) of isolated freshwater wetlands under a Freshwater Wetlands Statewide General Permit #6 for the construction of an access driveway on Block 24, Lot 12 in South Brunswick Township, Middlesex County.

Construction of an underground concrete vault under a Waterfront Development Individual Permit – Upland for splicing an underwater HVDC electrical cable to an HVDC land cable at Block 94, Lot 44 in the Borough of Keyport, Monmouth County.

Construction of an 11' x 25' temporary gravity cell under a Waterfront Development Individual Permit – In-water for the temporary installation of jet plow trenching equipment in Raritan Bay. This includes minor dredging within the confines of the gravity cell so as to allow for equipment installation.

Installation of 16.9 miles of electrical transmission cable beneath New Jersey boundary waters via the jet plow trenching method under a Waterfront Development Individual Permit – In-water.

Prepared by:	Received and/or Recorded by County Clerk:
Andrew Dromboski **Andrew Dromboski** If the permittee undertakes any regulated activity authorized under a permit, such action shall constitute the permittee's acceptance of the permit in its entirety as well as the permittee's agreement to abide by the permit and all conditions therein.	

This permit is not valid unless authorizing signature appears on the last page.

SPECIAL CONDITIONS FOR A COASTAL PERMIT:

1. In order to protect populations of winter flounder in Raritan Bay, no jet plow trenching or in-water construction activities are permitted from January 1st to May 31st.

2. In order to protect anadromous fish species within Raritan Bay, no jet plow trenching or in-water construction activities are permitted from March 1st to June 30th.

SPECIAL CONDITIONS FOR A FRESHWATER WETLANDS PERMIT:

1. The total amount of disturbance associated with this authorization shall not exceed 0.012 acres (520.6 SF) of wetlands for the construction of an access driveway under a Freshwater Wetlands Statewide General Permit #6 on Block 24, Lot 12, Township of South Brunswick, Middlesex County.

2. The wetlands affected by this permit authorization are of Intermediate resource value and the standard transition area or buffer required adjacent to these wetlands is 50 feet. This permit includes a transition area waiver, which allows encroachment only in that portion of the transition area, which has been determined by the Department to be necessary to accomplish the regulated activities. Any additional regulated activities conducted within the standard transition area on-site shall require a separate transition area waiver from the Division. Regulated activities within a transition area are defined at N.J.A.C. 7:7A-2.6. Please refer to the Freshwater Wetlands Protection Act (N.J.S.A. 13:9B-1 et seq.) and implementing rules (N.J.A.C. 7:7A-1.1 et seq.) for additional information.

HISTORIC PRESERVATION CONDITIONS:

1. No project ground disturbing activities will commence on the project site until the permittee completes the required archaeological and architectural program to identify, evaluate, avoid, and/or mitigate project impacts on archaeological and architectural resources.

2. The permittee shall conduct an intensive level architectural survey for the abandoned late nineteenth century farm complex at 114 Davidsons Mill Road (Block 24, Lot 12). The survey must comply with the HPO's *Guidelines for Architectural Survey* (1999). The survey shall make a formal determination if the property is eligible for listing on the National Register of Historic Places, and if determined eligible, include recommendations for the avoidance, minimization, and/or mitigation of any adverse effects. These surveys and findings shall be submitted to the Division of Land Use Regulation (DLUR) and the Historic Preservation Office (HPO) for comment. No fieldwork shall commence within 300 yards of either property until the process to identify historic properties, and any mitigation, has been approved by DLUR and the HPO.

3. If the HPO and DLUR determine the project will have an adverse effect on any historic architectural properties, the permittee shall ensure that any architectural or historic property mitigation plan shall be submitted to the HPO and DLUR for approval within **two months of the notice of adverse effects** and that the HPO and DLUR approved architectural properties mitigation plan is implemented prior to building demolition.

4. Architectural survey must be in keeping with the Office's 1999 *Guidelines for Architectural Survey* (http://www.nj.gov/dep/hpo/1identify/survarcht.htm) with reporting conforming to the guidelines at N.J.A.C. 7:4-8.6. Evaluations to determine the National Register eligibility of historic properties must be in keeping with the National Park Service's National Register Bulletin, *How to Apply the National Register Criteria for Evaluation*. Recommendations for avoidance of impacts to historic properties must conform to The Secretary of the Interior's *Standards for the Treatment of Historic Properties*.

5. The permittee shall submit an archaeological cemetery monitoring, avoidance, and mitigation plan (Plan) to the HPO for review and approval for the 1840 Fresh Ponds Chapel cemetery, circa $18^{th}/19^{th}$ century enslaved American/free black community cemetery (Area 2), and 18^{th} century cemetery (Area 17). The Plan must contain a process for halting all construction in the immediate area if human remains or burial site(s) are identified, shall consult the New Jersey Cemetery Board rules require a lower supreme court ruling to exhume and/or relocate any human burials, the Plan is referenced in project documents, and that the plan shall be implemented. Any Plan shall include horizontal directional drilling (HDD) as a mitigation option.

6. The permittee shall implement a 150-meter (500-foot) exclusion buffer, or buffer developed in consultation with the HPO and any federal agency pursuant to Section 106 of the National Historic Preservation Act, around two potential shipwreck sites (DSRA Cluster 1 and DSRA Cluster 2). The archaeological exclusion buffer shall be referenced in project documents with copies provided to DLUR and the HPO.

7. The permittee shall conduct a Phase I archaeological survey within HDD#6 (1903+00 to 1904+00) and the Olsens Boats Marina (Area 21) prior to construction to identify the presence or absence of archaeological deposits. The results of Phase I archaeological survey shall be submitted to the HPO for review and comment.

8. The permittee shall consult with the Historic Preservation Office upon completion of the Phase I archaeological survey to assess the presence or absence of archaeological resources within the project's area of potential effects and to determine if a Phase II archaeological survey is necessary to assess the eligibility of archaeological resources for listing on the New Jersey and National Registers of Historic Places.

9. The permittee shall submit a Phase II archaeological survey to the Historic Preservation Office for review, if archaeological resources were identified during Phase I archaeological survey and cannot be avoided. The Phase II archeological survey work plan shall be submitted to the Historic Preservation Office for review and approval prior to the commencement of the Phase II fieldwork.

10. The permittee shall consult with the Historic Preservation Office upon completion of the Phase II archaeological survey to assess the effects of the proposed project on any resources identified as eligible for listing on the New Jersey and National Registers of Historic Places.

11. The permittee shall submit an avoidance-plan to the Historic Preservation Office and the Division of Land Use Regulation within 30 days of completion of the Phase II archaeological survey if resources eligible for inclusion on the New Jersey and National Registers of Historic Places are identified.

12. The permittee shall submit a minimization and/or Phase III mitigation plan to the Historic Preservation Office if impacts to resources eligible for listing on the New Jersey and National Registers of Historic Places cannot be avoided. The minimization and/or mitigation plan(s) must be approved by the Historic Preservation Office prior to the commencement of on-site construction activities or any data recovery activities to ensure that the research designs, work plans, proposed archaeological buffer zones, data recovery plans and public outreach components are acceptable to the Historic Preservation Office.

13. The permittee shall ensure the Historic Preservation Office approved archaeological work plans for the Phase II and Phase III data recovery surveys are implemented.

14. The permittee shall not commence with any on-site construction activities until the Division of Land Use Regulation, in consultation with the Historic Preservation Office, has released the data recovery project site for construction once the fieldwork component of the data recovery is completed and the Historic Preservation Office has received A) an approved data recovery work plan; B) notification of the completion of the data recovery fieldwork; and C) a Historic Preservation Office approved data recovery management summary of the data recovery field work.

15. The permittee shall ensure complete draft Phase II reports shall be submitted to the Historic Preservation Office for review and approval within three months after respective phases of fieldwork are completed. The project permittee shall ensure a complete draft Phase III report shall be submitted to the Historic Preservation Office for review and approval within six months after fieldwork is completed. Final reports for each phase of survey shall be submitted to the Historic Preservation Office within two months after comments are received on the respective draft reports. Other timelines (for example, for public outreach) shall be established in consultation with the Historic Preservation Office, as necessary, based on the findings of the archaeological survey.

16. The permittee shall notify the Historic Preservation Office within three days of the completing of each phase of archaeological fieldwork.

17. The Permittee shall ensure that all phases of the archaeological survey and reporting shall be in keeping with the Secretary of the Interior's *Standards and Guidelines for Archaeology and Historic Preservation* and the archaeological survey and report rules at N.J.A.C. 7:4-8.4 through 8.5. Evaluations to determine the National Register eligibility of archaeological sites should be in keeping with the National Park Service's 2000 National Register Bulletin, *Guidelines for Evaluating and Registering Archaeological Properties.* The *Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation* are available on the National Park Services web site: http://www.nps.gov/history/local-law/arch_stnds_0.htm)

18. The Permittee shall ensure that the individual(s) conducting the work meet the Secretary of the Interior's *Professional Qualifications Standards* for archaeology and historic architecture (48 FR 44738-9).

19. The permittee shall ensure that all artifacts from State and National Register eligible archaeological sites will be analyzed, catalogued, and curated in accordance with the National Park Service Standards, codified as 36 CFR Part79.

20. The permittee shall ensure that within two months of the submission of the final Phase II report and any final Phase III data recovery report to Division Of Land Use Regulation and the Historic Preservation Office, the artifacts, field records (including the artifact catalogue), and copies of all phases of survey from National Register eligible sites shall have been turned over to the New Jersey State Museum or other institution meeting the Secretary of the Interior's Standards for Curation. A copy of the New Jersey State Museum Deed of Gift Form (or a Deed of Gift Form from another suitable curation facility) shall be submitted to the Historic Preservation Office at that time as an indicator of the final transmission of the artifact collection. All archaeological reports shall identify the repository where the project records and artifacts will be located.

21. The project permittee shall ensure that work that does not meet the Secretary of the Interior's *Standards and Guidelines for Archeology and Historic Preservation* and the requirements of the Coastal Zone Management Rules and Freshwater Wetlands Protection Act Rules as determined by the Historic Preservation Office in consultation with Division of Land Use Regulation, will be rectified by the project archaeological consultant(s).

22. The permittee shall immediately cease all ground disturbing activities and contact the Historic Preservation Office if potential human burials or human skeletal remains are encountered. The potential burials and/or human skeletal remains shall be left in place unless imminently threatened by human or natural displacement.

23. If, for any reason the Phase I identification survey, Phase II evaluation, Phase III data recovery, and/or architectural fieldwork is not accomplished prior to construction within the defined project area site limits, the project permittee shall be responsible for all investigation, evaluation, survey, salvage, and/or stabilization deemed necessary by the Historic Preservation Office, in consultation the Division Of Land Use Regulation, pursuant to the implementing regulations. Information gathered from such investigation, evaluation, or survey shall be used by the Historic Preservation Office, in consultation with Division of Land Use Regulation, to determine the extent of damage, evaluate the resource, and direct any measures to mitigate impacts from project-related activities, including any actions on the part of the permittee's contractors. Should any archaeological or architectural site be partially or entirely destroyed by project-related activities before completion of any of the required phases of archaeological fieldwork are completed, the Historic Preservation Office, in consultation with Division Of Land Use Regulation, shall determine other appropriate mitigation (e.g., alternative site excavation, alternative analysis, and/or public outreach activities) and enforcement, commensurate with the impacts which occurred.

24. The permittee shall provide a copy of these cultural resource conditions to the archaeological consultant(s) for the proposed project.

STANDARD CONDITIONS:

1. The issuance of a permit shall in no way expose the State of New Jersey or the Department to liability for the sufficiency or correctness of the design of any construction or structure(s). Neither the State nor the Department shall, in any way, be liable for any loss of life or property that may occur by virtue of the activity or project conducted as authorized under a permit.

2. The issuance of a permit does not convey any property rights or any exclusive privilege.

3. The permittee shall obtain all applicable Federal, State, and local approvals prior to commencement of regulated activities authorized under a permit.

4. A permittee conducting an activity involving soil disturbance, the creation of drainage structures, or changes in natural contours shall obtain any required approvals from the Soil Conservation District having jurisdiction over the site.

5. The permittee shall take all reasonable steps to prevent, minimize, or correct any adverse impact on the environment resulting from activities conducted pursuant to the permit, or from noncompliance with the permit.

6. The permittee shall immediately inform the Department by telephone at (877) 927-6337 (Warn DEP Hotline) of any noncompliance that may endanger the public health, safety, and welfare, or the environment. In addition, the permittee shall inform the Division of Land Use Regulation by telephone at (609) 777-0454 of any other noncompliance within two working days of the time the permittee becomes aware of the noncompliance, and in writing within five working days of the time the permittee becomes aware of the noncompliance. Such notice shall not, however, serve as a defense to enforcement action if the project is found to be in violation of this chapter. The written notice shall include:
    a. A description of the noncompliance and its cause;
    b. The period of noncompliance, including exact dates and times;
    c. If the noncompliance has not been corrected, the anticipated length of time it is expected to continue; and
    d. The steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance.

7. It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the authorized activity in order to maintain compliance with the conditions of the permit.

8. The permittee shall employ appropriate measures to minimize noise where necessary during construction, as specified in N.J.S.A. 13:1G-1 et seq. and N.J.A.C. 7:29.

9. The issuance of a permit does not relinquish the State's tidelands ownership or claim to any portion of the subject property or adjacent properties.

10. The issuance of a permit does not relinquish public rights to access and use tidal waterways and their shores.

11. The permittee shall allow an authorized representative of the Department, upon the presentation of credentials, to:
    a. Enter upon the permittee's premises where a regulated activity is located or conducted, or where records must be kept under the conditions of the permit;
    b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit; and
    c. Inspect at reasonable times any facilities, equipment, practices, or operations regulated or required under the permit. Failure to allow reasonable access under this paragraph shall be considered a violation of this chapter and subject the permittee to enforcement action under.

12. The permittee and its contractors and subcontractors shall comply with all conditions, site plans, and supporting documents approved by the permit. Any noncompliance with a permit constitutes a violation of this chapter and is grounds for enforcement action under, as well as, in the appropriate case, suspension and/or termination of the permit.

13. All conditions, site plans, and supporting documents approved by a permit shall remain in full force and effect so long as the regulated activity or project, or any portion thereof, is in existence, unless the permit is modified.

14. For Coastal Permits, Flood Hazard Permits and Flood Hazard Verifications, the permittee shall record the permit, including all conditions listed therein, with the Office of the County Clerk (the Registrar of Deeds and Mortgages, if applicable) of each county in which the site is located. The permit shall be recorded within 30 calendar days of receipt by the permittee, unless the permit authorizes activities within two or more counties, in which case the permit shall be recorded within 90 calendar days of receipt. Upon completion of all recording, a copy of the recorded permit shall be forwarded to the Division of Land Use Regulation at the address set forth in the rules.

15. If any condition or permit is determined to be legally unenforceable, modifications and additional conditions may be imposed by the Department as necessary to protect public health, safety, and welfare, or the environment.

16. A copy of the permit and all approved site plans and supporting documents shall be maintained at the site at all times and made available to Department representatives or their designated agents immediately upon request.

17. A permit shall be transferred to another person only in accordance with the regulations.

18. A permit can be suspended or terminated by the Department for cause.

19. The submittal of a request to modify a permit by the permittee, or a notification of planned changes or anticipated noncompliance, does not stay any condition of a permit.

20. Where the permittee becomes aware that it failed to submit any relevant facts in an application, or submitted incorrect information in an application or in any report to the Department, it shall promptly submit such facts or information.

21. The permittee shall submit written notification to the Bureau of Coastal and Land Use Compliance and Enforcement, 401 East State Street, 4th Floor, P.O. Box 420, Mail Code 401-04C, Trenton, NJ 08625, at least three working days prior to the commencement of regulated activities.

22. The permittee shall not cause or allow any unreasonable interference with the free flow of a regulated water by placing or dumping any materials, equipment, debris, or structures within or adjacent to the channel while the regulated activity(ies) is being undertaken. Upon completion of the regulated activity(ies), the permittee shall remove and dispose of in a lawful manner, all excess materials, debris, equipment, and silt fences and other temporary soil erosion and sediment control devices from all regulated areas.

23. The regulated activity shall not destroy, jeopardize, or adversely modify a present or documented habitat for threatened or endangered species, and shall not jeopardize the continued existence of any local population of a threatened or endangered species.

APPROVED PLANS:

"UTILITY PERMITTING PLANS FOR POSEIDON TRANSMISSION LINE ROUTE PERMIT PLAN (sheet 5 of XX)", prepared by Maser Consulting, PA, dated 12/9/2016, not revised.

"UTILITY PERMITTING PLANS FOR POSEIDON TRANSMISSION LINE ROUTE PERMIT PLAN (sheet 149 of XX)", prepared by Maser Consulting, PA, dated 12/9/2016, not revised.

"Poseidon Transmission 1, LLC NOAA Nautical Chart The Poseidon Project Middlesex County, New Jersey to Suffolk County, New York" (Figure 17, Sheet 1 of 2), prepared by ESS Group.

"Poseidon Transmission 1, LLC NOAA Nautical Chart The Poseidon Project Middlesex County, New Jersey to Suffolk County, New York" (Figure 17, Sheet 2 of 2), prepared by ESS Group.

In accordance with the applicable regulations, any person who is aggrieved by this decision or any of the conditions of this permit may request an adjudicatory hearing within 30 calendar days after public notice of the decision is published in the DEP Bulletin. This request must include a completed copy of the Adjudicatory Hearing Request form. The DEP Bulletin is available through the Department's website at http://www.nj.gov/dep/bulletin and the form is available through the Division's website at http://www.nj.gov/dep/landuse/download/lur_024.pdf. In addition to requesting a hearing, a request may be filed with the Department's Office of Dispute Resolution to determine whether the matter is suitable for mediation. Information concerning the dispute resolution process is available at www.nj.gov/dep/odr.

If you need clarification on any section of this permit or conditions, please contact the Division of Land Use Regulation's Technical Support Call Center at (609) 777-0454.

Approved By:

Christopher Jones, Manager
Division of Land Use Regulation

10/23/17
Date

Original sent to Agent to record
c: Permittee
Construction Official

A CONTRACT FOR SALE OF REAL ESTATE

This Contract of Sale is made this [redacted]

Between: [redacted], [redacted]

[redacted])

referred to as the "Seller",

and **AURORA NJ DEVELOPMENT LLC**, its successors and assigns, a New Jersey limited liability company,

[redacted]

referred to as the "Buyer".

[redacted].

[redacted]. [redacted] [redacted].

[redacted]. [redacted].

3. [redacted].

[redacted]. [redacted]:

[redacted]' [redacted]

[redacted]e [redacted]t [redacted]l [redacted].

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

EXTENSION OF OPTION AGREEMENT TO PURCHASE

THIS EXTENSION OF OPTION AGREEMENT TO PURCHASE (this "Extension Agreement") is made [redacted] ("Effective Date") by and between [redacted] and **BOARDWALK POWER LINK, LLC**, its successors and assigns, a New Jersey limited liability company, having an office at 401 Edgewater Place, Suite 640, Wakefield, MA 01880 ("Boardwalk").

[redacted]

[redacted]

[redacted]

[redacted]

OPTION AGREEMENT TO PURCHASE

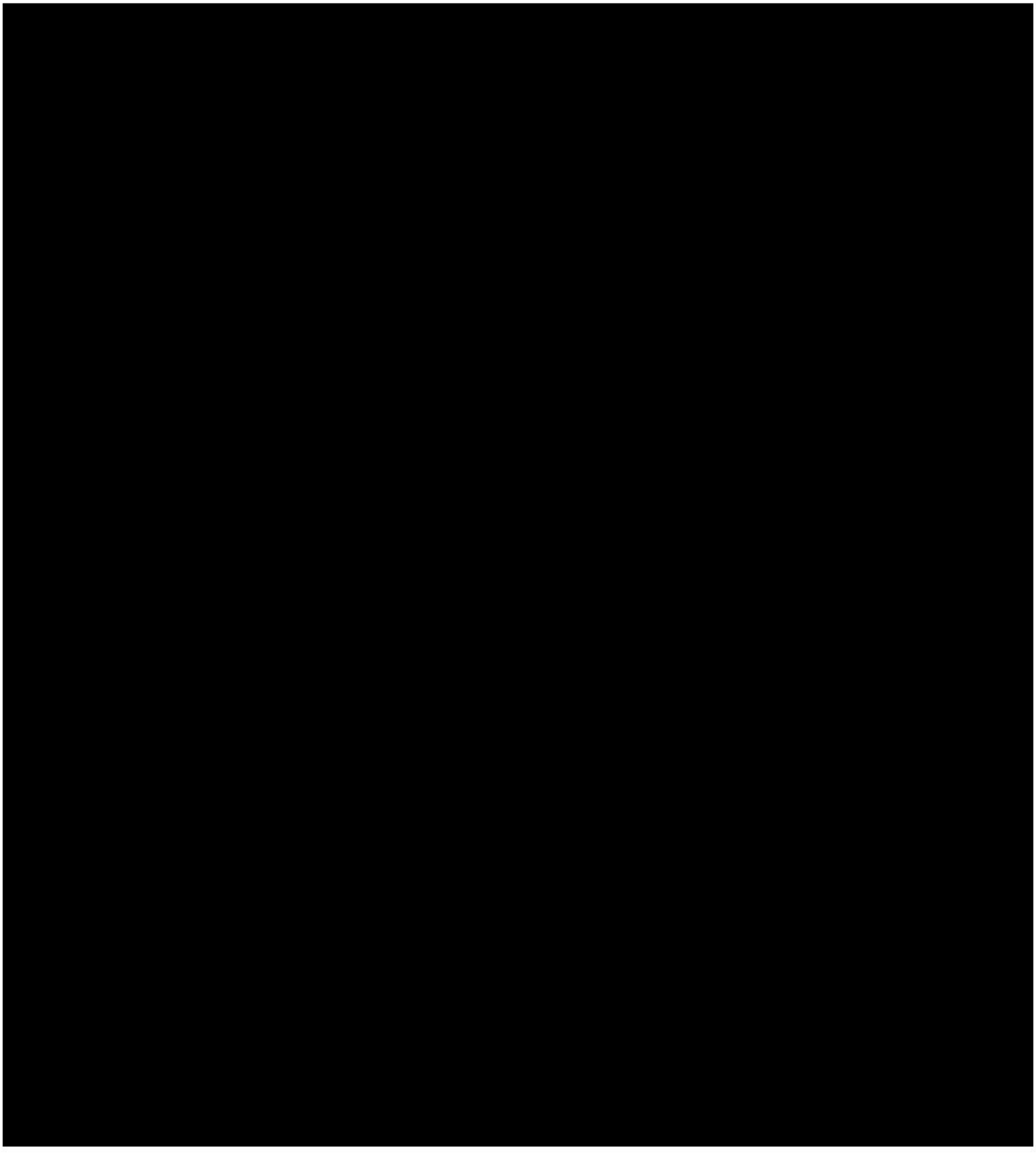
THIS OPTION AGREEMENT TO PURCHASE (this "Agreement") is made [redacted] ("Effective Date") by and between [redacted] and **AURORA NJ DEVELOPMENT LLC**, its successors and assigns, a New Jersey limited liability company, having an office at c/o Henry Kent-Smith, Esquire, Fox Rothschild LLP, 997 Lenox Drive, Building 3, Lawrenceville, New Jersey 08648 ("Aurora").

[redacted]

[redacted]

[redacted]

[redacted]



OPTION AGREEMENT TO PURCHASE

THIS OPTION AGREEMENT TO PURCHASE (this "Agreement") is made [redacted] ("Effective Date") by and between [redacted] ("Seller"), and **AURORA NJ DEVELOPMENT LLC**, its successors and assigns, a New Jersey limited liability company, having an office Henry Kent-Smith, Esquire, Fox Rothschild LLP, 997 Lenox Drive, Building 3, Lawrenceville, New Jersey 08648 ("Aurora").

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

OPTION AGREEMENT TO PURCHASE

THIS OPTION AGREEMENT TO PURCHASE (this "Agreement") is made this [redacted] ("Effective Date") by and between [redacted] and **BOARDWALK POWER LINK LLC**, its successors and assigns, a Delaware limited liability company, having an office c/o Henry Kent-Smith, Esquire, Fox Rothschild LLP, 997 Lenox Drive, Building 3, Lawrenceville, New Jersey 08648 ("Boardwalk").

[redacted]

[redacted]

[redacted]

OPTION AGREEMENT TO PURCHASE

THIS OPTION AGREEMENT TO PURCHASE (this "Agreement") is made this [redacted] ("Effective Date") by and between [redacted] and **AURORA NJ DEVELOPMENT LLC**, its successors and assigns, a New Jersey limited liability company, having an office Henry Kent-Smith, Esquire, Fox Rothschild LLP, 997 Lenox Drive, Building 3, Lawrenceville, New Jersey 08648 ("Aurora").

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

OPTION AGREEMENT TO PURCHASE

THIS OPTION AGREEMENT TO PURCHASE (this "Agreement") is made this [redacted] ("Effective Date") by and between [redacted] and **AURORA NJ DEVELOPMENT LLC,** its successors and assigns, a New Jersey limited liability company, having an office at c/o Henry Kent-Smith, Esquire, Fox Rothschild LLP, 997 Lenox Drive, Building 3, Lawrenceville, New Jersey 08648 ("Aurora").

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

PURCHASE AND SALE AGREEMENT

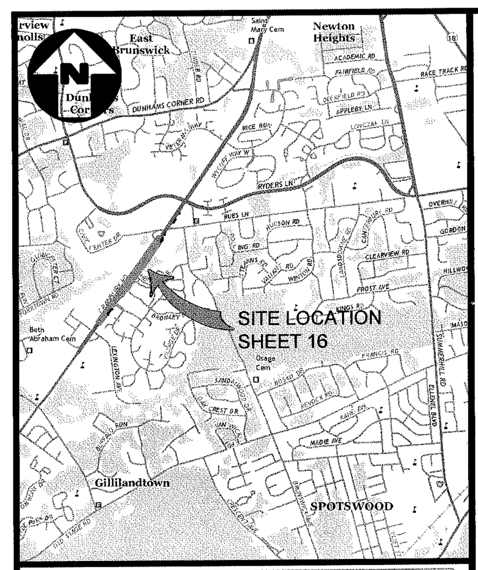
THIS AGREEMENT TO PURCHASE (this "Agreement") is made this [redacted] ("Effective Date") by and between [redacted] with an address at [redacted] and **BOARDWALK POWER LINK, LLC**, its successors and assigns, a New Jersey limited liability company, having an office at 401 Edgewater Place, Suite 680, Wakefield, MA 01880 ("Buyer").

RECITALS:

[redacted]

[redacted]

[redacted]



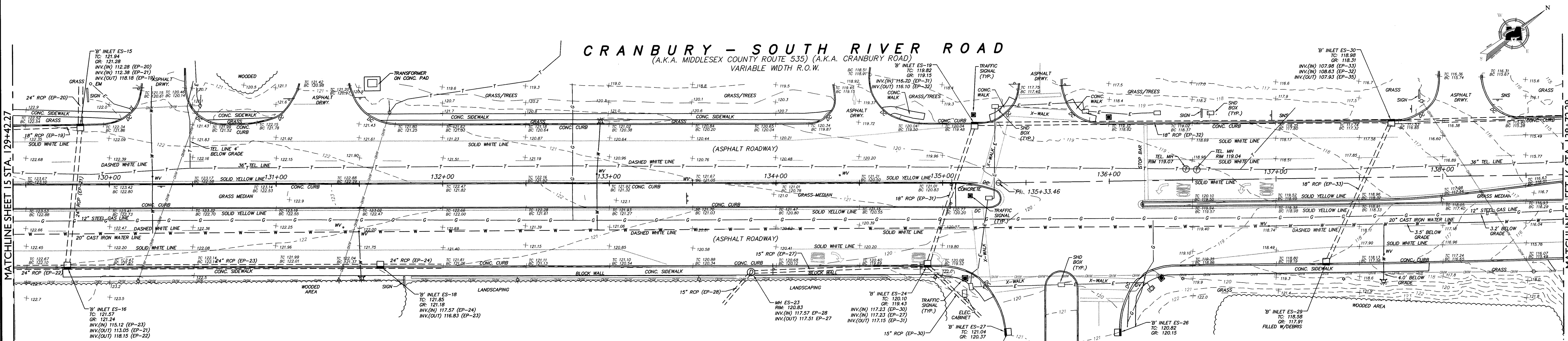
LOCATION MAP/KEY MAP
NEW BRUNSWICK USGS QUAD MAP
SCALE: 1"=4000'

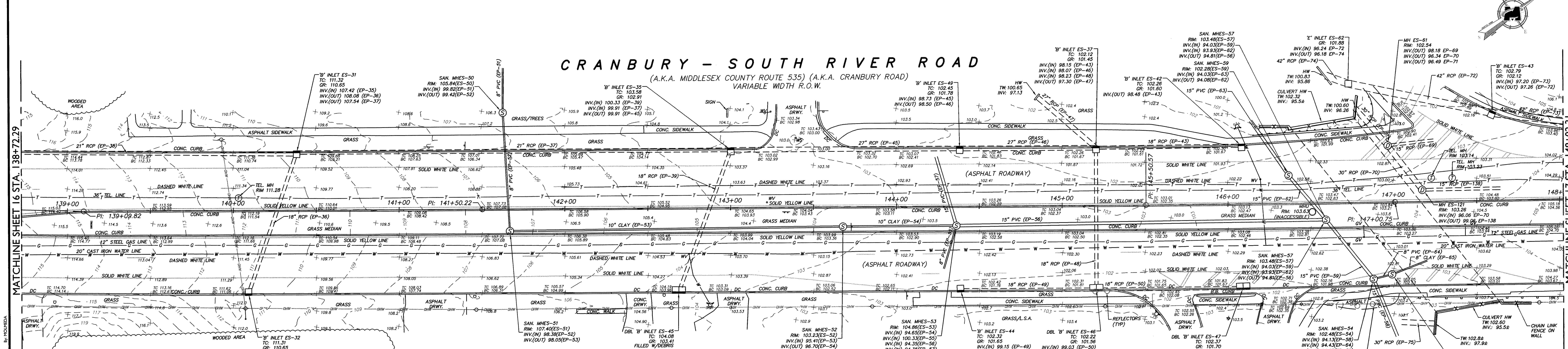
DRAWING LEGEND

CURB	TRAFFIC SIGNAL POLE
DEP. CURB	SHD BOX (STATE HIGHWAY DEPARTMENT)
SIGN	UNMARKED MANHOLE
DOUBLE SIGN	ELECTRIC MANHOLE
TREE	DRAINAGE MANHOLE
POLE MOUNTED LIGHT	SANITARY MANHOLE
UTILITY POLE W/ GUY	TELEPHONE MANHOLE
CHAIN FENCE	WATER MANHOLE
WALL	TYPE 'A' INLET
CONTOUR	TYPE 'B' INLET
86.7 SPOT ELEVATION	DBL. 'B' INLET
WM WATER METER	TYPE 'E' INLET
FIRE HYDRANT	—E— UNDERGROUND ELECTRIC LINE
WV WATER VALVE	—G— UNDERGROUND GAS LINE
MAILBOX	– –G– – UNDERGROUND GAS LINE (RECORD)
BC BOTTOM OF CURB	—OHW— OVERHEAD WIRES
BW BOTTOM OF WALL	UNDERGROUND SANITARY LINE
CONC CONCRETE	—T— UNDERGROUND TELEPHONE LINE
EOP EDGE OF PAVEMENT	– –T– – UNDERGROUND TELEPHONE LINE (RECORD)
GR GRATE	—U— UNDERGROUND UNKNOWN LINE
INV INVERT	—W— UNDERGROUND WATER LINE
MH MANHOLE	– –W– – UNDERGROUND WATER LINE (RECORD)
TC TOP OF CURB	
DWP DETECTABLE WARNING PAD	
CO CLEAN OUT	
GM GAS METER	
GV GAS VALVE	

GENERAL NOTES

1. PLANIMETRICS SHOWN HEREON TAKEN FROM MOBILE LiDAR DATA OBTAINED ON DECEMBER 12, 2014 UTILIZING A VMX-450 MOBILE SCANNING SYSTEM.
2. SPECIFIC TO THIS PROJECT: BASED UPON THE NEW JERSEY STATE PLANE COORDINATE SYSTEM, NAD 83 (NEAR SURFACE DERIVED COORDINATES UTILIZING KEYNET GPS).
3. EXISTING SITE TOPOGRAPHIC INFORMATION AS SHOWN HEREON IS BASED UPON NAVD 88 (NORTH AMERICAN VERTICAL DATUM OF 1988) PER GPS OBSERVATION BY MASER CONSULTING, P.A. UTILIZING THE FOLLOWING NGS MONUMENTS: KV6753/12W2-ELEV. 112.92', DM6231/12J5-ELEV. 143.40', KV0945/58PRR-ELEV. 10.06', KV0754/TIDAL 2 STA 17-ELEV. 17.23', AI8468/835 1545C TIDAL-ELEV. 7.61' & KV0757/WALNUT-ELEV. 7.69'.
4. UNDERGROUND UTILITIES SHOWN HEREON WERE MARKED OUT BY MASER CONSULTING'S GEOPHYSICAL DIVISION USING RADIO FREQUENCY PIPE & CABLE LOCATORS AND GROUND PENETRATING RADAR (GPR) UNLESS OTHERWISE NOTED. (SEE UTILITY NOTES ON COVER SHEET).





SCALE: 1" = 30'

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- Albany, NY
- Chestnut Ridge, NY
- Newburgh, NY
- Hawthorne, NY
- Bethlehem, PA
- Exton, PA
- Tampa, FL

State of N.J. Certificate of Authorization: 24GA27986500

811 Know what's below. Call before you dig.

PROTECT YOURSELF
ALL STATES REQUIRE NOTIFICATION OF EXCAVATORS, DESIGNERS, OR ANY PERSON PREPARING TO DISTURB THE EARTH'S SURFACE ANYWHERE IN ANY STATE

STATE REQUIRED FILE NUMBER
FOR STATE SPECIFIC DIRECT PHONE NUMBERS VISIT: WWW.CALL811.COM

REV	DATE	DRAWN BY	DESCRIPTION

GLENN J. LLOYD
NEW JERSEY PROFESSIONAL LAND SURVEYOR - LICENSE NUMBER: GS37598

TOPOGRAPHIC ROADWAY SURVEY
FOR
POSEIDON TRANSMISSION 1, LLC

A PORTION OF CRANBURY - SOUTH RIVER ROAD (A.K.A. C.R. 535)

TWP. OF EAST BRUNSWICK
MIDDLESEX COUNTY
NEW JERSEY

RED BANK OFFICE
Corporate Headquarters
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Unsolicited Right-of-Way/ Right-of-Use & Easement Grant Application

Redacted Version

New York/New Jersey Ocean Grid Project

Amended June 22, 2018

PREPARED FOR

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Amended June 22, 2018

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1.0 INTRODUCTION

Anbaric Development Partners, LLC (ADP) submits this Unsolicited Right-of-Way and Right-of-Use and Easement Grant (ROW/RUE Grant) Application to the Bureau of Ocean Energy Management (BOEM) for the New York/New Jersey Ocean Grid Project (NY/NJ Ocean Grid or the Project), in accordance with BOEM's regulations governing ROW and RUE Grants related to renewable energy projects (30 C.F.R Part 585, Subpart C).

ADP requests a ROW/RUE Grant for potential routing of subsea transmission cables and siting of Offshore Collector Platforms (OCPs) for the NY/NJ Ocean Grid Project located on the Outer Continental Shelf (OCS) offshore of New York and New Jersey. This ROW/RUE Grant Application is supported by engineering and environmental analyses, initial stakeholder consultations, and Interconnection Requests filed (or in the process of being filed) with the New York Independent System Operator (NYISO) and PJM Interconnection (PJM). In accordance with BOEM's renewable energy program regulations (30 C.F.R § 585.305), this ROW/RUE Grant Application includes the following information:

(a) The area ADP is requesting for a ROW/RUE Grant;

(b) A general description of ADP's objectives and the facilities that ADP will use to achieve those objectives;

(c) A general schedule of proposed activities; and

(d) Pertinent information concerning environmental conditions in the Area of Interest (AOI).

1.1 Overview of NY/NJ Ocean Grid Project

ADP is proposing the NY/NJ Ocean Grid – a planned offshore transmission system to efficiently deliver offshore wind energy generation to the onshore electric grid. The States of New York and New Jersey, respectively, have plans to develop 2,400 and 3,500 MW of offshore wind by 2030. ADP understands that commercial offshore wind development at this scale will benefit substantially from the availability of a carefully planned, coordinated offshore transmission system, as an alternative to project-by-project generator lead transmission interconnections that only serve one project. Through the strategic selection of onshore Points of Interconnection (POI), careful planning to minimize the Project footprint and environmental impacts, and by building transmission at scale, the NY/NJ Ocean Grid will serve as foundational infrastructure in support of this developing regional offshore wind industry. In addition, the Project is consistent with the actions identified in the National Offshore Wind Strategy (DOI/DOE 2016), including reducing costs and technology risks, supporting effective stewardship, and increasing the understanding of the benefits and costs of offshore wind.

The NY/NJ Ocean Grid will consist of strategically sited OCPs, each connected to one or more high voltage subsea export cables to the onshore POIs. Each proposed OCP will be designed to handle 800 to 1,200 MW of offshore wind energy generation, with the ability to connect multiple offshore wind projects and accommodate phased development within the designated Wind Energy Areas (WEAs). The development and construction of the NY/NJ Ocean Grid increases optionality and may be built in phases to maximize economic efficiency, align with the build-out of the WEAs, and best meet reliability needs as the offshore industry grows. These benefits and optionality will not be realized by the alternative of one-off, project specific generator leads constructed by the offshore wind developers.

The NY/NJ Ocean Grid will capitalize on implementing new technology and innovation that will promote cost-effective offshore wind energy transmission and take advantage of newer transmission technology for greater and more efficient accommodation of intermittent generation from offshore wind resources. In addition, the Project will provide optionality and flexibility in adapting to rapidly advancing offshore wind generating technologies.

The Project will help to facilitate the most cost-effective and reliable regional offshore wind development on the OCS from Long Island, NY to Cape May, NJ. The southerly segments of the Project may also be able to accept additional offshore wind generating capacity planned to be built offshore of Delaware and Maryland if the need arises.

1.2 BOEM's ROW/RUE Grant Approval Process

Under the applicable regulations, after receiving an unsolicited ROW/RUE grant request, BOEM must first determine whether there is competitive interest (30 C.F.R.§ 585.306(a)). To do so, BOEM will publish a notice in the Federal Register describing the Project and will solicit public comment (30 C.F.R.§ 585.307). BOEM will then make a determination whether the grant may be awarded non-competitively and, if so, will publish a "Notice of Determination of No Competitive Interest" in the Federal Register.

Consistent with BOEM's regulations (30 C.F.R. § 385.303), ADP is seeking BOEM approval for the NY/NJ Ocean Grid in two stages. First, ADP, through this ROW/RUE Application, is requesting that BOEM issue a ROW/RUE Grant encompassing the areas in which the NY/NJ Ocean Grid Project will be sited. Second, ADP will later submit for BOEM approval a General Activities Plan (GAP) that describes the design and construction of the proposed transmission system. Under BOEM's regulations, ADP must submit a GAP within 12 months of issuance of the ROW/RUE Grant (30 C.F.R. § 585.640(b)). There will be appropriate environmental reviews under the National Environmental Policy Act (NEPA) at each of these stages. Because the requested ROW/RUE Grant does not authorize ADP to begin any level of construction activity prior to approval of a GAP, the potential environmental effects at the ROW/RUE Grant stage are limited (30 C.F.R. § 585.640(b)).

1.3 Applicant for Right-of-Way and Right-of-Use Grant

Anbaric Development Partners, LLC
401 Edgewater Place, Suite 680
Wakefield, MA 01880
Contact Person: Clarke Bruno, President, Transmission, ADP

1.4 Qualifications of Anbaric's Team

ADP meets the technical, financial, and legal qualifications for grant holders, as outlined in BOEM's regulations (30 C.F.R. § 585.107). ADP has submitted these qualification materials to BOEM under separate cover.

2.0 UNSOLICITED RIGHT-OF-WAY AND RIGHT-OF-USE & EASEMENT GRANT AREA REQUEST

This section describes the process that was used to define the AOI (lease blocks) for which ADP submits this unsolicited ROW/RUE grant application.

2.1 Selection of the ROW/RUE Grant Area

ADP has conducted a preliminary desktop siting and routing assessment to identify potential locations for OCPs and subsea cable routes that will serve to connect the NY/NJ Ocean Grid with existing onshore electric substations at preferred POIs. Subsea cable routes within state waters, sea-to-shore landfalls and land cable routes to the POIs were also addressed in the desktop assessment from routing and transmission capacity standpoints. However, these proposed facilities are located outside the OCS and are therefore not the subject of this Application.

The preliminary desktop assessment was based on available resource information and Geographic Information System (GIS) data sources. This information was used in the siting and routing process to identify possible environmental constraints, use conflicts, and cultural constraints associated with the proposed Project facilities. The purpose of this desktop assessment was to identify potential strategic locations for the OCPs and subsea cable routes.

ADP will continue to refine and verify the location of the proposed facilities through additional site assessment and field surveys, including High Resolution Geophysical (HRG), geotechnical, and benthic surveys, as well as marine archaeology assessments. The OCS blocks identified in this Application provide siting flexibility to support that refinement.

In general, the geographic focus of the Project Area included the portions of the OCS that contain the existing BOEM offshore wind commercial Lease Areas and Call Areas, designated as offshore WEAs. These WEAs include the Statoil Lease Area (Empire Wind) offshore New York, US Wind and Ørsted (Ocean Wind) Lease Areas offshore southern New Jersey, Garden State Offshore Energy (Skipjack) Lease Area offshore Delaware, and additional areas included in BOEM’s New York Bight Call for Information and Nominations (83 Fed. Reg. 15602 (Apr. 11, 2018)).

To develop initial siting for the OCPs and associated subsea cable routes, both generalized siting criteria typical of such siting efforts and location-specific evaluation factors using publicly available information were used. This section describes the general criteria. Section 5 contains more information about the resources in the Project Area and data sources.

Identifying Potential Points of Interconnection

[redacted] the NY/NJ Ocean Grid will integrate offshore wind energy at a scale commensurate with each states’ goals, and make efficient use of limited available injection capacity near each states’ coasts.

Siting Offshore Collector Platforms

The following screening criteria were used for preliminary siting of the proposed OCPs:

- Proximity to WEAs including the existing commercial offshore WEAs and areas recently identified in BOEM's New York Bight Call for Information and Nominations;
- Maximum water depths of 150 feet (46 meters);
- Avoid variable seabed and subsurface geological conditions or hazards;
- Site at least 9 nautical miles (NM) (10.3 statute miles) from adjacent shoreline areas to reduce OCP visibility; and
- Minimize potential for conflicts with navigation and fishing uses and environmental hazards and resources.

Siting Subsea Cable Routes

The following screening criteria were used for preliminary siting of the subsea cable routes:

- Minimize overall cable length, potential environmental impacts, and need for mitigation;
- Minimize disturbances to beach and shoreline areas and sensitive coastal and marine environmental resources such as benthic habitats, fisheries, and marine mammals;
- Optimize the extent to which seabed conditions along the subsea cable routes will maximize the ability to install the cables using jet plow embedment at sufficient depths below the seabed to avoid use conflicts and minimize disturbance to benthic habitats;
- Minimize potential for conflicts with navigation and fishing uses;
- Minimize the potential use conflicts associated with crossing established vessel anchorages, mooring areas, and existing subsea infrastructure such as cables, pipelines, and municipal water intakes; and
- Avoid charted shipwrecks or other marine archaeological resources.

2.2 Requested Lease Blocks

Based on the desktop siting and routing assessment outlined in Section 2.1, ADP has identified the Project as shown on Figure 1. ADP requests an unsolicited ROW/RUE Grant for a total of 131 OCS lease blocks, as listed in Table 1. OCS lease blocks for which a RUE Grant is requested are indicated in bold text. BOEM regulations establish that the ROW Grant includes a 200-foot-wide corridor within the lease blocks (30 C.F.R. § 385.301(a)(2)). Therefore, the ultimate Project facilities will make up a small percentage of the actual OCS lease blocks for which the Grant is sought. ADP recognizes that the ROW/RUE Grant it seeks is subject to conditions, including that the United States may grant other rights, including ROW/RUE grants and easements related to offshore renewable energy transmission in the same area as long as any subsequent authorization does not unreasonably interfere with or impede activities or operations under ADP's Grant (30 C.F.R. § 385.302(b)). Given the small footprint of the future Project facilities within the ROW/RUE grant OCS lease blocks, the potential for interference is not expected.

Table 1. OCS Lease Blocks Requested for ROW/RUE Grant Easements

Block Number	Protraction Number	Block Number	Protraction Number	Block Number	Protraction Number	Block Number	Protraction Number
NJ18-02	6240	**NJ18-02**	**6882**	NK18-11	6540	NK18-12	6652
NJ18-02	6289	NJ18-02	6930	NK18-11	6939	NK18-12	6653
NJ18-02	6290	NJ18-02	6931	NK18-11	6940	NK18-12	6654
NJ18-02	6338	NJ18-02	6979	NK18-11	6989	NK18-12	6661
NJ18-02	6339	NJ18-02	6980	NK18-11	6990	NK18-12	6662
NJ18-02	6340	NJ18-02	6981	NK18-11	7039	NK18-12	6702
NJ18-02	6387	NJ18-02	7029	NK18-11	7040	NK18-12	6703
NJ18-02	6388	NJ18-02	7030	NK18-11	7089	NK18-12	6704
NJ18-02	6389	NJ18-02	7078	NK18-11	7090	**NK18-12**	**6711**
NJ18-02	6437	NJ18-02	7079	NK18-11	7140	NK18-12	6712
NJ18-02	6438	NJ18-02	7128	NK18-12	6457	NK18-12	6713
NJ18-02	6487	NJ18-02	7129	NK18-12	6458	NK18-12	6714
NJ18-02	6537	NJ18-03	6001	NK18-12	6501	**NK18-12**	**6715**
NJ18-02	6538	NJ18-03	6002	NK18-12	6505	NK18-12	6752
NJ18-02	6585	NJ18-03	6003	NK18-12	6506	NK18-12	6753
NJ18-02	6586	NJ18-03	6004	NK18-12	6507	NK18-12	6754
NJ18-02	**6587**	NJ18-03	6053	NK18-12	6508	NK18-12	6764
NJ18-02	6635	NJ18-03	6054	NK18-12	6509	NK18-12	6765
NJ18-02	6636	NJ18-03	6055	NK18-12	6551	NK18-12	6802
NJ18-02	6684	NJ18-03	6104	NK18-12	6552	NK18-12	6803
NJ18-02	6685	**NJ18-03**	**6105**	NK18-12	6555	**NK18-12**	**6804**
NJ18-02	6686	NJ18-03	6152	NK18-12	6558	NK18-12	6851
NJ18-02	6733	NJ18-03	6153	NK18-12	6559	NK18-12	6852
NJ18-02	6734	NJ18-03	6154	NK18-12	6560	NK18-12	6853
NJ18-02	6735	NJ18-03	6155	NK18-12	6561	NK18-12	6854
NJ18-02	6781	NJ18-03	6201	NK18-12	6562	NK18-12	6901
NJ18-02	6782	NJ18-03	6202	NK18-12	6601	NK18-12	6902
NJ18-02	6783	NJ18-03	6203	NK18-12	6602	NK18-12	6951
NJ18-02	6784	NJ18-03	6251	NK18-12	6604	NK18-12	7051
NJ18-02	6831	NJ18-05	6028	NK18-12	6605	NK18-12	7101
NJ18-02	6832	NJ18-05	6029	NK18-12	6610	NK18-12	7102
NJ18-02	6833	**NJ18-05**	**6078**	**NK18-12**	**6611**	NK18-12	7103
NJ18-02	6881	NJ18-05	6079	NK18-12	6612		

3.0 PROJECT DESCRIPTION OF THE NY/NJ OCEAN GRID PROJECT

This section describes the NY/NJ Ocean Grid Project, including the objectives, benefits, Project phasing, facilities, and schedule. This Application seeks only a ROW/RUE Grant for the Project. ADP will provide additional detail regarding Project configuration, facilities, and operations in its GAP submission and prior to BOEM's approval of any construction activities.

3.1 Project Objectives and Benefits

Offshore wind is a nascent industry in the U.S., and now is the time to carefully plan and build the infrastructure that will support its long-term growth. The NY/NJ Ocean Grid will help New York and New Jersey meet their respective goals of developing 2,400 and 3,500 MW of offshore wind by 2030. Planned infrastructure offers advantages over radial transmission lines in terms of economies of scale, efficient use of interconnections, and reducing footprint and potential environmental impacts. As BOEM and the Department of Energy (DOE) have recognized, transmission has the potential to be a choke point that limits the successful integration of offshore wind power generation with the electric grid through the limited interconnection capacity available onshore. New York and New Jersey each have a limited number of onshore substations that can handle substantial volumes of offshore wind without triggering extensive onshore transmission upgrades. The NY/NJ Ocean Grid will connect to the onshore electric grid with a goal of maximizing the deliverability from the offshore while minimizing the need and cost for onshore upgrades. At the same time, this does not interfere with developers' leasehold interests in any way, given that the issuance of a ROW/RUE Grant does not affect lessees' ability to develop other transmission options.

By building to scale, a planned transmission system will minimize environmental impacts by reducing the environmental footprint of transmission. This will decrease impacts to barrier beaches, estuaries, marshes, and bays associated with multiple sea-to-shore landfalls for each offshore wind development.

The NY/NJ Ocean Grid will also provide options for states, regulators, and wind developers as they consider how to best connect offshore wind power to the grid. Nothing about the NY/NJ Ocean Grid will preclude offshore wind developers from building their own export cables but providing offshore wind developers the option to connect to a planned transmission system could speed development and lower the delivered costs to ratepayers.

3.2 Proposed Facilities

The proposed NY/NJ Ocean Grid Project is a planned offshore transmission system that will provide common offshore interconnection points for multiple commercial wind energy developments within the area of the New York Bight and off the New Jersey coast.

The full build-out of the Project will be capable of accommodating approximately 5,900 MW of capacity from commercial offshore wind projects connecting to the electric transmission grid in New York and New Jersey. The Project will consist of a series of OCPs located in proximity to WEAs on the OCS and subsea cables connecting the OCPs to onshore POIs to the NYISO and PJM transmission grids (see Figure 1).

The following sections provide a general description of the proposed facilities that will comprise the NY/NJ Ocean Grid.

Offshore Collector Platform

Typical OCP Platform

The Project's OCPs will be located in proximity to WEAs. Each OCP will include modular electrical technology to allow for flexibility and expansion of the system. The OCPs will function to accept a series of feeder subsea cables from one or more Electric Service Platforms (ESPs) constructed by the offshore wind developers within the WEAs. The ESPs within the WEAs will function as the collection point for the low-voltage inter-array cables originating from each of the Wind Turbine Generators (WTGs). Each OCP could be equipped with electrical transformers that would increase the AC voltage levels and/or power converters that would switch the current from AC to DC. In addition to the electric equipment and switch gear, each OCP will be equipped with protection and control systems, emergency power, and communications facilities. Each OCP will also be capable of supporting several subsea export cables that will connect the platform to the POIs located on the onshore transmission grid.

The actual size and dimensions of the OCP topside and the foundation type (i.e., jacket or monopile) will be dependent on a number of factors, including selection of either AC or DC technology, advances in technology, equipment layout, and physical oceanographic conditions at the site.

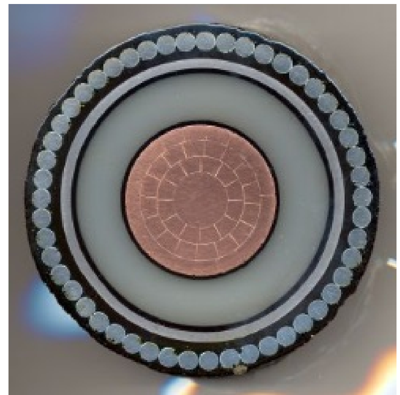
The areas requested in ADP's ROW/RUE Grant application would accommodate up to nine (9) OCPs, each with a design capacity to deliver between 800 and 1,200 MW along the subsea export cables to the onshore transmission grid.

A brief overview of the general locations of the OCPs based on the preliminary siting and desktop assessment described in Section 2 is provided below. The final siting of the OCPs will be refined based on more site-specific information gathered during additional site assessment and field surveys, including HRG, geotechnical, and benthic surveys, as well as marine archaeology assessments.

- **OCP 1:** OCP 1 is located 20.2 NM (23.3 statute miles) from the southern shoreline of Long Island, adjacent to the northern boundary between the existing Statoil NY WEA lease and the BOEM Hudson North call area. OCP 1 is located in approximately 131 feet (40 meters) of water.
- **OCP 2**: OCP 2 is located 17.5 NM (20.1 statute miles) from the southern shoreline of Long Island, on the northern boundary of the existing Statoil NY WEA lease approximately 8.3 NM (9.6 statute miles) to the west of OCP 1. OCP 2 is located in approximately 112 feet (34 meters) of water.
- **OCP 3**: OCP 3 is located 11.5 NM (13.2 statute miles) from the southern shoreline of Long Island, approximately 6.0 NM (6.9 statute miles) north of OCP 2 and the Statoil NY WEA lease, and 11.8 NM (13.6 statute miles) west of the BOEM Fairways South call area. OCP 3 is located in approximately 98 feet (30 meters) of water.
- **OCPs 4 and 5:** OCPs 4 and 5 are located 20.2 NM (23.3 statute miles) from the southern shoreline of Long Island and 13.5 NM (15.5 statute miles) from the shoreline of New Jersey, northwest of the BOEM Hudson South call area. OCPs 4 and 5 are located in approximately 98 feet (30 meters) of water.
- **OCP 6:** OCP 6 is located 21.2 NM (24.4 statute miles) from the shoreline of New Jersey, on the western boundary of the BOEM Hudson South call area. OCP 6 is located in approximately 112 feet (34 meters) of water.
- **OCP 7:** OCP 7 is located 9.4 NM (10.8 statute miles) from the shoreline of New Jersey, inshore of the US Wind Lease Area. OCP 7 is located in approximately 75 feet (23 meters) of water.
- **OCP 8:** OCP 8 is located 9.1 NM (10.5 statute miles) from the shoreline of New Jersey, inshore of the Ørsted Energy Lease Area. OCP 8 is located in approximately 62 feet (19 meters) of water.
- **OCP 9:** OCP 9 is located 11.0 NM (12.7 statute miles) from the shoreline of New Jersey, south of the Ørsted Energy Lease Area. OCP 9 is located in approximately 56 feet (17 meters) of water.

Subsea Cables

The primary component of the Project will be the subsea cables that will extend between the OCPs and to the landfalls near the onshore POIs (substations) selected in New York and New Jersey. At this stage of Project development, the technology of the subsea cables has not been finalized and may either be High Voltage Direct Current (HVDC) or High Voltage Alternating Current (HVAC). The selection of the most appropriate subsea cable technology will be based on a number of technical and economic factors, including the design capacity and construction schedules of the offshore wind farms, distance to POI, electric losses, and overall costs.



Example HVDC Subsea Cable

Examples of the types of subsea cable technologies under consideration are represented by HVDC and 3-core AC subsea cables shown in the images on the right.

Example 3-core AC Subsea Cable

Based on preliminary desktop siting and routing assessments as described in Section 2, the total length of subsea cable associated with the Project on the OCS could be up to approximately 185 NM (213 statute miles). The ultimate configuration of the system will depend on the desires of each state and on the commercial needs of the industry. The final routing of the subsea cables will be refined based on more site-specific information gathered during additional site assessment and field surveys, including HRG, geotechnical, and benthic surveys, as well as marine archaeology assessments.

Jet plow embedment is the preferred installation method for the subsea cables. Jet plow embedment simultaneously lays and buries the cable and ensures the placement of the cable at the target burial depth with minimum bottom disturbance and with the fluidized sediment settling back into the trench. The actual burial depth of the subsea cable will be determined based on seabed characteristics and discussions with the regulatory and resource agencies. The ease of installation, the lack of the need to dredge and remove sediments, and the minimal environmental impacts make jet plow embedment the preferred method of subsea cable installation.

[redacted]

The Project will include ancillary nearshore and onshore facilities that will be located outside of the OCS and therefore are not included within the areas subject to this Application. These facilities include the sea-to-shore landfall locations, land cable routes, and interconnections to the existing substations (the POIs) on the transmission grid. Depending on the subsea cable technology, an onshore converter station may also be required to transform the current from DC to AC before interconnection with the onshore electric grid.

[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]
[redacted]	[redacted]	[redacted]	[redacted]

[redacted] selection of the landfall locations and land cable routes will be refined based on more site-specific information collected during field surveys and discussions with local authorities, property owners, and stakeholders along the routes. ADP will continue to evaluate landfall locations and land cable routes that minimize interference with existing shoreline and recreational uses and avoid or, if not possible, minimize disturbances to sensitive environmental resources such as wetlands, waterbodies, protected habitats, and prime agricultural lands by utilizing previously disturbed areas. Specialized construction methods, such as Horizontal Directional Drilling (HDD) will be considered at the sea-to-shore landfall transition and at wetland crossings to avoid and minimize potential impacts.

3.3 Project Schedule

[redacted]

ADP is proposing a 12-month timeline for BOEM's review and approval of ADP's requested ROW/RUE Grant. As reflected in the proposed schedule, this provides sufficient time for BOEM to complete each step in the ROW/RUE Grant approval process, including the competitive interest determination and NEPA review and issuance of the Grant.

The schedule also will allow ADP's proposed planned transmission system to progress through the BOEM regulatory process in parallel with the review of wind energy development projects and planned transmission as an option for BOEM, the states, utilities, and developers.

The following preliminary Project schedule reflects the anticipated timeline of the initial phases of the proposed Project.

	2018				2019				2020				2021			
PROJECT PHASE	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q42	Q3	Q4	Q1	Q2	Q3	Q4
BOEM ROW/RUE Grant and Approvals																
Submission of ROW/RUE Grant Application		■														
BOEM Determination of No Competitive Interest			■													
BOEM ROW/RUE Grant EA and FONSI						■										
ROW/RUE Grant Issued						■										
[redacted]																

4.0 STAKEHOLDER OUTREACH

ADP has been actively meeting with and seeking input from key stakeholders and decision makers involved with offshore wind in New York and New Jersey since October 2017. Outreach to date has primarily focused on federal and state agencies, utilities, state and local governments, offshore wind developers with leases, community organizations, and environmental advocates. The goal of outreach has been to proactively obtain input on current Project plans and to discuss policy relating to offshore wind and specifically a planned transmission system. ADP's outreach will continue as the Project progresses, including during BOEM's review of this ROW/RUE Grant Application.

5.0 EXISTING ENVIRONMENTAL CONDITIONS IN AREA OF INTEREST

This section provides a general description of the existing environmental conditions (physical, biological, socioeconomic, and cultural) within the general Project Area and AOI. The Project Area represents the broader geographic region while the AOI represents the area within the requested lease blocks that are included in this ROW/RUE Grant Application. Information on these resources was compiled from publicly available data that was mined, reviewed, and used as part of the preliminary desktop siting and routing assessment process. This information included geospatial data available from national, regional, and state GIS portals and National Oceanographic and Atmospheric Administration (NOAA) navigation chart data. These data were compiled using GIS software to create a series of maps showing various resources (see Figures 2-11).

Resource characterizations of the general Project Area contained within other readily available sources (e.g., BOEM environmental studies) was used to supplement the information obtained during the preliminary desktop assessment.

ADP recognizes that BOEM will conduct appropriate NEPA review at both the ROW/RUE grant stage and the GAP review stage. This Application provides information on existing environmental conditions to support BOEM's environmental review of ADP's unsolicited request for a ROW/RUE Grant. Since the ROW/RUE Grant will not authorize any level of construction activity or significant disturbance, very limited environmental effects related to the ROW/RUE Grant are anticipated. As the Project is advanced, a more detailed characterization of the affected environment within the AOI will be completed. This will be facilitated by more site-specific research and comprehensive field surveys including HRG, geotechnical, benthic and surveys, as well as marine archaeology assessments. The findings from these surveys will assist in refining Project siting and to inform the engineering and design of the Project. These detailed materials will be provided to BOEM to support BOEM's environmental review of ADP's subsequent GAP proposal.

5.1 Physical Conditions

Physical Oceanography

Hydrography of the Project Area is generally sloping to the east and southeast with intermittent rises and troughs. As shown in Figure 2, charted water depths in the Project Area ranges between approximately 98 feet (30 meters) and 230 feet (70 meters) deep. Water depths at each of the OCPs vary from about 17 to 131 feet (40 meters) with an average depth of approximately 92 feet (28 meters) (Table 3). The maximum water depths are located where the AOI crosses the Hudson Canyon west of OCPs 4 and 5.

Table 3. Water Depth at Proposed OCP Locations

Offshore Collector Platform	Water Depth
OCP 1	131 ft (40 m)
OCP 2	112 ft (34 m)
OCP 3	98 ft (30 m)
OCP 4	98 ft (30 m)
OCP 5	98 ft (30 m)
OCP 6	112 ft (34 m)
OCP 7	75 ft (23 m)
OCP 8	62 ft (19 m)
OCP 9	56 ft (17 m)

Tidal characteristics of the Project Area are generally semi-diurnal (approximately twice each day). Between Nantucket, MA and Cape May, NJ, the tidal currents are generally rotary and shift direction, usually clockwise at a rate of 30 degrees per hour. Offshore, these tidal currents measure less than 0.3 knot, maintaining an approximately uniform velocity. Closer to the coast, in the vicinity of the large inland waterways, velocities can be expected to increase. Wind driven currents are considered the most impactful on navigation and may reach 1.5 knots under storm conditions (NOAA 2018).

Historic wave conditions for NOAA buoys 44091 (Barnegat, NJ) and 44025 (Long Island, NY) were reviewed through the National Data Buoy Center. For the data period of 2014 to 2017, buoy 44091 recorded its highest significant wave height, measured as the average of the highest one-third of the waves, of 27.3 feet (8.33 meters) on January 23, 2016. For the data period of 1991 to 2008, buoy 44025 recorded its highest significant wave height of 30.5 feet (9.3 meters) on December 11, 1992 (NOAA 2017a).

Geology and Sediment Type

Geology within the Project Area is characterized by gentle east and southeast slopes that ultimately end at a margin where the steeper continental slope begins. That margin, at the shelf-slope boundary, represents a low-stand shoreline that was approximately 393 feet (120 meters) lower than present. Approximately 20,000 years ago, the entirety of the Project Area would have been a subaerial environment dominated by sediment-laden braided rivers fed by the adjacent Wisconsin glacier. Following the glacial maximum, the glaciers began to recede, and various moraine complexes established the regional geomorphology of Long Island, NY, and the Cape and Islands of Massachusetts. As sea level rose with the melting glacial ice, coastal processes began to transgress and with successive depositional and erosional environments were preserved in part on the OCS. Because the OCS is a sediment starved environment, bedforms and underlying sediments may preserve the Pleistocene-Holocene regression and transgression (BOEM 2012a).

The Project Area seabed morphology consists largely of "…mid-flat formations (e.g. shelves, plateaus, flat terraces) interspersed with depressions, high-flat formations (e.g. banks, shoals, flats), and high-slope formations" (NYSERDA 2017a). Seabed sediment conditions vary due to sorting caused by waves, tidal currents, and storm events. Generally speaking, the finer sediments (fine sand and silts) are found in deeper water characterized by low-energy depositional environments. Shallower areas (e.g., high-flat formations) are characteristically coarser (e.g., sands). As shown in Figures 3A and 3B, the geologic conditions of the Project Area are characterized predominantly by mid-flat and upper flat formations, depressions, and varying amounts of sand. Lesser amounts of gravel, silt, and clay are found as well. Table 4 describes the seabed form and sediment type at each OCP location.

Table 4. Seabed Form and Sediment Type at Proposed OCP Locations

Offshore Collector Platform	USGS Seabed Form	Sediment Type
OCP 1	Mid Flat	Medium Sand
OCP 2	Mid Flat	Coarse Sand
OCP 3	Depression / Mid Flat	Medium to Coarse Sand
OCP 4	Upper Flat	Fine to Medium Sand
OCP 5	Upper Flat	Medium to Coarse Sand
OCP 6	Depression	Medium Sand
OCP 7	Depression	Coarse Sand
OCP 8	Mid Flat	Medium Sand
OCP 9	Depression / Mid Flat	Fine to Medium Sand

5.2 Biological Resources

Birds and Bats

Bird abundance in the New York Bight is concentrated along the New Jersey coast from Barnegat Bay to Delaware Bay (Kinlan et al. 2016; MDAT 2016). Bird abundance generally drops as distance from shore increases (BOEM 2012b; Kinlan et al. 2016; MDAT 2016). The Atlantic Flyway, a chief bird migration route, stretches along the eastern seaboard and includes the Project Area. Migratory land birds, including songbirds and shorebirds, may use the Project Area but are not expected to land on the water (BOEM 2016).

Species likely to occur within the Project Area are also generally found in nearshore environments from North Carolina to Massachusetts (BOEM 2016). Bird species that may be present in the Project Area include the double-crested cormorant (*Phalacrocorax auratus*), great black-backed gull (*Larus marinus*), herring gull (*Larus argentatus*), and ring-billed gull (*Larus delwarensis*) (BOEM 2012b; BOEM 2016).

Birds may occur anywhere in the Project Area but are concentrated along coastal areas from OCPs 6 to 9 in southern New Jersey. Avian abundance in the Project Area is highest along the sea-to-shore transition to the Cardiff Substation and lowest along offshore areas in New York and northern New Jersey (Figure 4).

ESA-listed Bird and Bat Species

The Endangered Species Act (ESA) establishes a program for conserving species listed by the Secretaries of the Interior and Commerce as endangered or threatened species. NOAA Fisheries is responsible for listed marine and anadromous species and the U.S. Fish and Wildlife Service (USFWS) is responsible for listed terrestrial and inland fish species. Bird species listed under the ESA that may be found in the Project Area include piping plover (*Charadrius melodus*), red knot (*Calidris canutus*), and roseate tern (*Sterna dougallii*) (Table 5). Piping plover and red knot may fly over the Project Area during migration, while the roseate tern occurs in coastal habitats and is not expected to occur in marine waters (BOEM 2012b; BOEM 2016).

Little is known about the migration patterns of bats. Some bat species are thought to fly along the coast or open ocean while migrating (Cryan and Brown 2007 and Johnson et al. 2011, as cited in BOEM 2012b). Two species of ESA-listed non-migratory bats occur in New York and New Jersey: the Indiana bat (*Myotis sodalis*) and the northern long-eared bat (*M. septentrionalis*) (Table 5). These species may occur in coastal habitats along the Project Area but are not expected to occur offshore. No bats were detected more than 10.5 NM (12.1 statute miles) from shore during The New Jersey Ecological Baseline Study (NJDEP 2010). Bats are considered unlikely to occur in the offshore but may occur in coastal environments in the Project Area.

Table 5. Threatened and Endangered Bird and Bat Species that May be Present in the Project Area

Common Name	Scientific Name	Federal Status	Occurrence
Birds			
Piping plover	*Charadrius melodus*	Threatened	Potential during migration
Red knot	*Calidris canutus*	Threatened	Potential during migration
Roseate tern	*Sterna dougallii*	Endangered	Rare
Bats			
Indiana bat	*Myotis sodalis*	Endangered	Rare
Northern long-eared bat	*Myotis septentrionalis*	Threatened	Rare

Reference: BOEM 2012b; BOEM 2016

Benthic Resources

Benthic biota in the New York Bight is characterized as soft substrata subject to episodic sediment transport events. In a recent survey of areas offshore New York, benthic habitat was characterized by fine, soft unconsolidated substrates (i.e., sand or mud) dominated by mobile and sessile epifauna, mobile fauna, and infauna (NYSERDA 2017b). Common infauna and mobile epifauna associated with soft sediments of the New York Bight include sea stars, burrowing anemones, crabs, gastropods, and bivalves. Commonly encountered taxa included sand dollars, annelids, priapulids, echiuroids, holothurians, sponges, sea urchins, bryozoans, ophiuroids, anemones, hydroids, tunicates, mollusks, and sea pansies. Sand dollar (*Echinarachnius parma*) were observed at most survey stations, ranging from sparse to complete cover. No sensitive habitats, characterized by epifauna and flora attached to a hard bottom, were observed (NYSERDA 2017b).

As shown in Figure 5, artificial reefs are abundant along the New Jersey shoreline, and less so along the New York shoreline. No known seagrass beds have been mapped offshore New York and New Jersey. OCPs and subsea cables have been sited away from known artificial reefs and inshore seagrass beds.

Finfish & Essential Fish Habitat

The Magnuson-Stevens Fishery Conservation and Management Act and the 1996 Sustainable Fisheries Act mandate that NOAA identify and protect important marine and anadromous fish habitat. This essential fish habitat (EFH) is defined as “those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity” (16 U.S.C. 1802(10)). The Magnuson-Stevens Act requires consultation with NOAA Fisheries for proposed activities that may adversely affect EFH. NOAA Fisheries designates EFH for most species in association with a grid of 10 x 10 minute squares, which covers all marine habitats along the United States coastline. NOAA Fisheries also designates EFH for estuarine waters (including estuaries, bays and rivers).

As shown in Figure 5, EFH occurs throughout the coastal and offshore portions of the Project Area, where the OCPs and the majority of the subsea cable routes are located. The number of species for which EFH has been designated within the Project Area varies by square and location, ranging from 2 species inshore to up to 15 species offshore for highly migratory species, and from 5 to 20 species per square for groundfish and shellfish depending upon location. Project Area-specific habitat conditions may indicate that EFH does not exist for some of the listed species or life stages in the Project Area. In preparation of a GAP, ADP will conduct a detailed assessment of EFH in the AOI.

ESA-listed Fish Species

Federally endangered shortnose sturgeon (*Acipenser brevirostrum*) and Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) may be found in the Project Area. Sturgeon are anadromous fish (migrating from salt water to spawn in freshwater) that use the Delaware and Hudson River estuaries while migrating to or from their preferred spawning, nursery, and overwintering areas upriver. Sturgeon can also be found in nearshore ocean waters (CWNJ 2016; Dunton et al. 2010; NOAA Fisheries 2018a). Shortnose sturgeon occur primarily in fresh and estuarine waters and occasionally enter the coastal ocean. Shortnose sturgeon are not known to make long distance offshore migrations (NOAA Fisheries 2018a). Atlantic sturgeon migrate through Raritan Bay and Delaware Bay in the spring as they move from oceanic overwintering grounds to spawning sites in the Hudson River and Delaware River, and then migrate back through the area as they move to lower reaches of the estuary and out into the ocean in the late spring and early summer. In general, Atlantic sturgeon adults may be found in the Project Area year-round (NOAA Fisheries 2018a).

The recently ESA-listed giant manta ray (*Manta birostris*) and oceanic whitetip shark (*Carcharhinus logimanus*), both listed as threatened, may also be present in the Project Area, although are expected to be uncommon (NOAA Fisheries 2018a). The giant manta inhabits nearshore to pelagic temperate to subtropical waters, with New Jersey being the northernmost portion of its range on the U.S. East coast (Marshall et al. 2011; NOAA Fisheries 2018a). The oceanic whitetip shark inhabits deeper, offshore tropical and subtropical waters (NOAA Fisheries 2018a). Alewife (*Alosa pseudoharengus*), blueback herring (*Alosa aestivalis*), and cusk (*Brosme brosme*) are proposed for listing under the ESA and may be found in the Project Area. However, cusk is generally found in deepwater marine environments (NOAA Fisheries 2018b).

Table 6. Threatened and Endangered Fish Species that May be Present in the Project Area

Common Name	Scientific Name	Federal Status	Occurrence
Atlantic sturgeon	*Acipenser oxyrinchus*	Endangered	Year-round in nearshore marine environments
Shortnose sturgeon	*Acipenser brevirostrum*	Endangered	Year-round in nearshore marine environments
Giant manta ray	*Manta birostris*	Threatened	Rare
Oceanic whitetip shark	*Carcharhinus logimanus*	Threatened	Rare
Alewife	*Alosa pseudoharengus*	Proposed	Year-round
Blueback herring	*Alosa aestivalis*	Proposed	Year-round
Cusk	*Brosme*	Proposed	Rare

Reference: NOAA Fisheries 2018a; NOAA Fisheries 2018b; NYSDEC 2018a; USFWS 2018a

Marine Mammals

Thirty-one species of marine mammals are present throughout the waters of the New York Bight, including baleen whales, sperm whales, beaked whales, a porpoise, dolphins, and seals (BOEM 2016). Marine mammal abundance is greatest along the continental shelf and the Hudson Canyon (Kinlan et al. 2016; MDAT 2016).

ESA-listed Marine Mammal Species

Six marine mammal species listed under the ESA occur in the New York Bight (Table 7) (BOEM 2016; NOAA Fisheries 2018a). Fin whales and humpback whales are the two most common ESA-listed marine mammals in the Project Area. Blue whales, sei whales, and sperm whales are considered rare in the Project Area. Blue whales are primarily found in deep water, while sei and sperm whales are primarily found near the edge of the continental shelf. North Atlantic right whales are uncommon but may be in the area year-round (BOEM 2016).

Of the six ESA-listed marine mammals, the North Atlantic right whale is the most endangered; the right whale has seen little to no recovery since it was listed as endangered in 1970 and continues to be one of the most endangered large whale species in the world (NOAA Fisheries 2004; NOAA Fisheries 2018a). Approximately 465 right whales are thought to inhabit the region (Waring et al. 2015 as cited in BOEM 2016). Right whales use coastal areas of the New York Bight for feeding and migration (BOEM 2016). Seasonal Management Areas (SMAs) for reducing ship strikes of North Atlantic right whales have been designated in the U.S. and Canada. All vessels greater than 65 ft (19.8 m) in overall length must operate at speeds of 10 knots or less within these areas during seasonal time periods.

Table 7. Threatened and Endangered Marine Mammals that May be Present in the Project Area

Common Name	Scientific Name	Federal Status	Occurrence
Fin whale	*Balaenoptera physalus*	Endangered	Common; year-round
Humpback whale	*Megaptera novaeangliae*	Threatened	Common; found within the continental shelf most of the year
Blue whale	*Balaenoptera musculus musculus*	Endangered	Rare
Sei whale	*Balaenoptera borealis*	Endangered	Rare
Sperm whale	*Physeter macrocephalus*	Endangered	Rare; cows and calves sighted within NY Bight
North Atlantic right whale	*Eubalaena glacialis*	Endangered	Uncommon; year-round

Reference: NOAA Fisheries 2018a; NOAA Fisheries 2018b; BOEM 2016

Non-ESA Listed Marine Mammal Species

The Marine Mammal Protection Act (MMPA), enacted in 1972, protects marine mammals by prohibiting the take of marine mammals in U.S. waters. The act also prohibits U.S. citizens from taking marine mammals in the high seas and prohibits the importation of marine mammals into the U.S. (USFWS 2018b).

Twenty-five species protected under the MMPA occur in the New York Bight, including twelve species of whales, nine species of dolphins and porpoises, and four species of pinnipeds (Table 8). At least four of the MMPA-protected species of whales, including common minke whale (*Balaenoptera acutorostrata*), long- (*Globicephala melas*) and short-finned (*G. macrorhynchus*) pilot whales, and pygmy sperm whales (*Kogia breviceps*), occur year-round. Other whale species are rare in the area or are more common in spring and summer. Several species of dolphins occur year-round, such as the bottlenose dolphin (*Tursiops truncates*) and striped dolphin (*Stenella coeruleoalba*). All four species of pinnipeds (i.e., seals) found in the New York Bight occur year-round (BOEM 2016).

Table 8. MMPA-protected Marine Mammals that May be Present in the Project Area

Common Name	Scientific Name	Occurrence
Whales		
Common minke whale	*Balaenoptera acutorostrata*	Year-round
Dwarf sperm whale	*Kogia sima*	Primarily in deep continental shelf waters
False killer whale	*Pseudorca crassidens*	Rare
Killer whale	*Orcinus orca*	Uncommon or rare
Long-finned pilot whale	*Globicephala melas*	Year-round
Pygmy sperm whale	*Kogia breviceps*	Year-round
Short-finned pilot whale	*Globicephala macrorhynchus*	Year-round
Blainville's beaked whale	*Mesoplodon densirostris*	More common spring/summer
Cuvier's beaked whale	*Ziphius cavirostris*	More common spring/summer
Gervais' beaked whale	*Mesoplodon europaeus*	More common spring/summer
Sowerby's beaked whale	*Mesoplodon bidens*	More common spring/summer
True's beaked whale	*Mesoplodon mirus*	More common spring/summer
Dolphins and Porpoises		
Atlantic spotted dolphin	*Stenella frontalis*	Rare beyond shelf break
Atlantic white-sided dolphin	*Lagenorhynchus acutus*	Year-round; peak in fall
Bottlenose dolphin	*Tursiops truncates*	Year-round
Pan-tropical spotted dolphin	*Stenella attenuata*	Rare beyond shelf break
Risso's dolphin	*Grampus griseus*	Year-round; primarily on shelf
Short-beaked common dolphin	*Delphinus delphis*	Year-round; peaks in winter and spring
Striped dolphin	*Stenella coeruleoalba*	Year-round
White-beaked dolphin	*Lagenorhynchus albirostris*	Rare
Harbor porpoise	*Phocoena phocoena*	Year-round; peaks in spring and winter
Pinnipeds		
Gray seal	*Halichoerus grypus*	Year-round on Long Island
Harbor seal	*Phoca vitulina*	Year-round on Long Island
Harp seal	*Pagophilus groenlandicus*	Year-round on Long Island
Hooded seal	*Cystophora cristata*	Rare; year-round

Reference: BOEM 2016

As shown in Figure 6, marine mammal abundance is low throughout the Project Area. Marine mammal abundance is thought to be the highest near OCPs 4 and 5 located in close proximity to the Hudson Canyon. OCPs 4 and 5 are also located within a SMA for right whales at the mouth of New York Harbor. OCP 9 is located in near a SMA for right whales at the mouth of Delaware Bay. However, these SMAs are an indication of areas of high vessel traffic rather than areas of high right whale abundance.

Sea Turtles

Five federally-listed endangered or threatened sea turtle species have the potential to occur within the Project Area as transient species (Table 9) (BOEM 2016; NOAA Fisheries 2018a). The loggerhead turtle (*Caretta caretta*), green turtle (*Chelonia mydas*), kemp's ridley turtle (*Lepidochelys kempii*), and leatherback turtle (*Dermochelys coriacea*) are generally found in the coastal and offshore sections of the Project Area from spring to fall (BOEM 2016; NOAA Fisheries 2018a; NYSDEC 2018b). The hawksbill sea turtle (*Eretmochelys imbricata*) prefers warm, tropical and subtropical water and is unlikely to be found in the Project Area (BOEM 2016).

Table 9. Threatened and Endangered Sea Turtles that May be Present in the Project Area

Common Name	Scientific Name	Federal Status	Occurrence
Loggerhead turtle	*Caretta caretta*	Threatened	Offshore May to October
Green turtle	*Chelonia mydas*	Threatened	Common eastern side of Long Island form July to November
Kemp's ridley turtle	*Lepidochelys kempii*	Endangered	June to October
Leatherback turtle	*Dermochelys coriacea*	Endangered	Coastal waters May to November
Hawksbill sea turtle	*Eretmochelys imbricata*	Endangered	Inhabits warm, tropical and subtropical water; unlikely to occur in NY Bight

Reference: BOEM 2016; NOAA Fisheries 2018a

5.3 Socioeconomic Resources

Commercial Fisheries and Recreational Fishing

The diverse finfish assemblages, squid, and shellfish present in the Project Area support both commercial and recreational fishing.

There are a number of fishery management plans administered by the Mid-Atlantic Fishery Management Council, which are in place for regulating and managing fisheries in the region. These include plans for summer flounder (*Paralichthys dentatus*), scup (*Stenotomus chrysops*), black sea bass (*Centropristis striata*), spiny dogfish (*Squalus acanthiasz*), Atlantic mackerel (*Scomber scombrus*), longfin squid (*Doryteuthis pealeii*), *Illex* squid (*Illex illecebrosus*), butterfish (*Peprilus triacanthus*), bluefish (*Pomatomus saltatrix*), Atlantic surf clam (*Spisula solidissima*), ocean quahog (*Arctica islandica*), golden tilefish (*Lopholatilus chamaelonticeps*), and blue tilefish (*Caulolatilus microps*).

From 2011 to 2016, commercial fisherman in New York and New Jersey earned a total of $1.37 billion of landings revenue, equating to approximately 1.08 billion pounds of fish. Approximately $320 million of this landings revenue came from New York fishermen and approximately $1.05 billion came from New Jersey fishermen (NOAA Fisheries 2017). The top commercial fisheries by dollar value in New York and New Jersey in 2016 are listed in Table 10.

Table 10. Top Commercial Fisheries by Dollar Value in 2016

Fishery	Scientific Name	Dollar Value	Metric Tons
New York			
Northern quahog	*Mercenaria mercenaria*	$11,951,812	985.7
Longfin squid	*Doryteuthis pealeii*	$7,812,296	2,852.5
Sea scallop	*Placopecten magellanicus*	$3,783,366	180.4
Golden tilefish	*Lopholatilus chamaelonticeps*	$2,972,175	336.3
Scup	*Stenotomus chrysops*	$2,896,708	1,589.5
New Jersey			
Sea scallop	Placopecten magellanicus	$123,369,150	4,758.8
Clams/bivalves	—	$16,275,260	8,222.5
Atlantic surf clam	*Spisula solidissima*	$9,969,824	7,480.9
Menhaden	*Brevoortia tyrannus*	$8,607,099	23,957.5
Longfin squid	*Doryteuthis pealeii*	$5,720,422	2,107.8

Reference: NOAA Fisheries 2017

Atlantic sea scallops are the most valuable fishery in New Jersey and one of the most valuable fisheries in New York based on landings value (Table 10). Areas of high sea scallop abundance in the Project Area are shown in Figure 7. None of the OCPs or subsea cable routes are located in these areas. Areas of abundance for other fisheries have not been evaluated, but commercial and recreational fishing are known to occur throughout the Project Area.

Along the southern shores of Long Island, NY, Montauk and Hampton Bays/Shinnecock are the major commercial fishing ports based on revenue (NOAA Fisheries 2018c). Commercial and recreational fishing along the southern shores of Long Island, NY also originate from Freeport, Oceanside, and Point Lookout (Nassau County) and Captree Island, Greenport, and Mattituck (Suffolk County).

Along the New Jersey shore, Cape May and Point Pleasant are the major commercial fishing ports based on revenue (NOAA Fisheries 2018c). Commercial and recreational fishing off New Jersey also originates from Belford/Middletown, Belmar, Brielle, and Highlands (Monmouth County); Barnegat Light/Long Beach Point, Pleasant Beach, Toms River and Waretown (Ocean County); Atlantic City (Atlantic County); and Avalon, Cape May Court House, Sea Isle City, and Wildwood (Cape May County).

Fishing vessel routes, as defined by data from vessels with automatic identification system (AIS) transponders, are shown in Figure 7. In the Project Area, the highest fishing vessel densities occur along the vessel routes in and out of port areas in the vicinity of OCPs 1, 6, 8, and 9 and along the subsea cable routes through New York Harbor. Patterns and densities of actual fishing activity are not readily observed in these data.

Additional data for recreational boaters includes routes for vessels engaged in activities that include fishing, relaxing, scenic enjoyment, swimming, and wildlife viewing (UCIMU et al. 2014). Of these activities, fishing is assumed to be the most common recreational activity. These data do not provide volumes of vessel activity, but are illustrated in Figure 7.

Navigation and Vessel Traffic

The following sections describe vessel and navigation routing systems located in the vicinity of the Project Area.

Shipping Lanes

Traffic Separation Schemes (TSS) are designated to help manage collision risk for commercial vessel traffic entering and existing major ports by creating traffic lanes and separation zones. Many if not all of the TSSs in the United States, including those serving U.S. ports along the Atlantic, were established under guidelines by the International Maritime Organization (IMO) set forth in the 1974 Safety Of Life At Sea (SOLAS) Convention. The guidelines and criteria developed by the IMO allows foreign-flagged vessels to operate in routing systems that are familiar regardless of the Port. Changes to the any routing system, including a TSS is possible; however, this would require the U.S. Coast Guard (USCG) to submit a proposal for a change to IMO.

Four TSS's are located in the vicinity of the Project Area: the Ambrose-Nantucket, the Hudson Canyon-Ambrose, the Barnegat-Ambrose, and the Five Fathom Bank to Cape Henlopen. Together, the Ambrose-Nantucket, Hudson Canyon-Ambrose, and Barnegat-Ambrose TSSs serve the Ports of New York and Jersey. The Five Fathom Bank to Cape Henlopen TSS serves the ports along the Delaware River. Each TSS has three key features: an inbound traffic lane, an outbound traffic lane, and a separation zone between them.

The USCG has developed Marine Policy Guidelines based on the Atlantic Coast Port Access Route Study (ACPARS). These guidelines recommend setbacks of 2 NM (2.3 statute miles) from the seaward boundary (outer edge) of a TSS and 5 NM (5.8 statute miles) from the entry/exit (terminations) of a TSS to reduce risk to maritime uses (USCG 2016). However, project risk is ultimately determined on a case by case basis and after review of a Navigation Safety Risk Assessment.

As shown in Figure 8, all of the OCPs are located outside of the traffic lanes within the TSSs. OCP 1 and 2 are located within the 2 NM (2.3 statute miles) outer boundary of a traffic lane, between the existing Statoil NY WEA lease and Ambrose to Nantucket traffic lane. OCP 3 is located within the separation zone of the Nantucket to Ambrose/Ambrose to Nantucket TSS, approximately 1 NM (1.2 statute miles) from the edge of the traffic lane. USCG has not specifically established setbacks within the separation zones of the TSS. OCP 6 is located within the 2 NM (2.3 statute miles) outer boundary of the Barnegat to Ambrose TSS. The subsea cable routes for OCPs 1 through 6 pass through at least one TSS. OCPs 4, 5, 7, 8, and 9 are located outside the TSSs and the USCG recommended 2 NM (2.3 statute miles) setback.

Safety Fairways

Safety fairways are regulated by the USCG to allow unobstructed approaches for vessels using U.S. ports. Two safety fairways exist in the vicinity of the Project Area to serve the Ambrose-Nantucket TSS. Each fairway serves as an extension of the inbound/outbound lanes of the TSS. Regulations under 33 CFR 166 outline that no structure, whether temporary or permanent, may be placed in a safety fairway. Temporary underwater obstacles may be permitted under certain conditions described for specific areas in 33 CFR 166, Subpart B.

OCP 1 is adjacent to a safety fairway; however, no OCP or subsea cable route is proposed to be located in a safety fairway (Figure 8).

Precautionary Areas

Traffic using the TSSs serving the Ports of New Jersey and New York enter and exit in an inshore area identified as the Precautionary Area. Mariners are urged to use extreme caution while transiting these areas because several traffic lanes intersect. Subsea cable routes passing through New York Harbor pass through the Precautionary Area (Figure 8).

Vessel Traffic

Vessel traffic is understood to exist along most of the Atlantic OCS with higher densities of use closest to the shore and within TSSs. While vessel traffic patterns are guided by use of routing systems, which include TSSs, safety fairways, two-way traffic lanes, recommended tracks, areas to be avoided, inshore traffic zones, precautionary areas, and deep-water routes, the master of each vessel may navigate freely upon the waters in the vicinity of the Project Area while operating between their ports of call. The presence of uncharted coastwise traffic routes, outside the USCG or IMO routing systems, are evident in annual summaries of vessel AIS data. These uncharted coastwise routes are commonly used by passenger vessels, fishing vessels, and tug and barge vessels and frequently connect ports along a straight-line. Along the New Jersey coast, a coastwise route utilized by the tug and barge fleet can be seen in the AIS data approximately 6 NM (6.9 statute miles) from shore (Figure 8).

The OCPs have been sited seaward of the existing uncharted coastwise shipping routes as reviewed in the AIS data to minimize potential conflicts. However, the subsea cable routes cross these routes (Figure 8).

Other Uses

Offshore Energy and Marine Infrastructure

The Project Area includes a number of designated offshore WEAs, including the Statoil Lease Area (Empire Wind) offshore New York, US Wind and Ørsted (Ocean Wind) Lease Areas offshore southern New Jersey, Garden State Offshore Energy (Skipjack) Lease Area offshore Delaware, and additional areas included in BOEM's New York Bight Call for Information and Nominations (83 Fed. Reg. 15602 (Apr. 11, 2018)). The proposed OCPs and subsea cable routes are located proximate to but outside of the WEAs.

In the general vicinity of the Project Area, undersea cables are the most abundant offshore infrastructure feature currently developed in the Atlantic OCS (Figure 9). While many of these cables are charted by NOAA as being inactive (e.g., disused), some active telecommunication cables exist in the vicinity of the Project Area. In addition, buoys maintained by NOAA, USCG, and academic institutions are located throughout the Atlantic OCS in the general vicinity of the Project Area. Along the coast in New Jersey and New York state waters, pipelines convey wastewater, natural gas, and petroleum products. OCPs have been sited away from existing infrastructure, and cable crossings of existing infrastructure were minimized in routing.

Marine Minerals

From 2000 to 2016, New York used 35 million cubic yards of dredged sand for 15 beach nourishment projects, while from 2000 to 2015, New Jersey used approximately 59 million cubic yards (NYSERDA 2017a). A comprehensive data and literature review carried out for the New York State Energy and Research Development Authority (NYSERDA) Offshore Wind Master Plan identified 120 active, formerly active, or potential future mining borrow areas off the coast of New York (46 sites) and New Jersey (78 sites). While not currently permitted for use or lease by either the states or BOEM, the potential future mining borrow areas are located where the resource may become economically viable.

As shown in Figure 9, the existing state and federally permitted marine mineral sites mapped in coordination with the U.S. Army Corps of Engineers/New Jersey Department of Environmental Protection and BOEM are located near the coast. The cables for OCP 6 are located adjacent to active and proposed BOEM mineral lease areas.

Marine Restricted Areas

Danger areas charted by NOAA are interspersed throughout the Atlantic OCS in the general vicinity of the Project Area. These areas are associated with historic wartime use and disposal of mines, depth charges and munitions, and carry charted warnings to avoid fishing, dragging, and laying cables. Danger areas may also be used for target practices or other hazardous operations and are therefore closed to the public on either a full-time or intermittent basis. The subsea cable route from OCP 4 to the Farragut and Gowanus Substations in New York Harbor pass through a danger area (Figure 10).

Portions of the Atlantic OCS have been impacted by the uncontrolled ocean disposal of municipal sewage sludge, industrial acids and wastes, unexploded ordnance (UXO), and explosives. OCPs and subsea cables routes have been sited to avoid the charted disposal areas and UXO (Figure 10).

Military Use Areas

The Department of Defense (DOD) has identified areas in the Atlantic OCS that may be used for military activities. The Project Area is located in the vicinity of the following DOD Operating Areas: the Virginia Capes Complex, the Atlantic City Complex, and the Narragansett Complex. Combined, these areas constitute three of the four locations available in the region for U.S. Navy training and testing events. Each of the range complexes consists of surface sea space and subsurface space. In addition, each complex also consists of special use airspace.

5.4 Cultural Resources

Marine archeological resources include pre-contact archeological sites and historic archeological sites (e.g., shipwrecks). The OCPs and subsea cable routes are located in regions of the OCS that may have been above sea level and available to humans during the last ice age. (Garrison et al. 2011, as cited in BOEM 2012b). Therefore, the Project Area may contain pre-contact archaeological sites from the last ice age.

The Project Area has a long history of intensive maritime activity with numerous wrecks and obstructions reported in NOAA’s Office of Coast Survey's Automated Wreck and Obstruction Information System database and charted within or in close proximity to the subsea cable routes (NOAA 2017b). Shipwrecks and other obstructions are concentrated along the New York and New Jersey coasts and within New York Harbor. The proposed locations for OCPs and subsea cable routes were sited to avoid known shipwrecks and other obstructions. Subsea cables routed through New York Harbor will require more refined siting to avoid a greater concentration of wrecks and other obstructions (Figure 11).

The presence/absence of pre-contact marine archaeological sites, which can be considered culturally important, was not investigated for this initial study.

5.5 Aesthetics

The distance at which a remote structure is visible is determined primarily by the height of the object, the elevation of the viewer, atmospheric conditions, and the curvature of the Earth. An object closer than the horizon is entirely visible to the observer, while objects beyond the horizon are partially or completely obscured by the surface of the planet. In preparation of a GAP, ADP will further assess and provide information to BOEM regarding potential visual impacts and relevant mitigation, if any. The requested ROW/RUE grant area was selected taking aesthetics into consideration.

The proposed OCP are primarily located near WEAs to minimize visual impacts. OCPs 3, 4, 5, 7, 8, and 9 are located within 15 NM (17 statute miles) of the nearest shoreline and may be visible from the shore, depending on design considerations. OCPs 1, 2, and 6 are located further than 15 NM (17 statute miles) from the nearest shoreline and are not expected to be visible from shore. OCP visibility and appearance will be influenced by final design (e.g., monopile vs. jacket foundation). All subsea cables will be buried and are not expected to have any visible effects.

5.5 Environmental Justice

Executive Order 12,898 instructs federal agencies to consider environmental justice issues in all agency decisions. It directs each federal agency to identify and address disproportionately high and adverse human health or environmental effects of the agency programs or actions on minority and low-income populations.

The following table presents data from the United States Census Bureau on the demographic composition of minority and low-income persons living within coastal communities adjacent to the Project Area. The following information was collected at the county level including percentage of minority population and low-income population by county.

Table 11. Percent of Minority Persons and Persons below Poverty for New York and New Jersey Coastal Counties adjacent to the Project Area

County, State	Minority Percentage of County (2016) [1,2]	Persons Below Poverty in County (2016) [3,4]
Queens, NY	74.4%	13.3%
Nassau, NY	39.2%	6.1%
Suffolk, NY	31.8%	7.6%
Monmouth, NJ	24.8%	7.1%
Ocean, NJ	15.3%	11.0%
Atlantic, NJ	42.7%	14.2%
Cape May, NJ	14.7%	11.9%

1 U.S. Census Bureau. 2016. QuickFacts: Race. https://www.census.gov/quickfacts/fact/map/US/RHI825216#viewtop

2 Percentage of Minority Persons in New Jersey was 44.2% and in New York was 44.2% based the 2010 U.S. Census

3 U.S. Census Bureau. 2016. Small Area Income and Poverty Estimates. https://www.census.gov/data-tools/demo/saipe/saipe.html?s_appName=saipe&map_yearSelector=2016&map_geoSelector=aa_c

4 Percentage of Poverty Rates (all ages) in New Jersey was 10.4% and in New York was 14.8% based the 2016 U.S. Census.

5.6 Summary of Existing Environmental Conditions

Based on the preliminary desktop siting and routing assessment and supplemental research, the potential environmental constraints and use conflicts within the AOI is minor. Adhering to the siting and routing criteria for the OCPs and subsea cables, most of the existing environmental, socioeconomic, and cultural resources of significance have been avoided. As previously indicated, ADP will continue to refine and verify the location of the proposed facilities through additional site assessment and field surveys, including HRG, geotechnical, and benthic surveys as well as marine archaeology assessments.

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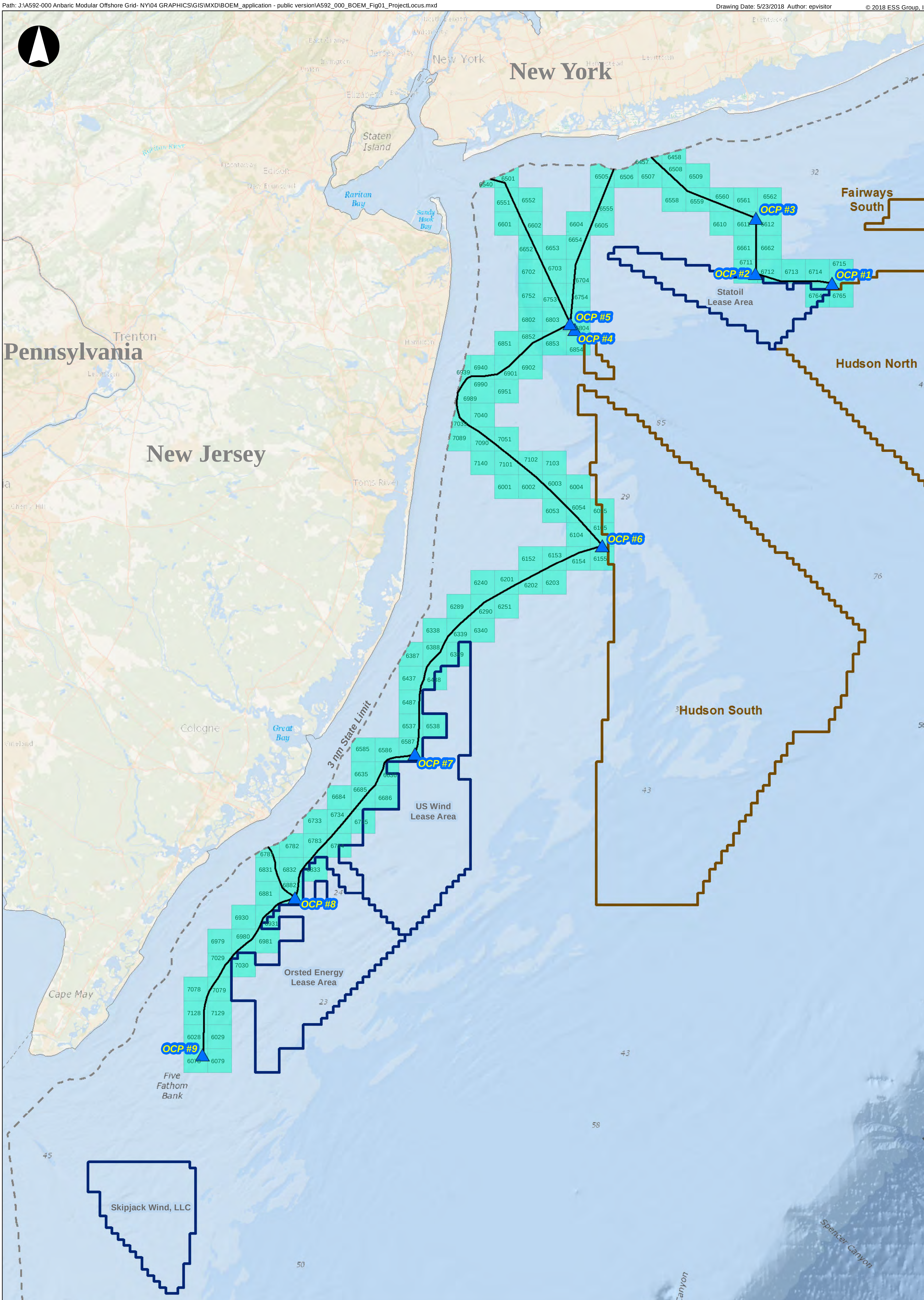

Anbaric Development Partners

New York and New Jersey

Source: 1) ESRI, World Ocean Base, 2018
2) BOEM, Lease Areas and Call Areas, 2018

0 5 10 Miles

Proposed Offshore Collector Platform

Proposed Cable Route (Federal Jurisdiction)

BOEM Lease Area

BOEM Call Area

Requested OCS Lease Blocks

Project Location and Requested OCS Lease Blocks (Redacted version)

Figure 1

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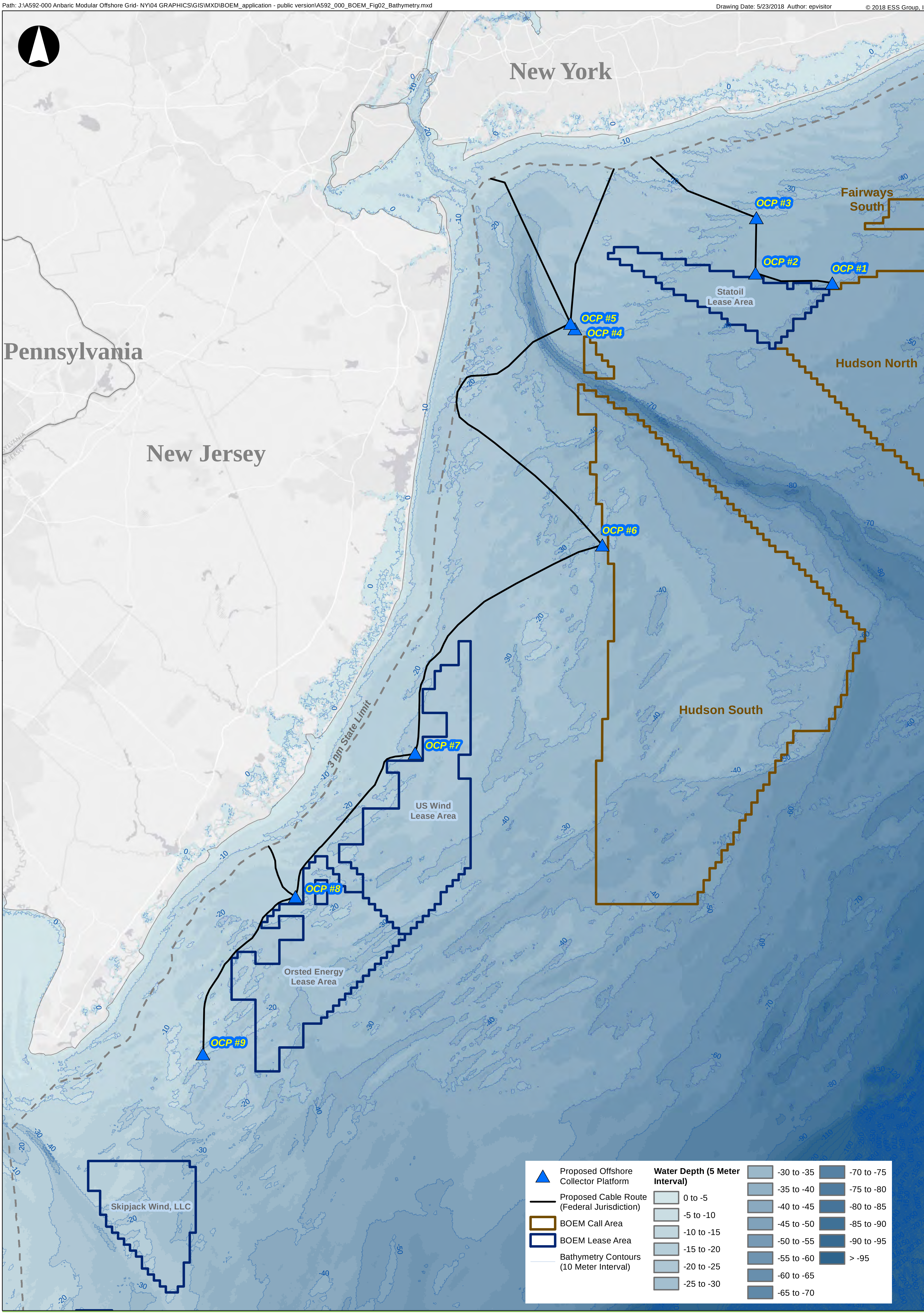

Anbaric Development Partners

New York and New Jersey

Source: 1) ESRI, World Gray Base, 2018
2) BOEM, Lease Areas and Call Areas 2018
3) The Nature Conservancy, Bathymetry, 2010

0 5 10 Miles

Bathymetry (Redacted version)

Figure 2

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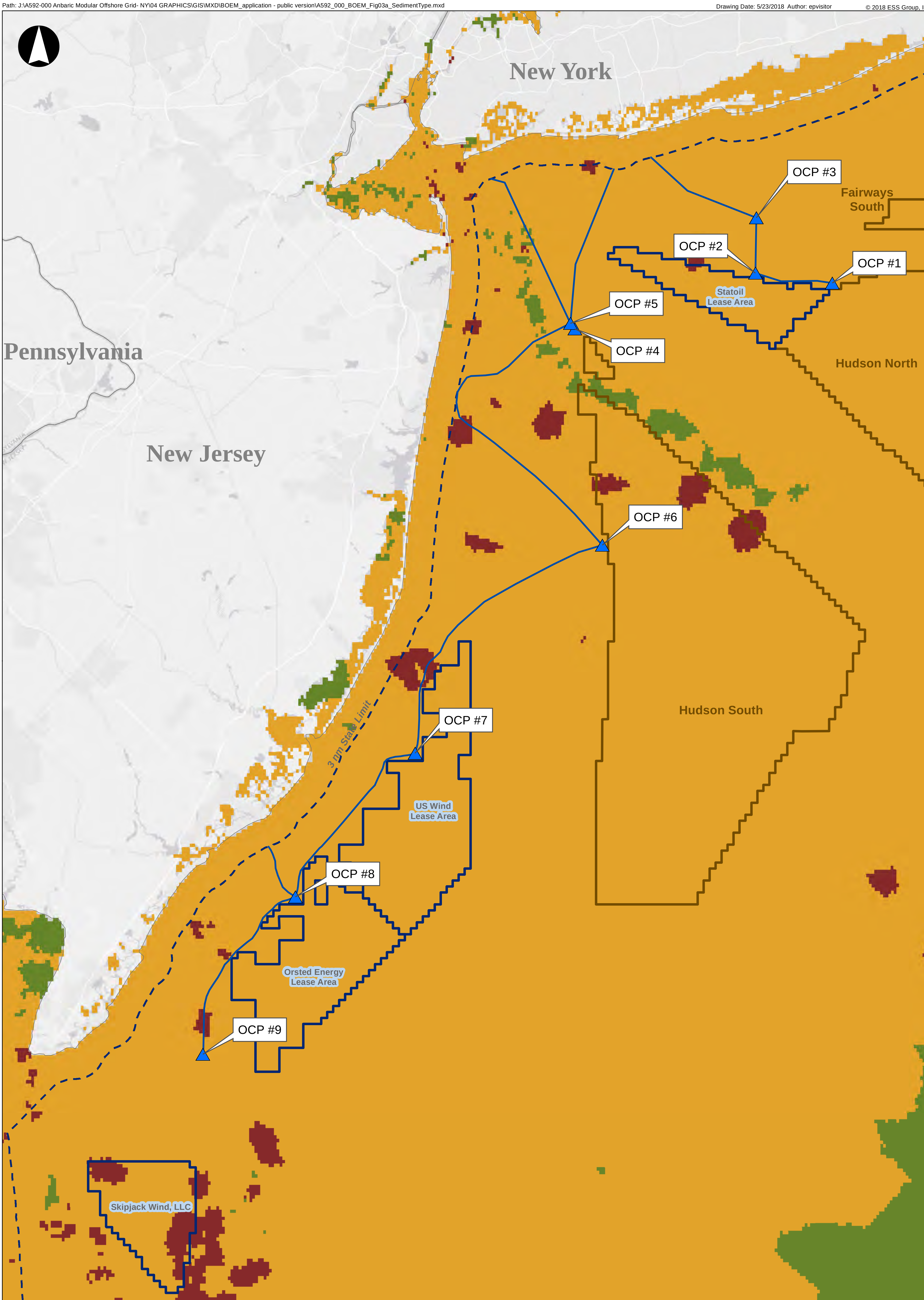

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Anbaric Development Partners

New York and New Jersey

Source: 1) ESRI, World Gray Base, 2018
2) BOEM, Lease Areas and Call Areas, 2018
3) The Nature Conservancy, Sediments Grain Size, 2015

0 5 10 Miles

Proposed Offshore Collector Platform

Proposed Cable Route (Federal Jurisdiction)

BOEM Call Area

BOEM Lease Area

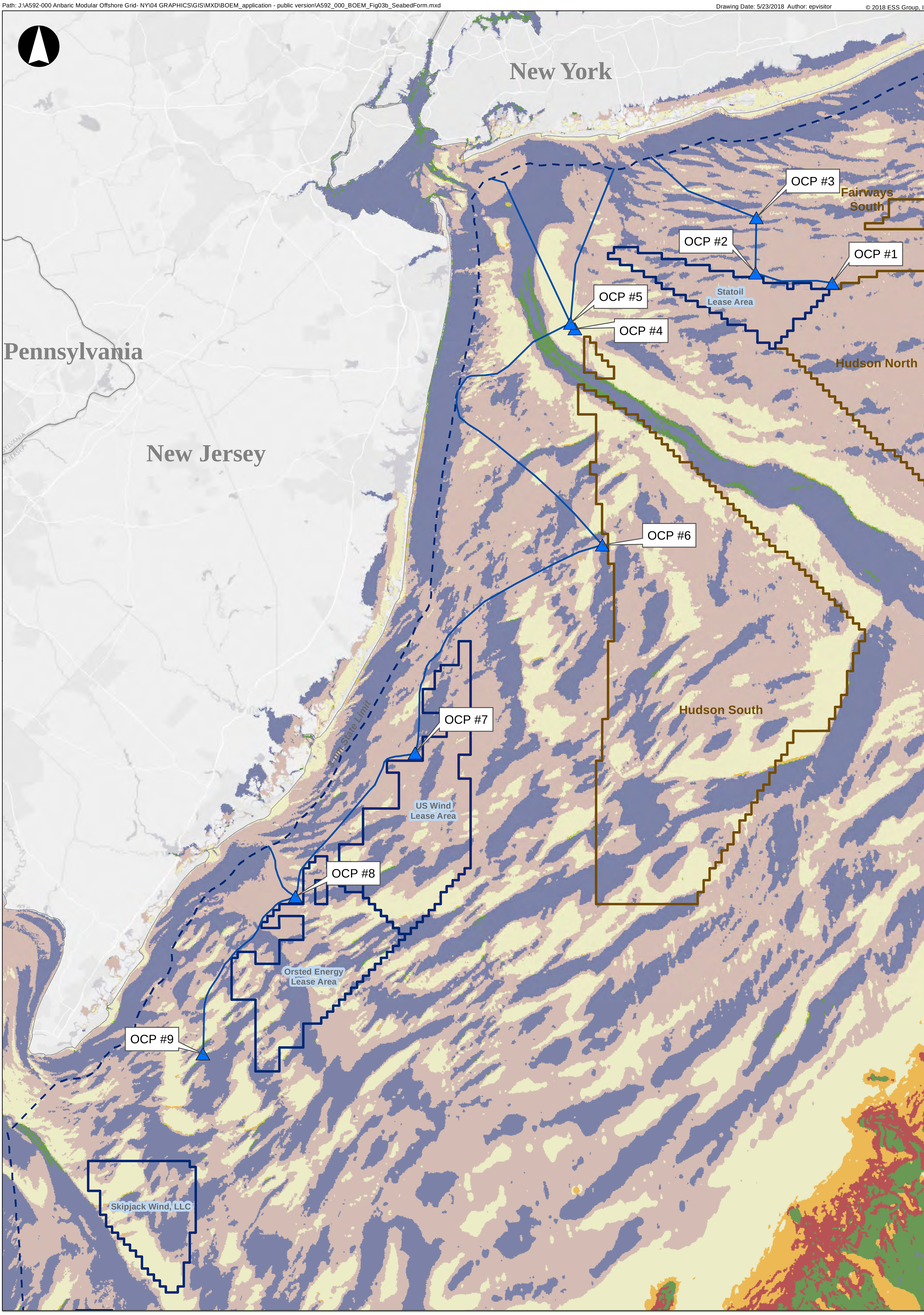
Silt

Sand

Gravel

Sediment Type
(Redacted version)

Figure 3A



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New York and New Jersey

Source: 1) ESRI, World Gray Base, 2018
2) BOEM, Lease Areas and Call Areas, 2018
3) The Nature Conservancy, Seabed Forms, 2015

0 5 10 Miles

Proposed Offshore Collector Platform

Proposed Cable Route (Federal Jurisdiction)

BOEM Lease Area

BOEM Call Area

Seabed Forms

Depression

Mid Flat

Upper Flat

Low Slope

Scarp

Side Slope

Upper Slope

Seabed Form
(Redacted version)

Figure 3B

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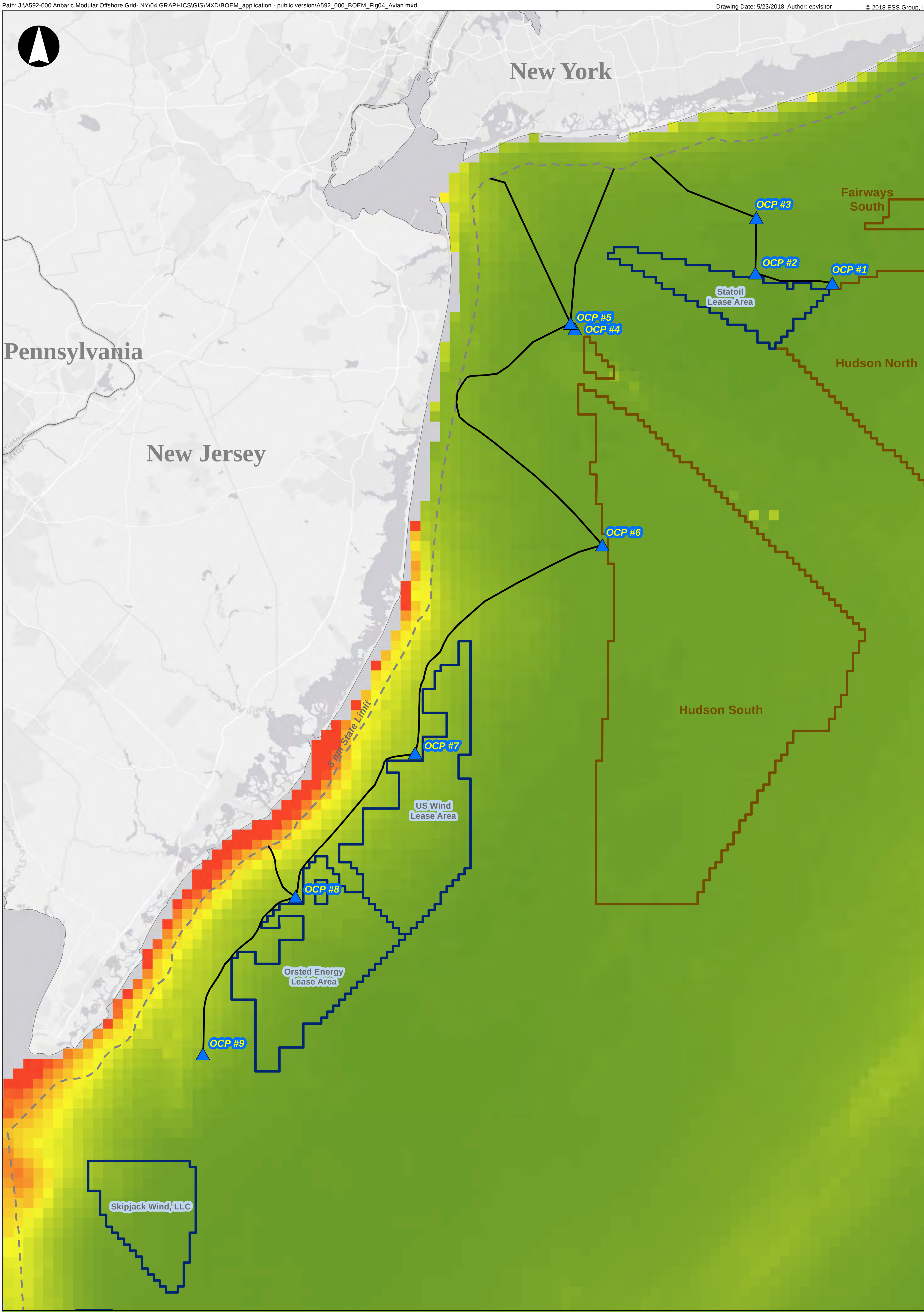

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0 5 10 Miles

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New York and New Jersey

Source: 1) ESRI, World Gray Base, 2018
2) BOEM, Lease Areas and Call Areas, 2018
3) Duke Univ., Avian Abundance, 2016

Proposed Offshore Collector Platform
Proposed Cable Route (Federal Jurisdiction)
BOEM Lease Area
BOEM Call Area

Avian Abundance (All Species)
High : 2620.35
Low : 0

Avian
(Redacted version)

Figure 4

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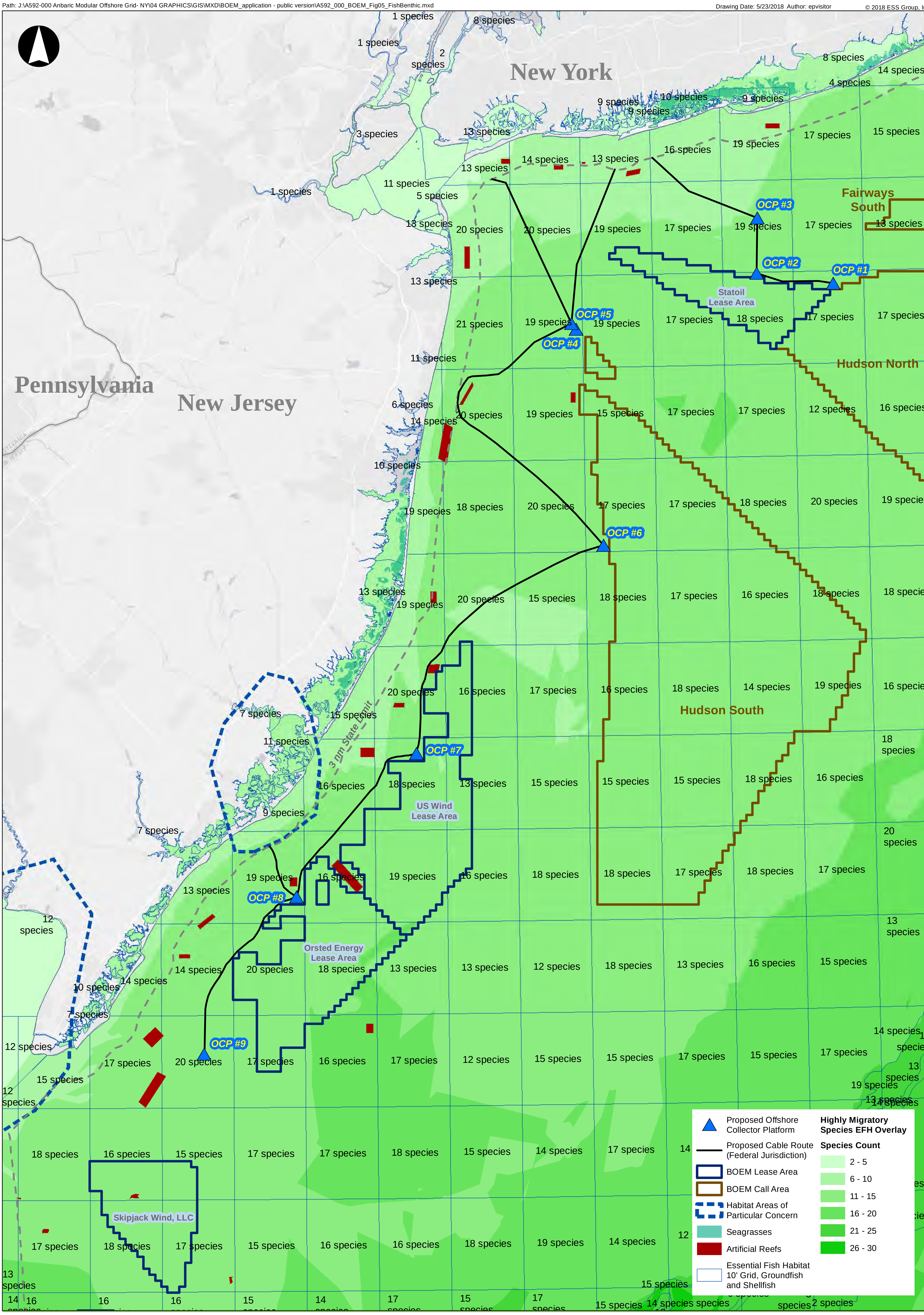

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New York and New Jersey

Source: 1) ESRI, World Gray Base, 2018
2) BOEM, Lease Areas and Call Areas, 2018
3) NOAA, Habitat Areas of Particular Concern, EFH, Seagrasses (2015), Artificial Reefs (2017)
4) NMFS, Highly Migratory Species, 2015
5) Rutgers, Submerged Aqu. Veg., 2009

Fish & Benthic Habitat
(Redacted version)

Figure 5

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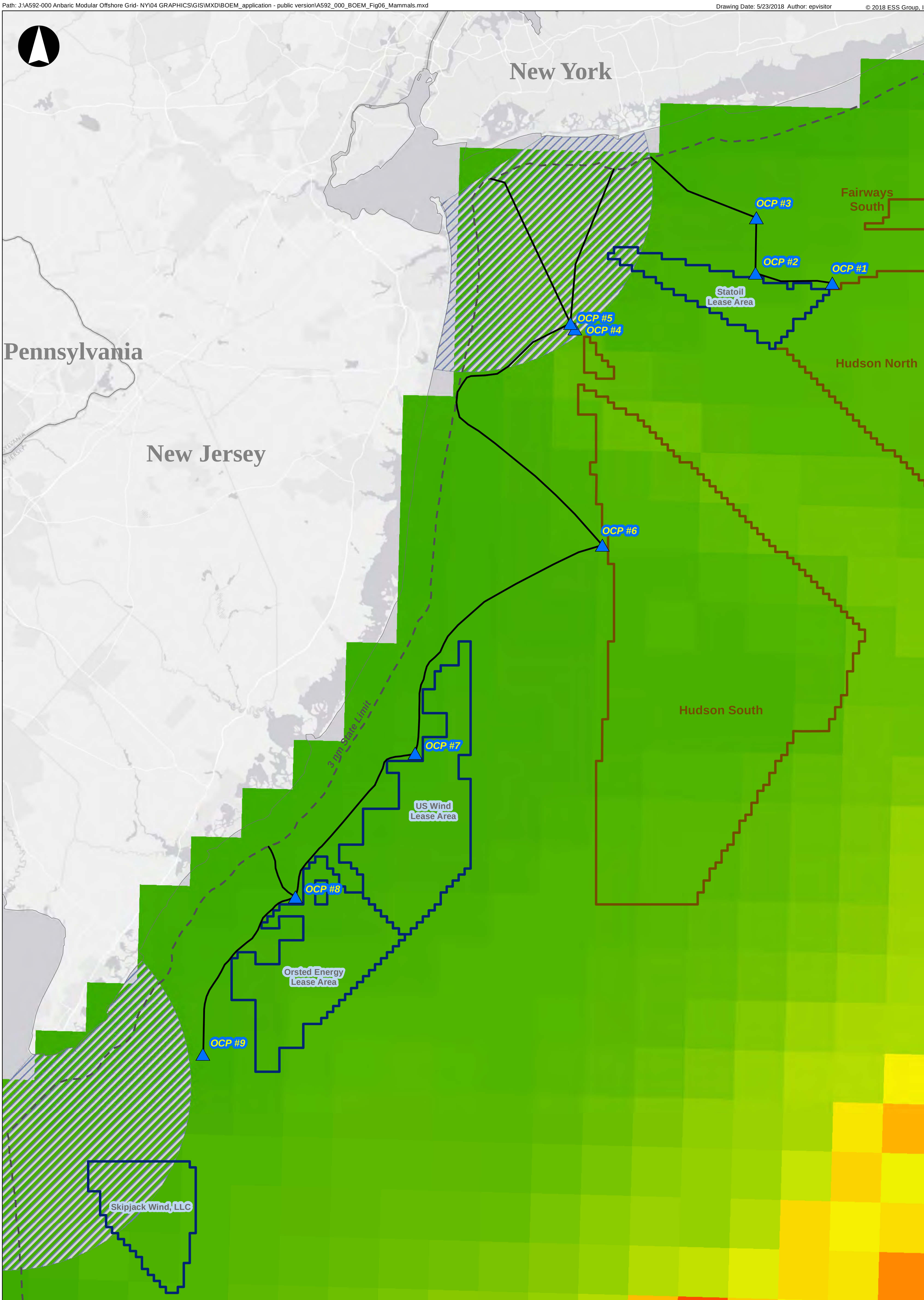


Anbaric Development Partners

New York and New Jersey

Source: 1) ESRI, World Gray Base, 2018
2) BOEM, Lease Areas and Call Areas, 2018
3) NOAA, Coastal Critical Habitat (2017), Right Whale Critical Habitat (2016), Right Whale SMA (2013)
4) Duke Univ., Mammal Abundance, 2016

0 5 10 Miles

Proposed Offshore Collector Platform

Proposed Cable Route (Federal Jurisdiction)

BOEM Lease Area

BOEM Call Area

Right Whale Seasonal Management Area

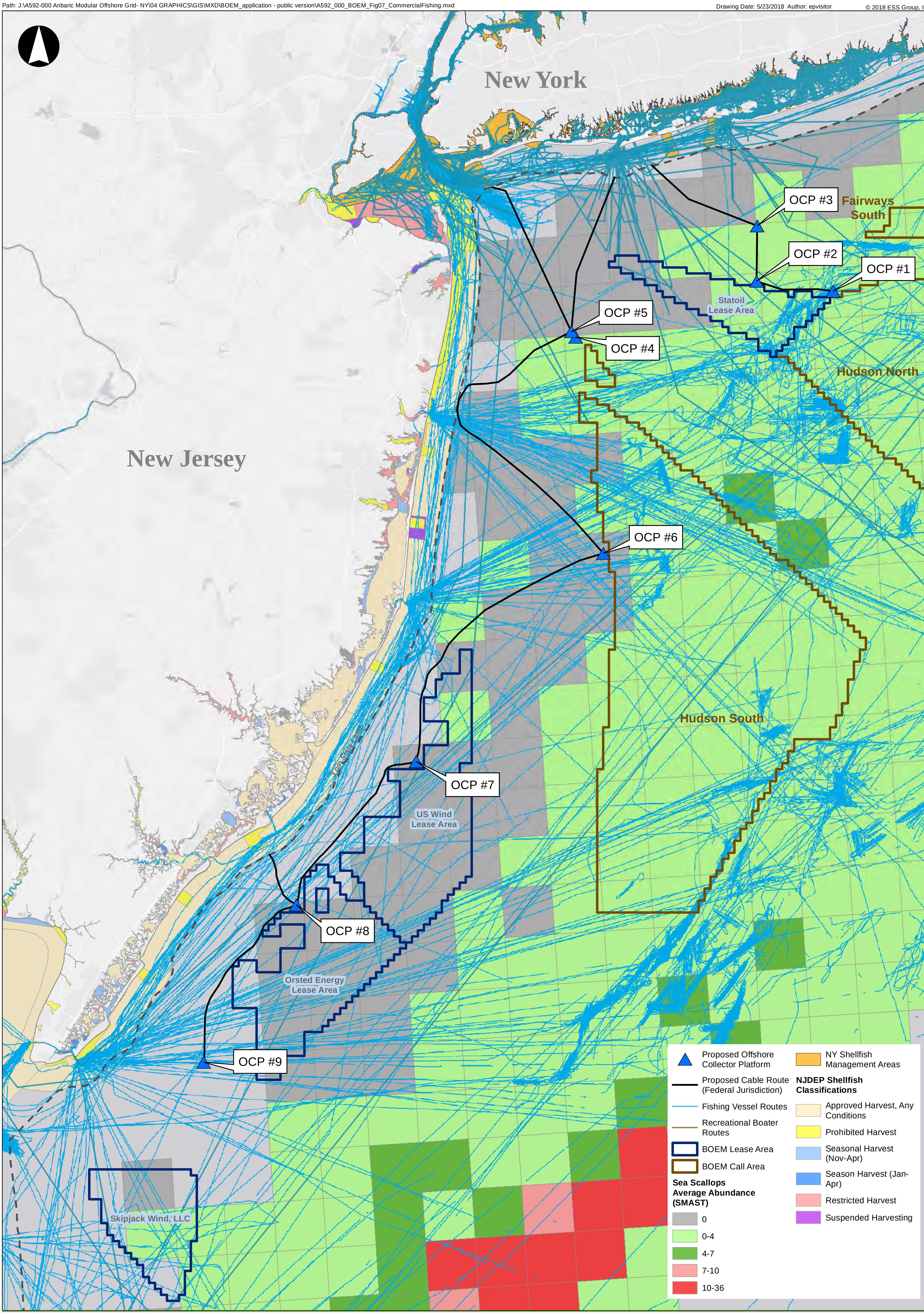
Mammal Abundance All ESA Listed

High : 11.3

Low : 0

Marine Mammals (Redacted version)

Figure 6



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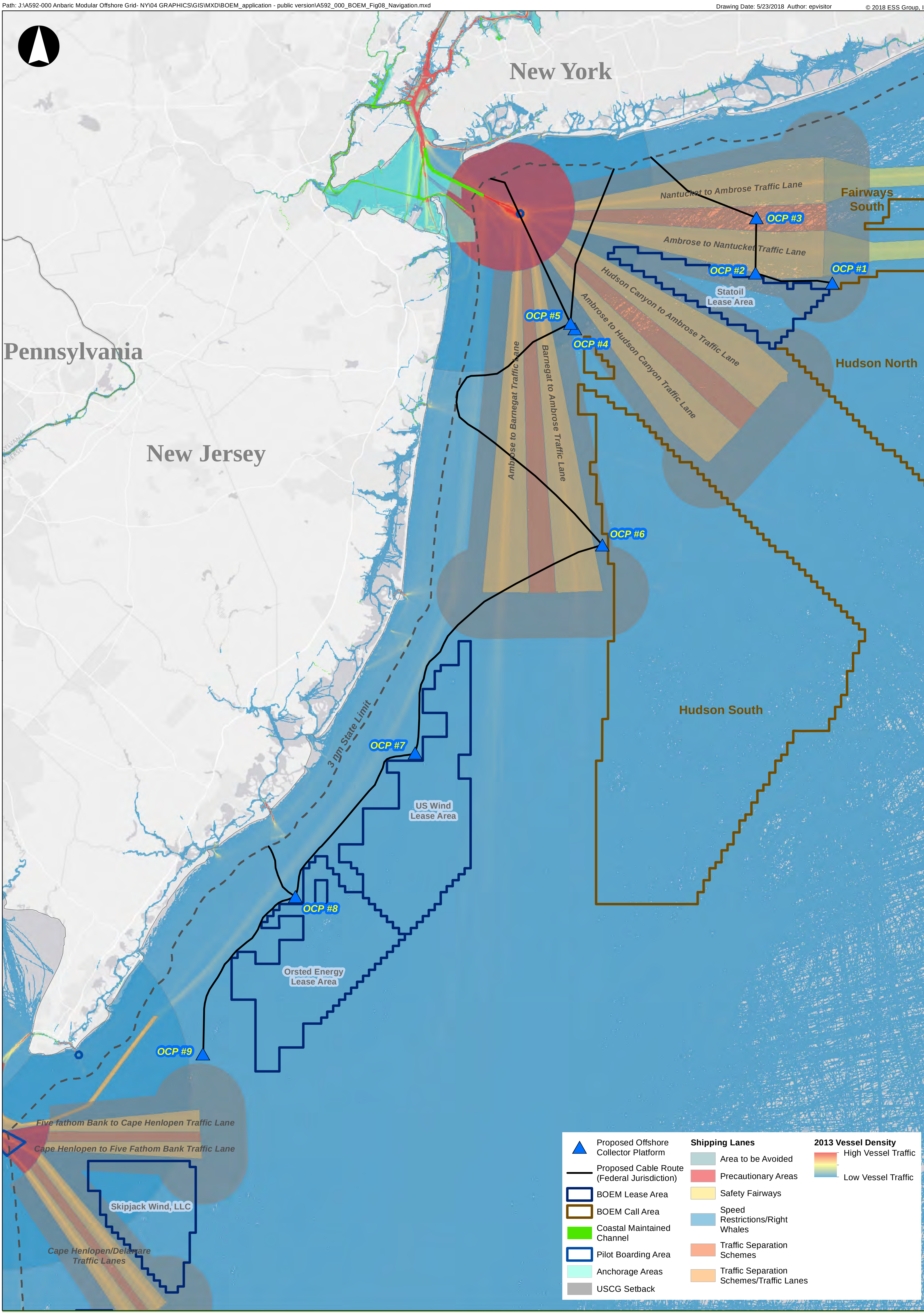
New York and New Jersey

Commercial/Recreational Fishing & Shellfishing (Redacted version)

Source: 1) ESRI, World Gray Base, 2018
2) BOEM, Lease Areas and Call Areas, 2018
3) MARCO, Rec. Boater Routes, 2014
4) NJDEP, Shellfish, 2015
5) NOAA, Fishing Traffic, 2013
6) SMAST, Shellfish Abundance, 2012

0 5 10 Miles

Figure 7



Anbaric Development Partners
New York and New Jersey

Navigation & Vessel Traffic
(Redacted version)

Source: 1) ESRI, World Gray Base, 2018
2) BOEM, Lease Areas and Call Areas, 2018
3) NOAA, Vessel Density (2013), Pilot Boarding Areas (2014), Shipping Lanes (2015), Coastal Channels (2013)
4) USCG, Anchorage Areas, 2017, ACPARS (2016)

0 5 10 Miles

Figure 8

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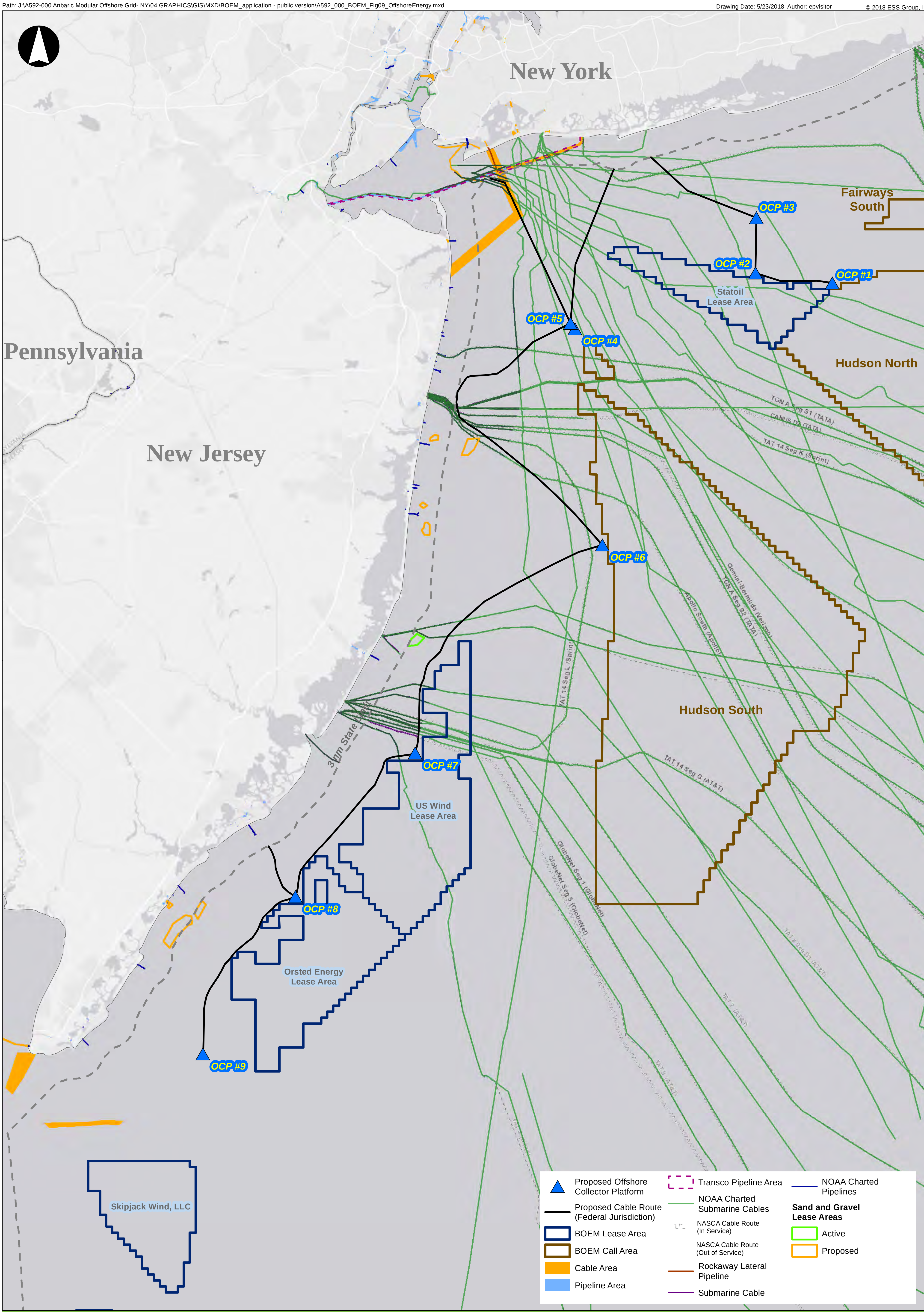

Anbaric Development Partners

New York and New Jersey

Source: 1) ESRI, World Gray Base, 2018
2) BOEM, Lease Areas and Call Areas, 2018
3) NOAA, ENC Data, 2018
4) NASCA/MarineCadastre, Submarine Cables, 2017
5) BOEM, Sand and Gravel Areas, 2017

0 5 10 Miles

Offshore Energy & Marine Infrastructure (Redacted version)

Figure 9

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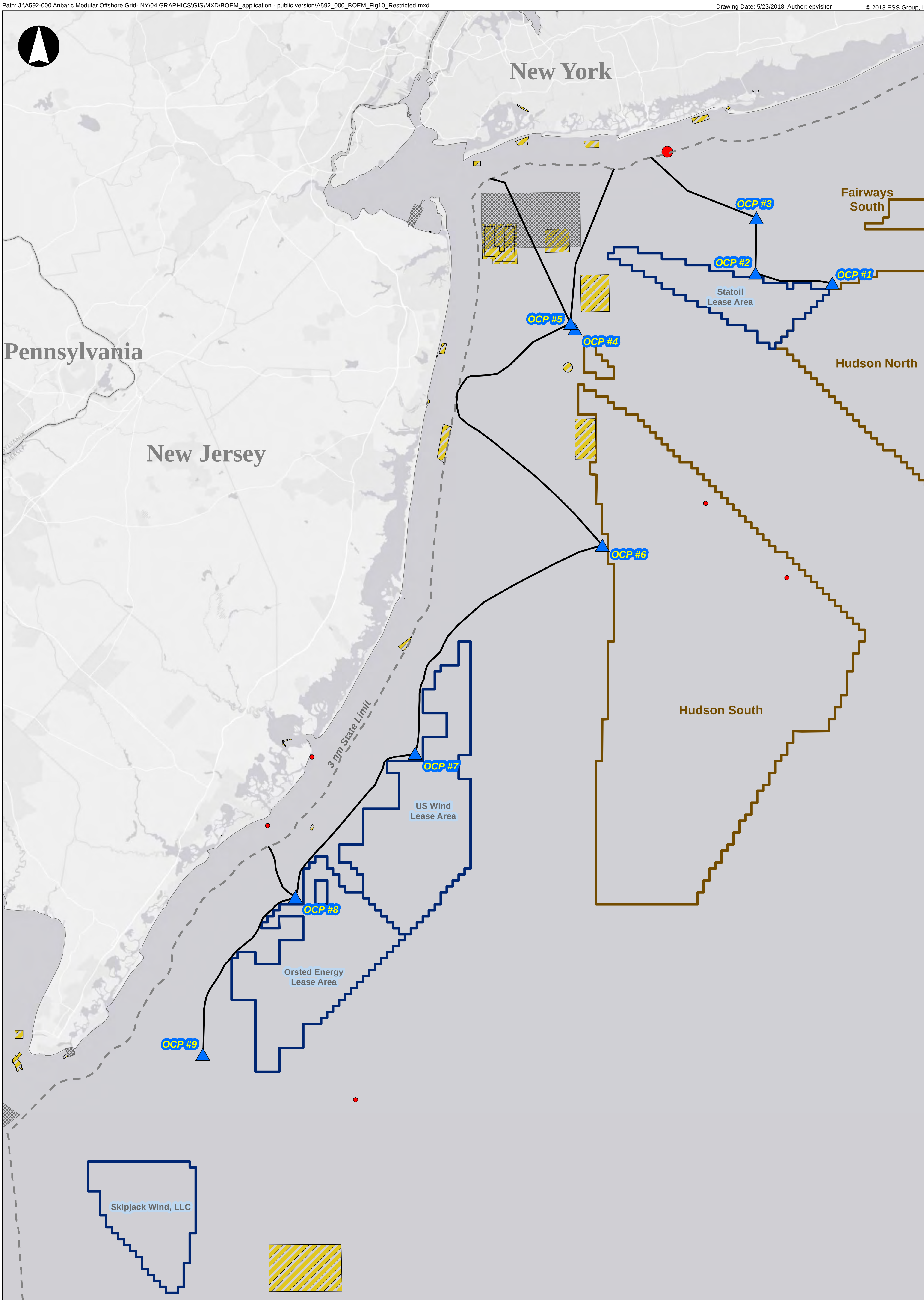

Anbaric Development Partners

New York and New Jersey

Source: 1) ESRI, World Gray Base, 2018
2) BOEM, Lease Areas and Call Areas, 2018
3) NOAA, Wrecks and Obstructions Data (2011, 2018), AWOIS (2016), ENC Data (2018)

0 5 10 Miles

Proposed Offshore Collector Platform

Proposed Cable Route (Federal Jurisdiction)

Danger Zones/Restricted Areas

Ocean Disposal Sites

Unexploded Ordnances

BOEM Lease Area

BOEM Call Area

Marine Restricted Areas (Redacted version)

Figure 10

Path: J:\A592-000 Anbaric Modular Offshore Grid- NY\04 GRAPHICS\GIS\MXD\BOEM_application - public version\A592_000_BOEM_Fig11_Wrecks.mxd

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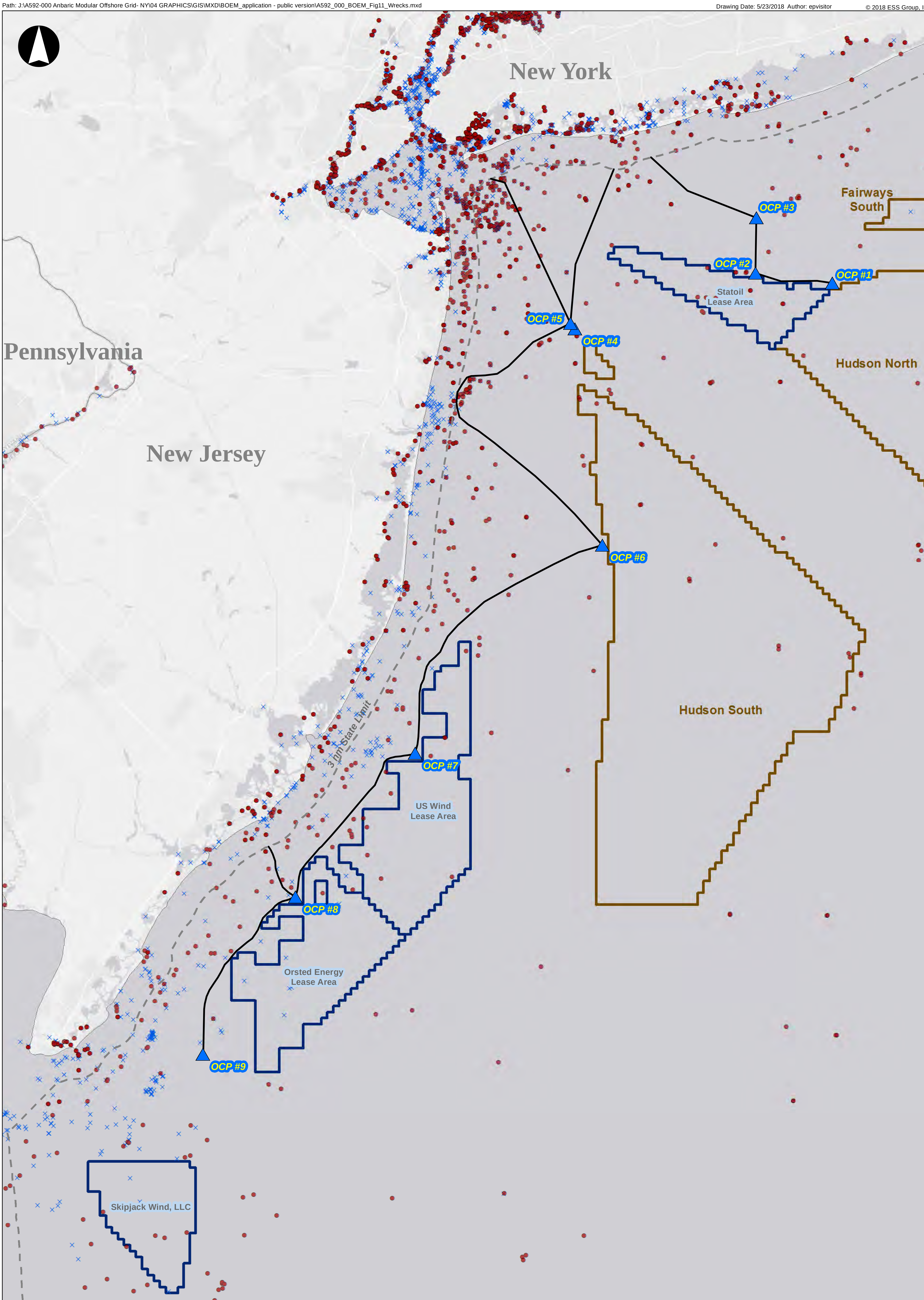

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New York and New Jersey

Source: 1) ESRI, World Gray Base, 2018
2) BOEM, Lease Areas and Call Areas, 2018
3) NOAA, Wrecks and Obstructions Data (2011, 2018), AWOIS (2016), ENC Data (2018)

0 5 10 Miles

Proposed Offshore Collector Platform
Wreck
Obstruction
Proposed Cable Route (Federal Jurisdiction)
BOEM Lease Area
BOEM Call Area

Wrecks & Obstructions (Redacted version)

Figure 11

Engineering a Sustainable Future

March 25, 2015
[redacted]

Mr. Clarke Bruno
Poseidon Transmission 1, LLC
401 Edgewater Place, Suite 650
Wakefield, MA 01880
cbruno@anbaricpower.com

Re: Preliminary Geotechnical Report
Proposed Poseidon Deans Converter Station
114 Davidson Mill Road
South Brunswick, New Jersey

Dear Mr. Bruno,

Nobis Engineering, Inc.'s (Nobis) is pleased to submit our preliminary geotechnical letter report for the proposed Poseidon Deans Converter Station, located at 114 Davidson Mill Road in South Brunswick, New Jersey. Our report was prepared in accordance to our scope and agreement executed September 8, 2014, and is subject to the limitations in Appendix C.

This geotechnical evaluation is for the initial phase of the South Brunswick, New Jersey converter station. The intent of this report is to aid in locating the station and its components at the site. Nobis prepared a preliminary subsurface exploration program that gathered subsurface data across the site for a preliminary evaluation, to facilitate the selection of locations for critical infrastructure, and enable an optimal layout of site features. Nobis anticipates that additional work, including more targeted soil borings in critical areas, will be required as the design of the station evolves.

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Request for Information: AC Offshore Platforms for New Jersey Offshore Wind Transmission - Anbaric bid preparation

Anbaric Development Partners LLC

Customer Reference: 10678287

Document No.: 10281783-DLL-RFI-03-A

Date of issue: 26 May 2021

Date of last revision: N/A

DNV Energy USA Inc.

Customer Details (the **"Customer" or "Anbaric")**

Customer Name:	Anbaric Development Partners LLC
Customer Address:	401 Edgewater Pl Ste 680, Wakefield, MA 01880-6228, USA
Customer Reference:	10678287
Contact Person:	Janice Fuller

DNV Company Details ("DNV")

DNV Legal Entity:	DNV Energy USA Inc.
DNV Organization Unit:	Energy Systems
DNV Address:	2777 North Stemmons Freeway, Suite 1520, Dallas, TX 75207 USA
DNV Telephone. No.:	214-396-2647

About this document (the "Request for Information" or "RFI")

DNV Doc. No.:	10281783-DLL-RFI-03-A
RFI Title:	Request for Information: AC Offshore Platforms for New Jersey Offshore Wind Transmission - Anbaric bid preparation
Date of Issue:	26 May 2021
Date of Last Revision:	N/A
Document Classification:	Commercial in Confidence
Prepared by:	Farshid Salehi, Senior Engineer
Verified by:	Cornelis Plet, Principal Consultant Noe Rouxel, Senior Consultant
Approved by:	Mike Tabrizi, Head of Department - Power System Advisory

Project details

Project Name:	Offshore Wind Grid Integration Strategy for State of New Jersey
Project Location:	New Jersey, USA

Confidentiality

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Table of contents

Appendices

1 INTRODUCTION

The State of New Jersey has outlined an aggressive clean energy roadmap aiming for 50% of power generated from renewable sources by 2030 and 100% by 2050. Given this growth in the offshore wind industry, the Federal Energy Regulatory Commission (FERC) continues to explore ways for Regional Transmission Organizations (RTOs) and Independent System Operators (ISOs) to accommodate the anticipated growth, including a “transmission first” approach. On November 18, 2020, the New Jersey Board of Public Utilities (NJBPU) issued an order formally requesting that PJM Interconnection (“PJM”) to incorporate the State’s goal of achieving 7500 MW of offshore wind generation by the year 2035 and evaluate necessary transmission system upgrades during the PJM Regional Transmission Expansion Planning (RTEP) process utilizing the State Agreement Approach. Under the State Agreement Approach, New Jersey customers would ultimately be responsible for the costs of transmission infrastructure developed to meet the State’s offshore wind goals. PJM will conduct a competitive solicitation in 2021 on behalf of the NJBPU, as part of the RTEP process, and the NJBPU recommends that the solicitation evaluates different offshore transmission networks, connecting the offshore collector platforms to the onshore substations, and any onshore PJM grid upgrades necessary to effectively and reliably integrate the anticipated offshore wind generations. This set of circumstances has created an opportunity for developers and investors to build strategic alliances and partnerships with knowledgeable, experienced engineers, and consultants.

With this background, Anbaric Development Partners LLC (Anbaric or the “Customer”) has requested DNV Energy USA Inc. (DNV) to provide a technical support to participate in the PJM competitive transmission window. In this process, DNV as leading technical partner will collaborate with other engineering teams and offshore original equipment manufacturers (OEMs) to propose feasible, cost effective and state-of-the-art transmission solutions. For further details about the NJBPU order and plausible offshore buildout scenarios please refer to appendix A and B, respectively.

2 REQUEST FOR INFORMATION

2.1 Project Description

DNV has developed several concept offshore grid designs to meet the requirements of the NJBPU order. Based on the above background, Anbaric and DNV would like to incorporate input/comments from offshore OEMs in the proposed solutions to ensure that final bids are in line with the latest available technologies and supplier capability. OEMs input on performance evaluation, cost estimates, and US supply chains allow for more accurate assessment and comparison of different potential transmission solutions.

Figure 2-1 shows a high-level process workflow and identifies the milestones where the OEMs could support and provide information.

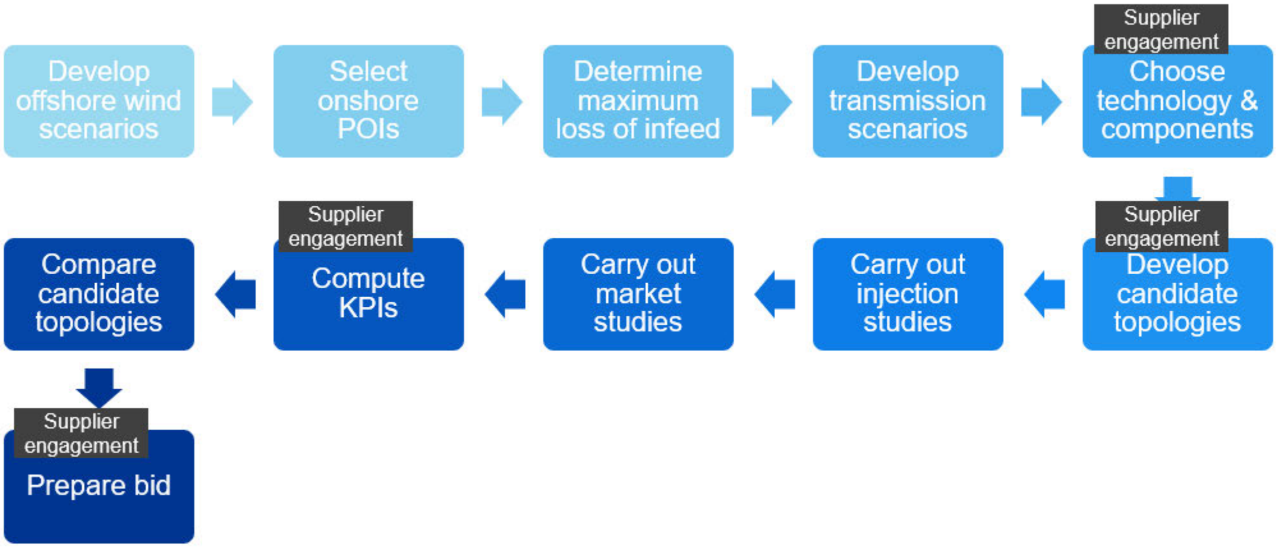
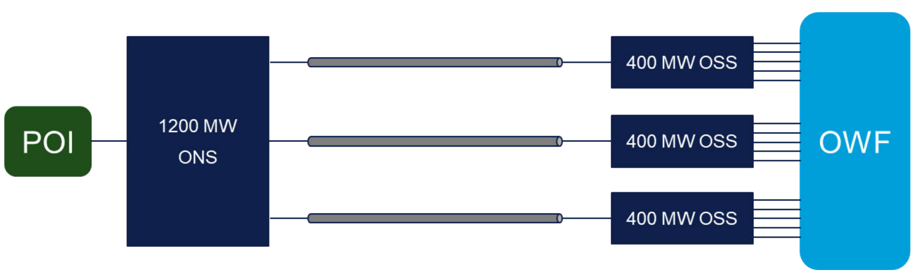


Figure 2-1 High-level process

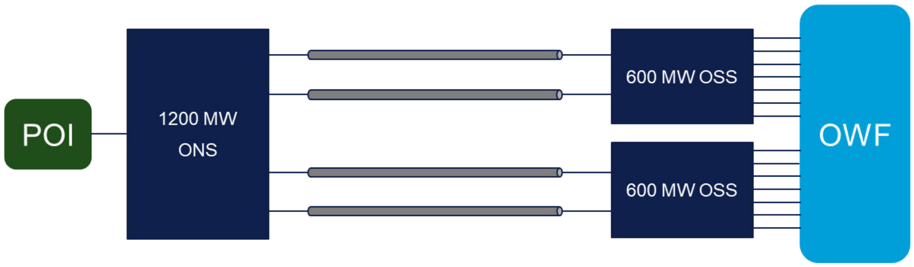
As it can be seen in the in the Figure 2-1, the OEMs involvement is expected at different stages.

The high-level characteristics of the project are as follows. A total of 4000-6400 MW of offshore wind power will be realized over the next 15 years and connected to 4-6 onshore points of interconnection. The offshore wind farm capacities are either 1200 MW or 1400 MW. The maximum loss of infeed of the onshore grid is 1500 MW. A combination of AC and DC transmission solutions is foreseen. For AC solutions, the total transmission distance between onshore POIs and offshore windfarms ranges between approximately 40 km and 115 km. The onshore POI AC voltages could be 230 kV, 345 kV and 500 kV. Based on this design envelope, DNV has developed several high-level conceptual candidate offshore grid designs which are modularly built up from the following basic building blocks, which are characterized by different total project capacities, different number of export circuits, and different number of offshore substation (OSS) platforms. Depending on the final design, to be chosen based on a comprehensive cost & benefit analysis, the total number of required AC platforms can range between 2 and 13.

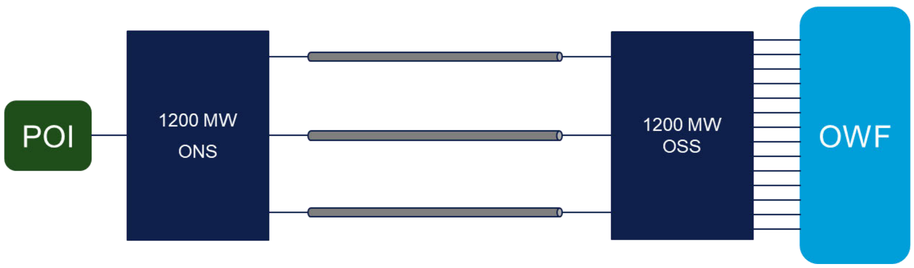
- 400 MW AC – Single export circuit (275 kV)



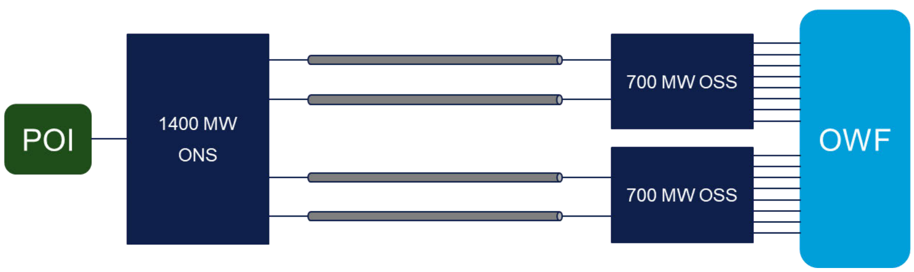
- 600 MW AC – Double export circuit (230 or 275 kV)



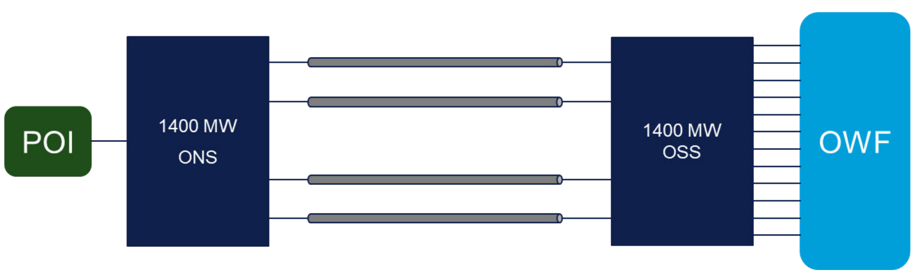
- 1200 MW AC – Triple export circuit (275 kV)



- 700 MW AC – Double export circuit (230 or 275 kV)



- 1400 MW AC – Quadruple export circuit (230 or 275 kV)



These building blocks are envisaged to be arranged in several configurations to achieve different offshore AC grid topologies to achieve additional availability and backbone capacity. The offshore substations must be expandable, i.e. have facilities to connect one or two HV cables to neighbouring offshore substations of the same or of an adjacent offshore wind farm.

Anbaric and DNV are requiring information on the feasibility, commercial availability, performance and cost of the vendor's solutions to realize the above configurations. The following additional design choices can be considered.

[redacted]

2.2 Expected inputs from Supplier

Please kindly supply the following information regarding your solutions and commercial offering for each of those 5 OSS configurations:

- Technical Description
  - Typical General Arrangement concept
  - Typical dimensions & weights
  - Budget price for each of the 5 platform setups. If possible, the cost should be broken down as follow:

        - Foundation construction
        - Topside Construction
        - High Voltage Electrical Equipment
        - Transport & Installation
    - Available transport & installation methods:
        - Assess the feasibility of an installation with the existing Heavy Lifting Vessels (HLV), considering a maximum lifting capacity of 5,000 mt.
        - If not feasible, propose alternative installation methods, such as multi-lifts, semi-submersible crane vessels or float-over and assess the impact on cost and schedule.
    - Typical project schedules
        - Engineering and design
        - Material procurement
        - Construction
        - Transport & Installation
        - Testing/commissioning
    - Considerations on trade-offs between cost and availability, maintainability, operability, accessibility, expandability, etc.
    - Please provide a typical maintenance plan detailing number of required outages per year, periodicity of maintenance campaigns, required spare parts, etc.
    - Consideration for harsh weather condition and associated cost impacts
- Indicate major partnerships with other suppliers
- Any US supply chain challenges, such as the Jones Act which could impact the transport and installation strategy.
- Review comments of selected topologies and conceptual designs
- Participation in several clarification meetings and workshops with DNV and Anbaric

3 APPLICABLE STANDARDS

A selection of applicable standards and recommended practices for offshore wind are shown in Table 3-1 and Table 3-2, respectively. Additional PJM, NERC and FERC related documents also are listed in

Table 3-3 and Table 3-4.The assortment is limited to a few documents concerning main components and specific features of offshore wind installations.

Table 3-1 Standards applicable to offshore wind installations

Area	Standard	Description
General	BS EN 60529	Specification for degrees of protection provided by enclosures (IP code)
	IEC 60071/IEEE C62.22	Insulation coordination and surge arrester sizing
	IEC 60332	Test for vertical flame propagations
	IEC 60529	Degrees of protection provided by Enclosures (IP Code)
	IEC 60721-2-6	Classification of environmental conditions - Environmental conditions appearing in nature -Earthquake vibration and shock
	IEC 61000 series	Electromagnetic compatibility (EMC)
	IEEE Std 519	Recommended practice and requirements for harmonic control in electric power systems
	IEC 61850 series	Communication networks and systems for power utility automation
	IEC 62053 series	Electricity metering equipment (a.c.) – Particular requirements
	IEC 62351	Power systems management and associated information exchange - Data and communications security
	IMO IF110E - SOLAS	International convention for the safety of life at sea
	ISO 14122	Safety of machinery – Permanent means of access to machinery
	IEC 62751	Power losses in voltage sourced converter
Platform	BS 5266-1 to -10	Code of practice for emergency lighting
	BS EN 50172	Emergency escape lighting systems
	EN 12079	Requirements for the design, manufacture and marking of offshore freight and service containers with maximum gross mass not exceeding 25000kg, intended for repeated use to, from and between offshore installations and ships
	IEC 61892 series	Mobile and Fixed offshore Units – Electrical Installations

Area	Standard	Description
	ISO 12944-1	Paints and varnishes - Corrosion protection of steel structures by protective paint systems - General introduction
	ISO 8528 series	Reciprocating internal combustion engine driven alternating current generating sets
Transformer	BS EN 60422/IEEE C57.106	Mineral insulating oils in electrical equipment - Supervision and maintenance guidance
	CENELEC HD 398.3/IEEE C57.12.90	Power transformers - Insulation levels and dielectric tests
	CENELEC HD 398.5/IEEE C57.12.90	Power Transformers - Ability to withstand short-circuit
	IEC 60044/IEEE C57.13 series	Instrument transformers
	IEC 60076/IEEE C57.12.00series	Liquid-Immersed Distribution, Power, and Regulating transformers
	IEC 60695-1-40	Fire hazard testing - Guidance for assessing the fire hazard of electro technical products - Insulating liquids
	IEEE C57.10	Standard requirements for liquid-immersed power transformers
Switchgear	BS EN 60947-1 to - 8 / IEEE C37.20.3	Specification for low voltage enclosed switch gear and control-gear
	IEC 60364	Low voltage electrical installations - Protection for safety and protection against electric shock
	IEC 61439 series / IEEE C37.20.3	Low-voltage switchgear and control-gear assemblies
	IEC 62271 series / IEEE C37.04, IEEE C37.06	High-voltage switchgear and control-gear
	IEEE C37.30.1	Standard requirements for HVAC air switches rated above 1 kV
	IEC/TS 61639	Direct connection between power transformers and gas-insulated metal-enclosed switchgear for rated voltages of 72,5kV and above

Area	Standard	Description
	IEEE C37.09	Standard test procedure for HVAC circuit breakers
	IEEE C37.122.1	Guide for gas insulated substations rated above 52 kV
	IEEE C37.123	Guide to specifications for gas insulated electric power substation equipment
Filters and reactive power compensation	IEC 60871 series / IEEE Std 18	Shunt capacitors for a.c. power systems having a rated voltage above 1000 V
	IEC 61642	Industrial a.c. networks affected by harmonics - Application of filters and shunt capacitors
Surge arresters and lightning protection	IEC 60099/IEEE C62.11 series	Surge Arresters
	IEC 62305/IEEE Std. 998 series	Protection against lightning
Cables	IEC 60331/IEEE Std 400 series	Tests for electric cables
	IEC 60794	Optical fiber cables
	IEC 60840	Power cables with extruded insulation and their accessories for rated voltages above 30kV (Um = 36kV) up to 150kV (Um = 170kV) - Test methods and requirements
	IEC 62067	Power cables with extruded insulation and their accessories for rated voltages above 150kV (Um = 170kV) up to 500kV (Um = 550kV) - Test methods and requirements
Rotating machines	BS 5000 series	Specification for rotating electrical machines of particular types or for particular applications
	IEC 60034 series	Rotating electrical machines

Table 3-2 Recommended practices and guidelines applicable for offshore wind installations

Area	Standard	Name
General	CIGRE Technical Brochure 483	Guidelines for the design and construction of AC offshore substations for wind power plants
	CIGRÉ TB 619	HVDC connection of offshore wind power plants

	DNV-OS-A101	Safety principles and arrangements
	DNV-OS-D201	DNV Offshore Standard for Electrical Installations
	DNV-OS-E301	DNV Offshore Standard for Position mooring
	DNV-OS-F101	DNV Offshore Standard for Submarine pipeline systems
	DNV-OS-H101	DNV Offshore Standard for Marine operations, general
	DNV-OS-H203	DNV Offshore Standard for Transit and positioning of mobile offshore units
	DNV-OS-J201	DNV Offshore Standard for Offshore Substations for Wind Farms
	DNV-RP-C205	DNV Recommended Practice for Environmental conditions and environmental loads
	DNV-RP-H101	DNV Recommended Practice for Risk management in marine and subsea operations
Cables	CIGRE Electra 171	Recommendations for mechanical tests on sub-marine
	CIGRE TB 194	Construction, laying and installation techniques for extruded and self-contained fluid filled cable systems
	CIGRE TB 303	Revision of qualification procedures for HV and EHV AC extruded underground cable systems
	CIGRE TB 379	Update of service experience of HV underground and submarine cable systems
	CIGRE TB 398	Third-party damage to underground and submarine cables
	CIGRE TB 490	Recommendations for testing of long AC submarine
	CIGRE TB 815	Update of service experience of HV underground and submarine cable systems
	DNV-RP-F401	DNV Recommended Practice for Electrical power cables in subsea applications
	DNV-RP-J301	DNV Recommended Practice for Subsea Power Cables in Shallow Water - Renewable Energy Applications

Table 3-3 PJM applicable Manuals

Manual Number	Description
PJM Manual 10	Pre-Scheduling Operations
PJM Manual 12	Balancing Operations
PJM Manual 13	Emergency Operations
PJM Manual 14B	Transmission Planning Process
PJM Manual 38	Operations Planning

Table 3-4 FERC & NERC Applicable Standards

Standard No.	Description
TPL-001 -04 NERC	Transmission System Planning Performance Requirements
FERC 715	Annual transmission planning and evaluation

4 SCHEDULE

[redacted]

5 COMMUNICATION

DNV Team and the Suppliers will communicate directly for this matter subject to Anbaric Team be copied in all communications.

APPENDIX A – NEW JERSEY BOARD OF PUBLIC UTILITIES (NJBPU) ORDER

2021
NJ_OSW_Proposal Wi

BPU Supplemental
SAA Bid Data Collectic

[redacted]

Request for Information: Cable Manufacturers for New Jersey Offshore Wind Transmission - Anbaric bid preparation

Anbaric Development Partners LLC

Customer Reference: 10678287

Document No.: 10281783-DLL-RFI-01-A

Date of issue: 27 May 2021

Date of last revision: N/A

DNV Energy USA Inc.

Customer Details (the **"Customer" or "Anbaric")**

Customer Name:	Anbaric Development Partners LLC
Customer Address:	401 Edgewater Pl Ste 680, Wakefield, MA 01880-6228, USA
Customer Reference:	10678287
Contact Person:	Janice Fuller

DNV Company Details ("DNV")

DNV Legal Entity:	DNV Energy USA Inc.
DNV Organization Unit:	Energy Systems
DNV Address:	2777 North Stemmons Freeway, Suite 1520, Dallas, TX 75207 USA
DNV Telephone. No.:	214-396-2647

About this document (the "Request for Information" or "RFI")

DNV Doc. No.:	10281783-DLL-RFI-01-A
RFI Title:	Request for Information: Cable Manufacturers for New Jersey Offshore Wind Transmission - Anbaric bid preparation
Date of Issue:	27 May 2021
Date of Last Revision:	N/A
Document Classification:	Commercial in Confidence
Prepared by:	Farshid Salehi, Senior Engineer
Verified by:	Cornelis Plet, Principal Consultant
Approved by:	Mike Tabrizi, Head of Department - Power System Advisory

Project details

Project Name:	Offshore Wind Grid Integration Strategy for State of New Jersey
Project Location:	New Jersey, USA

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Appendices

1 INTRODUCTION

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With this background, Anbaric Development Partners LLC (Anbaric or the “Customer”) has requested DNV Energy USA Inc. (DNV) to provide a technical support to participate in the PJM competitive transmission window. In this process, DNV as leading technical partner will collaborate with other engineering teams and offshore original equipment manufacturers (OEMs) to propose feasible, cost effective and state-of-the-art transmission solutions. Further details regarding the NJBPU order, offshore wind farm location, and point of interconnections can be found in Appendix A and B.

2 REQUEST FOR INFORMATION

2.1 Project Description

DNV has developed several concept offshore grid designs to meet the requirements of the NJBPU order. Based on the above background, Anbaric and DNV would like to incorporate input/comments from offshore OEMs in the proposed solutions to ensure that final bids are in line with the latest available technologies and supplier capability. OEMs input on performance evaluation, cost estimates, and US supply chains allow for more accurate assessment and comparison of different potential transmission solutions.

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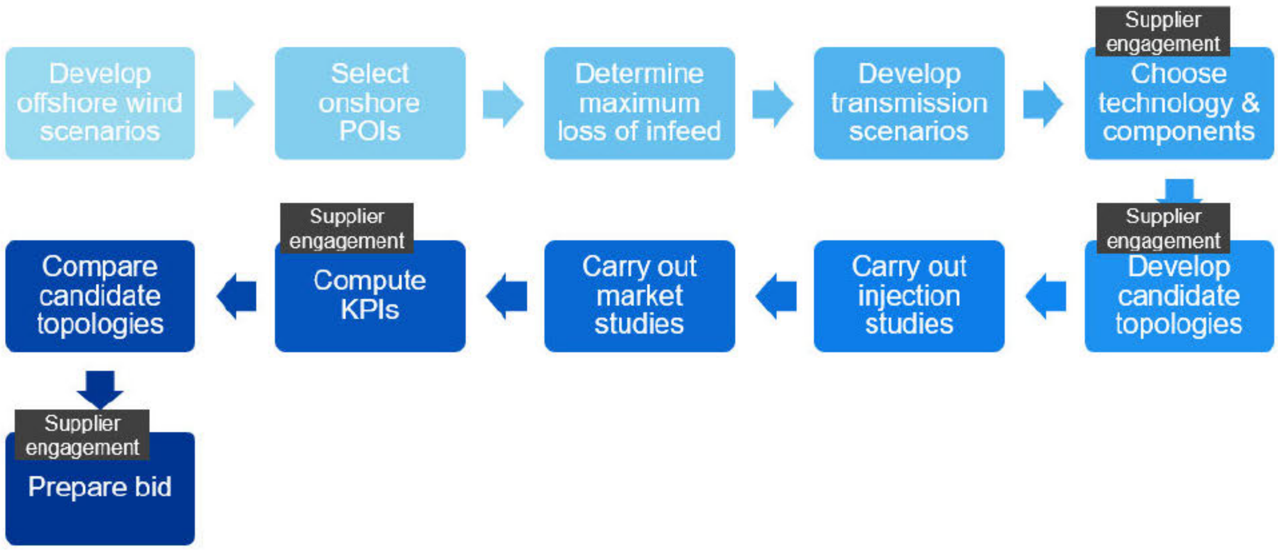


Figure 2-1 High-level process

As it can be seen in the in the Figure 2-1, the OEMs involvement is expected at different stages.

The high-level characteristics of the project are as follows.

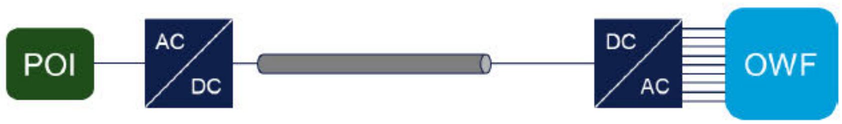
Award Year	COD	Capacity Target (MW)	Total Capacity (MW)
2019	2024	1,100	1,100
2021	2027	1,200	2,300
2023	2029	1,200	3,500
2025	2031	1,200	4,700
2027	2033	1,400	6,100
2029	2035	1,400	7,500

A total of 6400 MW of offshore wind power will be realized over the next 15 years and connected to 4-6 onshore points of interconnection. The offshore wind farm capacities are either 1200 MW or 1400 MW. The maximum loss of infeed of the onshore grid is 1500 MW. A combination of AC and DC transmission solutions is foreseen. For the DC solutions, the total transmission distances between onshore POIs and offshore windfarms range between approximately 70 km and 290 km. The onshore POI AC voltages could be 230 kV, 345 kV and 500 kV. Based on this design envelope, DNV has developed several high-level conceptual candidate offshore grid designs which are modularly built up from the following basic building block:

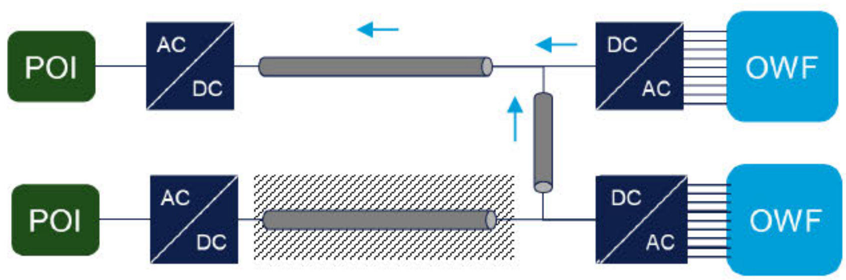
- 1400 MW symmetrical monopole

Anbaric and DNV intend to develop this basic building block as a design standard. The system is intended to include the offshore provisions (HVDC switchyard) to enable HVDC links to two neighbouring HVDC platforms or onshore POIs. Depending on the final design, to be chosen based on a comprehensive cost & benefit analysis, the total number of required DC platforms can range between 2 and 6. The building blocks can be arranged in several configurations to achieve different HVDC grid topologies:

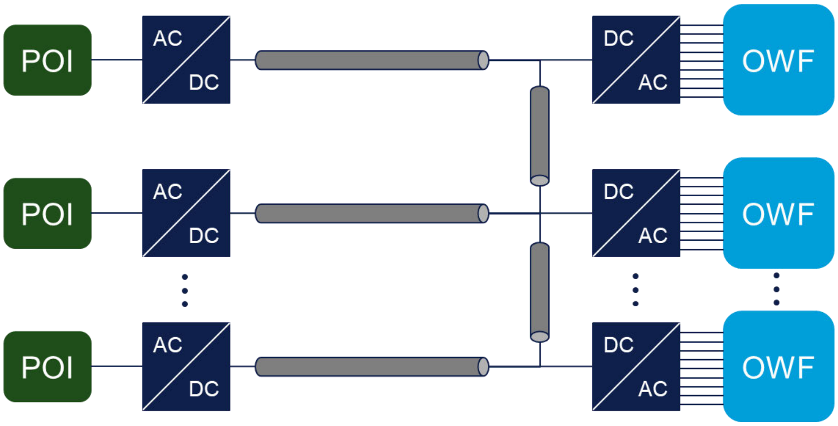
- Point-to-point topology
  - Connecting one wind farm to one POI with no provisions for redundant links, minimizing need for additional offshore equipment.



- Radial multi-terminal topology
  - Connecting multiple wind farms to one onshore point of interconnection (e.g. in case of outage of one export cable). The export link and onshore converter in this case are rated for the capacity of one wind farm or slightly above. The offshore converters are equipped with a DC switchyard that enables the multi-terminal connection. The switchyard can be equipped with switchgear that enables the connection of a 2nd windfarm to an export link without the need for de-energization.



  - Connecting one or more wind farms to multiple points of interconnection, while also enabling transmission capacity between the points of interconnection (i.e. backbone functionality). In this case the combined offshore wind farm capacity feeding into the resulting HVDC grid exceeds the local maximum loss of infeed of 1500 MW and HVDC fault clearing is required. The offshore converters are equipped with a DC switchyard that enables the multi-terminal connection. Furthermore, the HVDC system is equipped with an HVDC fault clearing system (HVDC circuit breakers or full bridge converters) which may require the installation of additional HVDC switchgear offshore. The HVDC circuit breakers may be placed on a separate platform.



Anbaric and DNV are requiring information on the feasibility, commercial availability, performance and cost of the vendor's solutions to realize the above configurations.

[redacted]

[redacted]

[1] The available geophysical survey data has been included as attachment

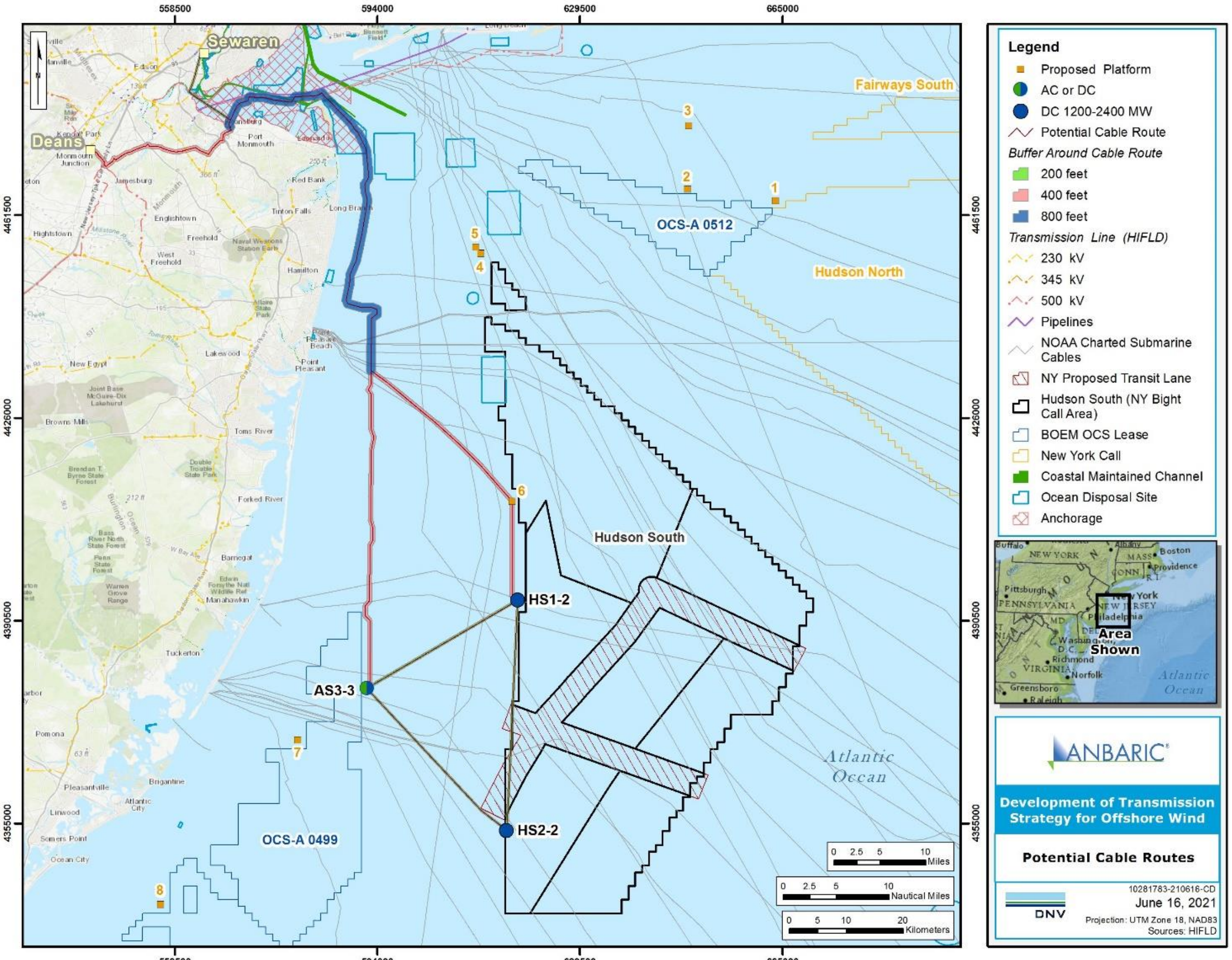


Figure 2 - Expected crossings of submarine infrastructure

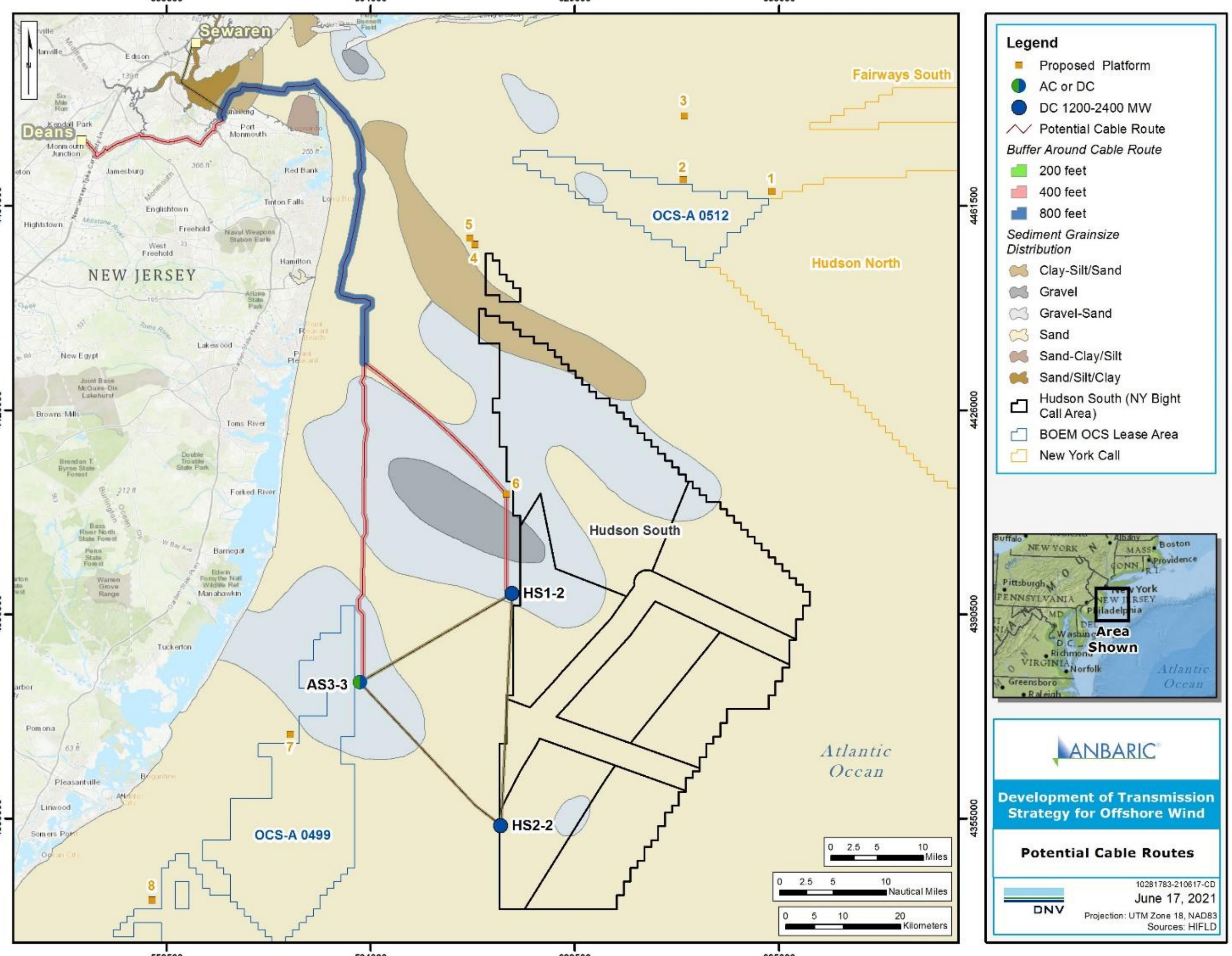


Figure 3 - Soil types along the submarine cable routes

DNV

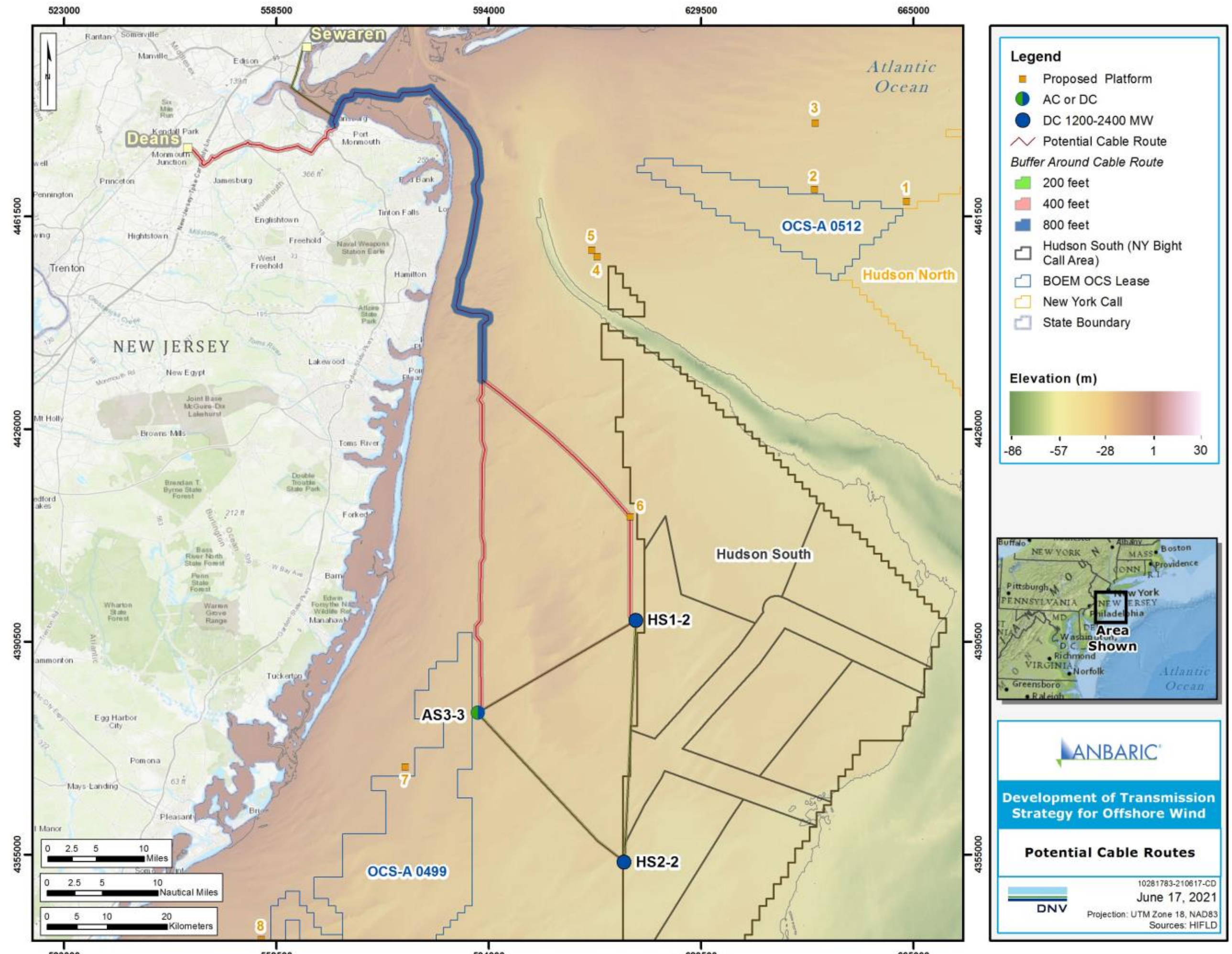


Figure 4 - Bathymetry

[redacted]

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	IEC 60794	Optical fiber cables
	IEC 60840	Power cables with extruded insulation and their accessories for rated voltages above 30kV (Um = 36kV) up to 150kV (Um = 170kV) - Test methods and requirements
	IEC 62067	Power cables with extruded insulation and their accessories for rated voltages above 150kV (Um = 170kV) up to 500kV (Um = 550kV) - Test methods and requirements
	IEC 62895	High voltage direct current (HVDC) power transmission - Cables with extruded insulation and their accessories for rated voltages up to 320 kV for land applications - Test methods and requirements
Rotating machines	BS 5000 series	Specification for rotating electrical machines of particular types or for particular applications
	IEC 60034 series	Rotating electrical machines

Table 3-2 Recommended practices and guidelines applicable for offshore wind installations

Area	Standard	Name

General	CIGRE Technical Brochure 483	Guidelines for the design and construction of AC offshore substations for wind power plants
	CIGRÉ TB 619	HVDC connection of offshore wind power plants
	DNV-OS-A101	Safety principles and arrangements
	DNV-OS-D201	DNV Offshore Standard for Electrical Installations
	DNV-OS-E301	DNV Offshore Standard for Position mooring
	DNV-OS-F101	DNV Offshore Standard for Submarine pipeline systems
	DNV-OS-H101	DNV Offshore Standard for Marine operations, general
	DNV-OS-H203	DNV Offshore Standard for Transit and positioning of mobile offshore units
	DNV-OS-J201	DNV Offshore Standard for Offshore Substations for Wind Farms
	DNV-RP-C205	DNV Recommended Practice for Environmental conditions and environmental loads
	DNV-RP-H101	DNV Recommended Practice for Risk management in marine and subsea operations
Cables	CIGRE Electra 171	Recommendations for mechanical tests on sub-marine
	CIGRE TB 194	Construction, laying and installation techniques for extruded and self-contained fluid filled cable systems
	CIGRE TB 303	Revision of qualification procedures for HV and EHV AC extruded underground cable systems
	CIGRE TB 379	Update of service experience of HV underground and submarine cable systems
	CIGRE TB 398	Third-party damage to underground and submarine cables
	CIGRE TB 490	Recommendations for testing of long AC submarine
	CIGRE TB 496	Recommendations for Testing DC Extruded Cable Systems for Power Transmission at a Rated Voltage up to 500 kV
	CIGRE TB 623	Recommendations for Mechanical Testing of Submarine Cables
	CIGRE TB 815	Update of service experience of HV underground and submarine cable systems

	DNV-RP-F401	DNV Recommended Practice for Electrical power cables in subsea applications
	DNV-RP-J301	DNV Recommended Practice for Subsea Power Cables in Shallow Water - Renewable Energy Applications

Table 3-3 PJM applicable Manuals

Manual Number	Description
PJM Manual 10	Pre-Scheduling Operations
PJM Manual 12	Balancing Operations
PJM Manual 13	Emergency Operations
PJM Manual 14B	Transmission Planning Process
PJM Manual 38	Operations Planning

Table 3-4 FERC & NERC Applicable Standards

Standard No.	Description
TPL-001-04 - NERC	Transmission System Planning Performance Requirements
FERC 715	Annual transmission planning and evaluation

4 SCHEDULE

[redacted]

5 COMMUNICATION

6 NDA

APPENDIX A – NEW JERSEY BOARD OF PUBLIC UTILITIES (NJBPU) ORDER

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APPENDIX C – OFFSHORE SURVEY DATA

Geotechnical survey - Results.pdf

Geotechnical survey - Sampling locations.pc

Request for Information: HVDC equipment manufacturers for New Jersey Offshore Wind Transmission - Anbaric bid preparation

Anbaric Development Partners LLC

Customer Reference: 10678287

Document No.: 10281783-DLL-RFI-02-A

Date of issue: 26 May 2021

Date of last revision: N/A

DNV Energy USA Inc.

Customer Details (the **"Customer" or "Anbaric")**

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Customer Reference:	10678287
Contact Person:	Janice Fuller

DNV Company Details ("DNV")

DNV Legal Entity:	**DNV Energy USA Inc.**
DNV Organization Unit:	Energy Systems
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DNV Telephone. No.:	214-396-2647

About this document (the "Request for Information" or "RFI")

DNV Doc. No.:	10281783-DLL-RFI-02-A
RFI Title:	Request for Information: HVDC equipment manufacturers for New Jersey Offshore Wind Transmission - Anbaric bid preparation
Date of Issue:	26 May 2021
Date of Last Revision:	N/A
Document Classification:	Commercial in Confidence
Prepared by:	Farshid Salehi, Senior Engineer
Verified by:	Cornelis Plet, Principal Consultant
Approved by:	Mike Tabrizi, Head of Department - Power System Advisory

Project details

Project Name:	Offshore Wind Grid Integration Strategy for State of New Jersey
Project Location:	New Jersey, USA

Confidentiality

This RFI contains information that is business sensitive to DNV. No part of the RFI or information received during the RFI process may be used, duplicated or disclosed for any other purpose. Any such use of DNV's information is regarded as an infringement of DNV intellectual property rights.

Important Notice and Disclaimer

Confidentiality and Copyright Protection

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Appendices

1 INTRODUCTION

The State of New Jersey has outlined an aggressive clean energy roadmap aiming for 50% of power generated from renewable sources by 2030 and 100% by 2050. Given this growth in the offshore wind industry, the Federal Energy Regulatory Commission (FERC) continues to explore ways for Regional Transmission Organizations (RTOs) and Independent System Operators (ISOs) to accommodate the anticipated growth, including a “transmission first” approach. On November 18, 2020, the New Jersey Board of Public Utilities (NJBPU) issued an order formally requesting that PJM Interconnection (“PJM”) to incorporate the State’s goal of achieving 7500 MW of offshore wind generation by the year 2035 and evaluate necessary transmission system upgrades during the PJM Regional Transmission Expansion Planning (RTEP) process utilizing the State Agreement Approach. Under the State Agreement Approach, New Jersey customers would ultimately be responsible for the costs of transmission infrastructure developed to meet the State’s offshore wind goals. PJM will conduct a competitive solicitation in 2021 on behalf of the NJBPU, as part of the RTEP process, and the NJBPU recommends that the solicitation evaluates different offshore transmission networks, connecting the offshore collector platforms to the onshore substations, and any onshore PJM grid upgrades necessary to effectively and reliably integrate the anticipated offshore wind generations. This set of circumstances has created an opportunity for developers and investors to build strategic alliances and partnerships with knowledgeable, experienced engineers, and consultants.

With this background, Anbaric Development Partners LLC (Anbaric or the “Customer”) has requested DNV Energy USA Inc. (DNV) to provide a technical support to participate in the PJM competitive transmission window. In this process, DNV as leading technical partner will collaborate with other engineering teams and offshore original equipment manufacturers (OEMs) to propose feasible, cost effective and state-of-the-art transmission solutions. Further details regarding the NJBPU order, offshore wind farm location, and point of interconnections can be found in Appendix A and B.

2 REQUEST FOR INFORMATION

2.1 Project Description

Anbaric and DNV would like to incorporate input/comments from offshore OEMs in the proposed solutions to ensure that final bids are in line with the latest available technologies and supplier capability. OEMs input on performance evaluation, cost estimates, and US supply chains allow for more accurate assessment and comparison of different potential transmission solutions.

Figure 2-1 shows a high-level process workflow and identifies the milestones where the OEMs could support and provide information.

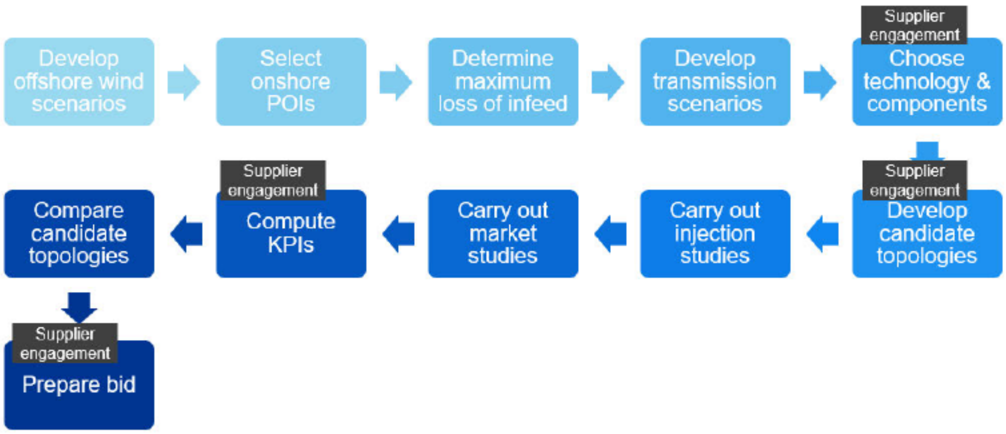


Figure 2-1 High-level process

As it can be seen in the in the Figure 2-1, the OEMs involvement is expected at different stages.

The high-level characteristics of the project are as follows.

Award Year	COD	Capacity Target (MW)	Total Capacity (MW)
2019	2024	1,100	1,100
2021	2027	1,200	2,300
2023	2029	1,200	3,500
2025	2031	1,200	4,700
2027	2033	1,400	6,100
2029	2035	1,400	7,500

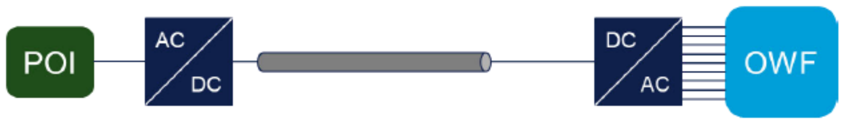
A total of 6400 MW of offshore wind power will be realized over the next 15 years and connected to 4-6 onshore points of interconnection. The offshore wind farm capacities are either 1200 MW or 1400 MW. The maximum loss of infeed of the onshore grid is 1500 MW. A combination of AC and DC transmission solutions is foreseen. For the DC solutions, the total transmission distances between onshore POIs and offshore windfarms range between approximately 70 km and 290 km. The onshore POI AC voltages could be 230 kV, 345 kV and 500 kV. Based on this design envelope, DNV has developed several high-level conceptual candidate offshore grid designs which are modularly built up from the following basic building block:

- 1400 MW symmetrical monopole

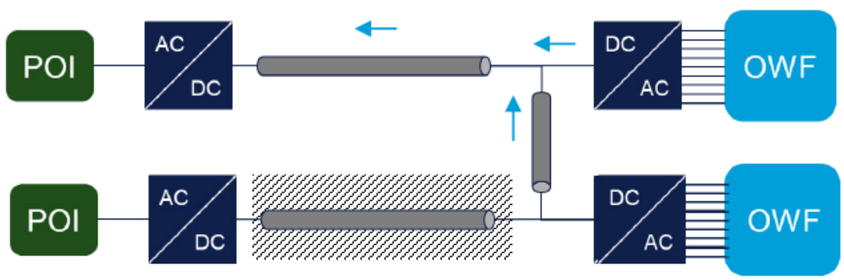
Anbaric and DNV intend to develop this basic building block as a design standard. The system is intended to include the offshore provisions (HVDC switchyard) to enable HVDC links to two neighbouring HVDC platforms or onshore POIs. Depending on the final design, to be chosen based on a comprehensive cost & benefit analysis, the total number of required

DC platforms can range between 2 and 6. The building blocks can be arranged in several configurations to achieve different HVDC grid topologies:

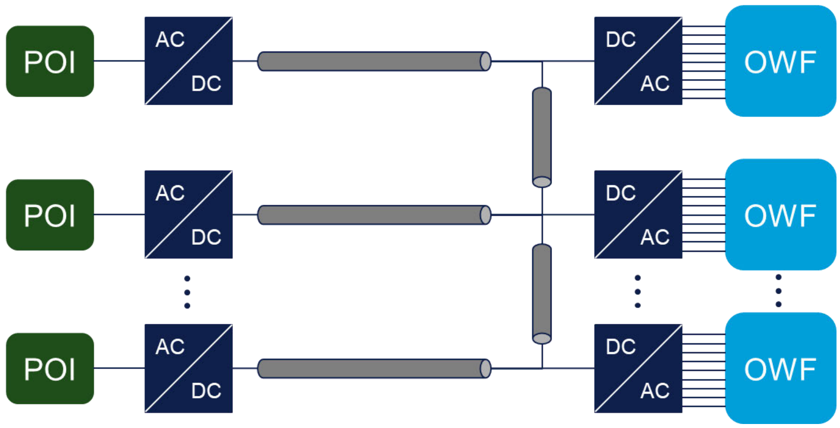
- Point-to-point topology
  - Connecting one wind farm to one POI with no provisions for redundant links, minimizing need for additional offshore equipment.



- Radial multi-terminal topology
  - Connecting multiple wind farms to one onshore point of interconnection (e.g. in case of outage of one export cable). The export link and onshore converter in this case are rated for the capacity of one wind farm or slightly above. The offshore converters are equipped with a DC switchyard that enables the multi-terminal connection. The switchyard can be equipped with switchgear that enables the connection of a 2nd windfarm to an export link without the need for de-energization.



  - Connecting one or more wind farms to multiple points of interconnection, while also enabling transmission capacity between the points of interconnection (i.e. backbone functionality). In this case the combined offshore wind farm capacity feeding into the resulting HVDC grid exceeds the local maximum loss of infeed of 1500 MW and HVDC fault clearing is required. The offshore converters are equipped with a DC switchyard that enables the multi-terminal connection. Furthermore, the HVDC system is equipped with an HVDC fault clearing system (HVDC circuit breakers or full bridge converters) which may require the installation of additional HVDC switchgear offshore. The HVDC circuit breakers may be placed on a separate platform.



Anbaric and DNV are requiring information on the feasibility, commercial availability, performance and cost of the vendor's solutions to realize the above configurations.

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2.2 Expected input from Supplier

Please kindly supply the following information regarding your solutions and commercial offering for each of the presented configurations:

- Technical description
    - Typical general arrangement concepts onshore and offshore
    - Available technologies & solutions
    - Options for multi-terminal connections and operation
        - Available HVDC fault clearing strategies
        - Available HVDC switchgear
            - High speed switches
            - HVDC GIS
                - Please comment on the volumetric space requirements and platform designs for the offshore HVDC switchyard in the following two cases:
                    - Point-point symmetrical monopole with **no** offshore HVDC bays for interlinks using **air** insulated DC yard
                    - Point-point symmetrical monopole with **two** additional offshore HVDC bays for interlinks using **gas** insulated DC yard

                  Is it possible to make one platform design that accommodates either of these options?
            - HVDC circuit breakers
            - Pre-insertion resistors
        - Available multi-terminal control & protection
        - Requirements for connecting to systems from different vendor
    - Please comment on solutions to realize a high-power AC connection to other offshore substation platforms
    - Maturity and qualification (use TRL definitions)
    - Indicate major partnerships with other suppliers
- Typical footprint & building height for onshore converter stations
- Typical necessary protection and control functions
- Typical dimensions & weight
    - For offshore converter stations
    - For offshore HVDC circuit breaker stations
- Typical costs (including comparison of point-point vs multi-terminal ready designs). It is preferred to have cost estimate numbers as a per unit value (e.g. USD per MW...) to allow adjustment for different sizes and designs. If there is any factor for economy of scale, please also provide those.
- Typical project schedules including:

  - Engineering and design
  - Material procurement
  - Manufacturing & Construction
  - Transport & Installation
- Testing/commissioning and associated outages
- Typical loss figures at 0%, 30%, 70% & 100% of loading in both real and reactive power (i.e. 16 points)
  - Q to be in line with local grid code requirements (PJM states that New Service Queue on or after November 1, 2016 are required to provide dynamic reactive power and follow the assigned voltage schedule according to FERC Order No. 827 - Reactive Power Requirements for Non-Synchronous Generation[1]. It should be noted that local utilities might have more stringent criteria)
- Typical availability figures (Forced Energy Unavailability and Scheduled Energy Unavailability)
  - In case of bipole, please comment on possibility of bipole outage due to a converter station event (e.g. neutral zone failure), and discuss any measures to reduce or entirely avoid the chance of a full bipole trip
- Available transport & installation methods
  - Assess the feasibility of an installation with the existing Heavy Lifting Vessels (HLV), considering a maximum lifting capacity of 5,000 mt.
  - If not feasible, propose alternative installation methods, such as multi-lifts, semi-submersible crane vessels or float-over and assess the impact on cost and schedule.
- Please comment on necessity for helideck.
- Please comment on options for increasing availability (e.g. 66 kV switchgear configurations).
- Please comment on options for voltage control and chopper placement and dimensioning in multi-terminal backbone grids.
- Please provide a typical maintenance plan detailing number of required outages per year, periodicity of maintenance campaigns, required spare parts, etc.
- Please comment on the necessity for diesel generators
  - If AC interlinks can be made to neighbouring platforms (what are the requirements for such an interlink?)
  - If black-startable offshore wind turbines are used (what are the requirements for such wind turbines?)
- Please comment on any US supply chain challenges such as the Jones Act which could impact the transport and installation strategy.
- Review of selected topologies and conceptual designs
- Participation in several clarification meetings and workshops with DNV and Anbaric

Furthermore, Anbaric and DNV kindly request the vendor to supply simulation suitable models for power flow, short-circuit and dynamic studies.

[1] FERC requires all newly interconnecting non-synchronous generators to design their facilities to maintain a composite power delivery at continuous rated power output at the point of interconnection at a power factor within the range of 0.95 leading to 0.95 lagging, measured at the high-side of the generator substation.

DNV

3 APPLICABLE STANDARDS

A selection of applicable standards and recommended practices for offshore wind are shown in Table 3-1 and Table 3-2, respectively. Additional PJM, NERC and FERC related documents also are listed in Table 3-3 and Table 3-4.The assortment is limited to a few documents concerning main components and specific features of offshore wind installations.

Table 3-1 Standards applicable to offshore wind installations

Area	Standard	Description
General	BS EN 60529	Specification for degrees of protection provided by enclosures (IP code)
	IEC 60071/IEEE C62.22	Insulation coordination and surge arrester sizing
	IEC 60332	Test for vertical flame propagations
	IEC 60529	Degrees of protection provided by Enclosures (IP Code)
	IEC 60721-2-6	Classification of environmental conditions - Environmental conditions appearing in nature -Earthquake vibration and shock
	IEC 61000 series	Electromagnetic compatibility (EMC)
	IEEE Std 519	Recommended practice and requirements for harmonic control in electric power systems
	IEC 61850 series	Communication networks and systems for power utility automation
	IEC 62053 series	Electricity metering equipment (a.c.) – Particular requirements
	IEC 62351	Power systems management and associated information exchange - Data and communications security
	IMO IF110E - SOLAS	International convention for the safety of life at sea
	ISO 14122	Safety of machinery – Permanent means of access to machinery
	IEC 62751	Power losses in voltage sourced converter
Platform	BS 5266-1 to -10	Code of practice for emergency lighting
	BS EN 50172	Emergency escape lighting systems
	EN 12079	Requirements for the design, manufacture and marking of offshore freight and service containers with maximum gross mass not exceeding 25000kg, intended for repeated use to, from and between offshore installations and ships

Area	Standard	Description
	IEC 61892 series	Mobile and Fixed offshore Units – Electrical Installations
	ISO 12944-1	Paints and varnishes - Corrosion protection of steel structures by protective paint systems - General introduction
	ISO 8528 series	Reciprocating internal combustion engine driven alternating current generating sets
Transformer	BS EN 60422/IEEE C57.106	Mineral insulating oils in electrical equipment - Supervision and maintenance guidance
	CENELEC HD 398.3/IEEE C57.12.90	Power transformers - Insulation levels and dielectric tests
	CENELEC HD 398.5/IEEE C57.12.90	Power Transformers - Ability to withstand short-circuit
	IEC 60044/IEEE C57.13 series	Instrument transformers
	IEC 60076/IEEE C57.12.00series	Liquid-Immersed Distribution, Power, and Regulating transformers
	IEC 60695-1-40	Fire hazard testing - Guidance for assessing the fire hazard of electro technical products - Insulating liquids
	IEEE C57.10	Standard requirements for liquid-immersed power transformers
Switchgear	BS EN 60947-1 to - 8 / IEEE C37.20.3	Specification for low voltage enclosed switch gear and control-gear
	IEC 60364	Low voltage electrical installations - Protection for safety and protection against electric shock
	IEC 61439 series / IEEE C37.20.3	Low-voltage switchgear and control-gear assemblies
	IEC 62271 series / IEEE C37.04, IEEE C37.06	High-voltage switchgear and control-gear
	IEEE C37.30.1	Standard requirements for HVAC air switches rated above 1 kV

Area	Standard	Description
	IEC/TS 61639	Direct connection between power transformers and gas-insulated metal-enclosed switchgear for rated voltages of 72,5kV and above
	IEEE C37.09	Standard test procedure for HVAC circuit breakers
	IEEE C37.122.1	Guide for gas insulated substations rated above 52 kV
	IEEE C37.123	Guide to specifications for gas insulated electric power substation equipment
Filters and reactive power compensation	IEC 60871 series / IEEE Std 18	Shunt capacitors for a.c. power systems having a rated voltage above 1000 V
	IEC 61642	Industrial a.c. networks affected by harmonics - Application of filters and shunt capacitors
Surge arresters and lightning protection	IEC 60099/IEEE C62.11 series	Surge Arresters
	IEC 62305/IEEE Std. 998 series	Protection against lightning
Cables	IEC 60331/IEEE Std 400 series	Tests for electric cables
	IEC 60794	Optical fiber cables
	IEC 60840	Power cables with extruded insulation and their accessories for rated voltages above 30kV (Um = 36kV) up to 150kV (Um = 170kV) - Test methods and requirements
	IEC 62067	Power cables with extruded insulation and their accessories for rated voltages above 150kV (Um = 170kV) up to 500kV (Um = 550kV) - Test methods and requirements
Rotating machines	BS 5000 series	Specification for rotating electrical machines of particular types or for particular applications
	IEC 60034 series	Rotating electrical machines

Table 3-2 Recommended practices and guidelines applicable for offshore wind installations

Area	Standard	Name
General	CIGRE Technical Brochure 483	Guidelines for the design and construction of AC offshore substations for wind power plants
	CIGRÉ TB 619	HVDC connection of offshore wind power plants
	DNV-OS-A101	Safety principles and arrangements
	DNV-OS-D201	DNV Offshore Standard for Electrical Installations
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Table 3-3 PJM applicable Manuals

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PJM Manual 12	Balancing Operations
PJM Manual 13	Emergency Operations
PJM Manual 14B	Transmission Planning Process
PJM Manual 38	Operations Planning

Table 3-4 FERC & NERC Applicable Standards

Standard No.	Description
TPL-001-04 - NERC	Transmission System Planning Performance Requirements
FERC 715	Annual transmission planning and evaluation

4 SCHEDULE

[redacted]

With the above schedule in consideration and given the time-sensitive nature of the engagement, Anbaric and DNV would request a response within 2-3 weeks from this initial request.

5 COMMUNICATION

DNV Team and the Suppliers will communicate directly for this matter subject to Anbaric Team be copied in all communications.

APPENDIX A – NEW JERSEY BOARD OF PUBLIC UTILITIES (NJBPU) ORDER

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