

MARINE ARCHAEOLOGICAL RESOURCES ASSESSMENT - SOUTH FORK WIND FARM AND EXPORT CABLE, RHODE ISLAND AND NEW YORK

Non-Technical Summary

Gray & Pape, 2020

INTRODUCTION

Gray & Pape Inc. (Gray & Pape) completed a marine archaeological assessment of geophysical and geotechnical survey data collected for Deepwater Wind South Fork, LLC (now, South Fork Wind), at the proposed South Fork Wind Farm (SFWF) and South Fork Export Cable (SFEC) areas in Rhode Island Sound and off the southern shore of Long Island, New York. The purpose of the assessment was to identify submerged archaeological resources, or potential archaeological resources, that may be affected by seabed-disturbing Project activities, including site characterization surveys, and the construction, operation, and/or decommissioning of project facilities.

The assessment was conducted to satisfy the federal regulatory requirements as outlined in the Bureau of Ocean Energy Management (BOEM) Offshore Renewable Energy Program's Guidelines on Providing Archaeological and Historic Property Information. Consistent with BOEM guidelines, South Fork Wind will seek to avoid archaeological resources and potential archaeological resources during project development, construction, operation, and decommissioning, where feasible. To accommodate alternate locations for turbine placement or cable routing required to avoid affecting potentially significant cultural resources, survey efforts included an area larger than the designed footprint of the SFWF and the SFEC.

The proposed SFWF consists of up to 15 wind turbine generators (WTGs, turbines), each with a capacity of 6 to 12 megawatts (MW), submarine cables (Inter-array Cables [IACs]) connecting the WTGs, and an offshore substation (OSS), all to be located in federal waters on the Outer Continental Shelf (OCS), within BOEM Renewable Energy Lease Area OCS-A-0517 (Lease Area). The wind farm layout also includes two alternate WTG foundation locations. OCS-A-0517 is located approximately 30.6 kilometers (km) (19.0 miles [mi], 16.5 nautical miles [NM]) southeast of Block Island, in Rhode Island Sound, and 56.3 km (35 miles, 30.5 nautical miles) east of Montauk Point, New York. The SFEC is an alternating current (AC) electric cable (138 kV) that will connect the SFWF to the existing mainland electric grid in East Hampton, New York.

The area surveyed for the SFWF in 2017 and 2018, measures approximately 7 km (4.3 miles) north-south by 12 km (7.4 miles) east-west. Depth of water within the survey area ranges from approximately 27 to 45 meters (m) (89 to 148 feet [ft]) deep. Within the SFWF, the

project's defined Area of Potential Effects (APE) is defined as the depth and breadth of the seabed potentially affected by any proposed bottom-disturbing activities.

The proposed SFEC extends west from the SFWF toward Long Island and measures approximately 99 km (61.5 miles) in length. Depths along the SFEC, excepting the shoreline approach segments, range between approximately 30 to 45 m (98 to 148 ft) in the OCS, and are shallower in New York waters. Two proposed landing sites have been identified and surveyed. These are located 14 to 35 km (8.6 and 21.7 miles) west of Montauk Point. The project APE along the SFEC is defined as the depth and breadth of the seabed potentially affected by any proposed bottom-disturbing activities.

The seabed throughout the project area consists of formerly exposed sand, gravel, and boulders that were deposited during the more recent glacial periods and subsequently submerged by marine transgression. The seabed has no dramatic relief, and bathymetric changes appear gradual. The area proposed for the wind farm is characterized as a bouldery terminal moraine.

The U.S. Department of the Interior (DOI) is charged with managing the OCS under the Outer Continental Shelf Lands Act (43 U.S.C. 1337). DOI delegated certain responsibilities for regulation of renewable energy projects on the OCS to BOEM, in the Energy Policy Act of 2005 (Pub. L. 109-58). Federal statutes and regulations require BOEM to identify historic properties and other significant cultural resources that may be affected by renewable energy projects on the OCS and to consider project effects to these properties prior to project approval. These requirements are established in the National Historic Preservation Act of 1966, as amended (NHPA; 54 U.S.C. 300101 et seq.), and the applicable procedures are outlined in the NHPA's implementing regulations (36 CFR § 800). The National Environmental Policy Act (NEPA; 42 U.S.C. 4321 et seq.) and NEPA's implementing regulations (40 CFR § 1500-1508) are also applicable.

BOEM has adopted regulations for the planning and development of renewable energy projects on the OCS in 30 CFR § 585. These regulations establish developers' responsibilities for the collection of information to support and facilitate the agency's compliance with the NHPA and NEPA. BOEM's *Guidelines for Providing Archaeological and Historic Property Information Pursuant to 30 CFR § 585* (March 2017) provides developers and their teams with information on how to comply with 30 CFR § 585. Additionally, stipulations in DWSF's OCS-A 0486 lease agreement, effective October 1, 2013 informed the work conducted by Gray & Pape. OCS-A 0517, within which SFWF would be constructed, was subdivided from OCS-A 0486 in 2020.

ARCHAEOLOGICAL ASSESSMENT

The archaeological assessment for potential submerged resources included archival (background) research, geophysical (remote sensing) survey, geotechnical investigations, and laboratory analyses of sediment samples collected from the proposed SFWF and SFEC corridor. Archaeological investigations and laboratory analyses were conducted in coordination with six federally recognized Native American tribes. The methods and results of the integrated research are summarized below.

Archival Research

Background research included a review of historical documents, previous research reports, state site files, shipwreck inventories, and historical maps. Archives at the Rhode Island Historical Preservation and Heritage Commission (RIHPHC), the New York State Historic Preservation Office (NYSHPO), and the Massachusetts Board of Underwater Archaeological Resources (MBUAR) were consulted to identify information on shipwrecks. Relevant geological and paleoenvironmental sources were reviewed to assist in the effort to reconstruct environmental conditions during periods of potential pre-contact land use within the project area. These studies found that during the last glaciation of the region and for several thousands of years after the ice retreated sea levels were much lower, exposing portions of the wind farm and export cable as dry land. Terrestrial landscapes existed in portions of the proposed wind farm between approximately 24,000 and 10,000 years ago and may have been occupied by Native American people.

Geophysical Surveys

Field investigations included a High Resolution Geophysical (HRG) marine survey utilizing magnetometer/gradiometer, side scan sonar, multibeam echo-sounder, and both shallow and medium penetration sub-bottom profilers. This instrument array provided data on objects and seabed features exposed on the sea floor and the characteristics of buried sediments that may be affected by the Project. The total area surveyed during the 2017 and 2018 field investigations consisted of approximately 7,700 hectares (ha) (19,027 acres [ac]) in the SFWF area and 3,400 ha (8,402 ac) along the SFEC route to New York. The Maximum Work Area (MWA) for the wind farm represents the proposed APE for the Section 106 process and encompasses all areas of potential seabed disturbance associated with the wind turbine generators (WTGs), IACs linking the WTGs, and the offshore substation. A corridor was defined along the SFEC to encompass the APE for construction, operation, and decommissioning of the export cable linking the wind farm to the terrestrial electrical grid.

Magnetic data were collected, saved, edited, processed, and plotted, and anomalies tabulated according to: magnetic intensity (total deviation of the magnetic background measured in gammas); pulse duration (detectable signature duration); signature characteristics (monopolar, or dipolar); and location. There were 6219 anomalies of 5 gamma or greater were identified during the 2017 and 2018 geophysical surveys. This includes the SFWF, SFEC and additional reconnaissance survey in the broader OCS-A 0486 lease area. Fugro located 4005 anomalies during their survey for the wind farm and adjacent sections of OCS-A Lease 0486. Of these, 3,518 reside within the SFWF APE used for the present assessment. Along the SFEC survey another 1,203 anomalies were located, of which 512 were located within the 180-m (591-ft) wide SFEC APE. An additional 1,011 anomalies were located in reconnaissance areas outside the defined SFWF and SFEC APEs. Of the 3,518 magnetic anomalies identified in the SFWF APE, 21 are correlated with five distinct sonar contacts and are likely associated with shipwreck sites.

The magnetic survey located three potential shipwreck sites and two confirmed shipwreck sites in the SFWF APE as well as isolated debris and fishing gear. Natural features such as boulders and ancient submerged landforms were also identified during the survey. The ancient stream and river channels were formed during the last glaciation and the period of time following the melting of the ice and subsequent inundation of the

landscapes by rising seas. Boulders, cobbles, and gravel were transported to the SFWF area by glaciers and meltwater streams. The coarse stone within the wind farm appears to have originated primarily from Rhode Island and southeastern Massachusetts. Bedrock in these areas is known to contain magnetite and iron-rich minerals. Magnetic fields from these minerals correlate with the edges of the Holocene and Pleistocene channels that bisect the SFWF APE.

For the SFEC survey, 1,203 magnetic anomalies were interpreted from the magnetometer data, of which 512 were located within the 180-meter (591 ft)- wide SFEC corridor APE. Several anomalies were identified as known cable crossings. Forty-eight of these magnetic anomalies were noted within New York State waters. All other anomalies likely represent articles of ferrous debris that are either buried below the seabed or too small to be acoustically detected and are likely associated with prior construction activities or passing ship traffic. Other sources of the unidentified anomalies may be lost fishing gear.

The side scan sonar data for the seabed in the SFWF and SFEC areas were generally unremarkable, with the exception of numerous boulders and areas of sand ripples. The sonar data were collected at a 30-m (98.5-ft) transect spacing, with a 50-m (164-ft) per channel, 100-m (328-ft) swath width throughout the SFWF and SFEC areas, to achieve a coverage pattern of well over 300 percent. Side scan files were presented to the QMA from the marine surveyors for review.

Each line file was examined for cultural material, structure, linear forms and other indications of human activity. An examination of the side scan sonar records from the 2017 and 2018 geophysical surveys indicate that there are 219 above- or on-seabed bed targets with a resolution of 0.5 m (1.6 ft) that are not interpreted as boulders or other natural features. The SFWF APE contains 59 side scan sonar targets, the SFEC route contains 11 side scan sonar targets and the reconnaissance survey areas contain 149 side scan targets. There are at least two obvious shipwrecks located in the project area; Contacts 28 and 32. Four other side scan sonar targets are complex and anthropogenic in appearance. These targets contain linear elements in apparent association with several components and magnetic anomalies. Contact 82 was observed during reconnaissance survey activities and appears to have linear form multi components but is well north of the SFWF APE. Contact 112 appears unnatural due to its linearity. Contact 30 appears to be a debris scatter, only has a single, associated anomaly. Contact 218 represents a possible scatter and is located to the immediate north and slightly east of center of the SFWF APE. The other side scan sonar contacts were not considered to be significant. Of the other side scan sonar contacts that appear to be cultural, most are small and rectangular in shape. It is believed that these contacts represent fishing gear, lobster traps, cable sections, isolated debris and other isolated objects.

Two types of sub-bottom profilers were used and provided two different types of data. The Chirp SBP was deployed on all survey lines. The Chirp model exhibited that the sound energy was absorbed in the near-surface area. The seafloor in many areas is made up of highly compact sands and fine gravels, that absorb/disperse the acoustic energy of the Chirp SBP and do not allow for sufficient penetration to adequately distinguish sub-seafloor reflectors. The Sparker MPS generally utilized a lower frequency than the Chirp and provided resolution of deeper subbottom features. Sparker data was collected on

all survey lines; with single channel data collected at 30-m (98-ft) spacing and multi-channel data collected at 150 m (492 ft) spacing.

Analyses of data from depths between 15 ft (4.7 m) and 164 ft (50 m), the maximum depth of monopile penetration, included integration of vibracore sampling, SBP and MPS data, and data collected from CPT and deep borings. The combined datasets were critical in the development of the paleolandscape model and refinement of the geologic context.

Within the SFWF and SFEC APEs, the seabed contains numerous boulders - some clustered in fields and others isolated - with areas of sand ripples and plains. Sub-bottom profiler data indicates buried paleochannels separated by relatively flat, laminated sediments on interfluvies (areas between ancient rivers and streams). There are several of these interpreted water courses in the shallow sub-seabed region of the SFEC route. Two larger paleochannels, the Block Island Channel southwest of Block Island and the Mud Hole channel southeast of the island, are associated with the drainage of Glacial Lakes Block Island and Rhode Island and are intersected by the SFEC. Smaller, more recent channels likely associated with southward draining freshwater streams or rivers are also present within the SFEC. In the SFWF APE, there are several subglacial channels or depressions that trend northwest-southeast. These features were formed under the glacier as it approached its maximum extent. A second generation of smaller channels were incised into the tunnel valley fills following deglaciation and prior to marine transgression.

Geotechnical Investigations

The potential for cultural resources buried below the seabed within the APE was assessed through the integration of vibracore sampling, sub-bottom imagery, and data collected from cone penetration tests (CPTs), which measure the physical properties of sediments, and deep borings. Based on analyses of the geophysical survey data and in consultation with tribal representatives, forty locations were selected for geotechnical testing (coring) as part of the archaeological studies. Coring was used to identify possible evidence of ancient terrestrial landforms and ground truth the geophysical data. The combined geophysical and geotechnical datasets were critical in the development of a paleolandscape model describing the character of the once-exposed ancient landscapes within the project area and the refinement of the geologic context used by archaeologists to assess where parts of the ancient landscapes may be preserved.

The completed marine archaeological assessment indicates that ancient submerged landforms are present within the SFWF and SFEC; specifically, three within the SFWF and five within the SFEC. The preserved landforms are associated with soils (paleosols) formed when the project area was exposed and vegetated with trees, shrubs, and grasses. Paleosols were identified up to 1.38 m (4.52 ft) below the seafloor. Intact or partially eroded terrestrial landform surfaces were found to range between 0.5 to 3.4 m (1.6 to 11.1 ft) below the seafloor. No potentially habitable land surfaces were identified at depths below 6 m (19.7 ft) from the seafloor.

The SFEC, which runs from the SFWF to the south coast of Long Island, contains areas near the shoreline that were submerged more recently. Geophysical and geotechnical data indicate that near-shore ancient landscapes in the SFEC have been disturbed or

destroyed by ocean waves, coastal storms, and longshore drift. As a result, there is a low potential for the presence of intact archaeological resources in these settings.

Gray and Pape's analyses indicate a potential for preserved pre-contact indigenous sites within eight (8) ancient, submerged landform features identified in the 2017 and 2018 surveys. Five such landforms were identified within the SFEC APE and three within the SFWF APE. Along the SFEC, five potentially sensitive features are located within incised channels and their margins on the former exposed landscape within the APE. These features are designated as Avoidance Areas SFEC-CF-3, SFEC-CF-5, SFEC-CF-7, SFEC-CF-9, and SFEC-CF-13. All of the culturally sensitive landforms within the SFEC APE are located in federal waters. Within the SFWF APE, three sensitive features, designated as SFWF-PL-1, SFWF-PL-2, and SFWF-PL-3, include post-glacial channel features and a possible estuary in the north-central section of the proposed wind farm.

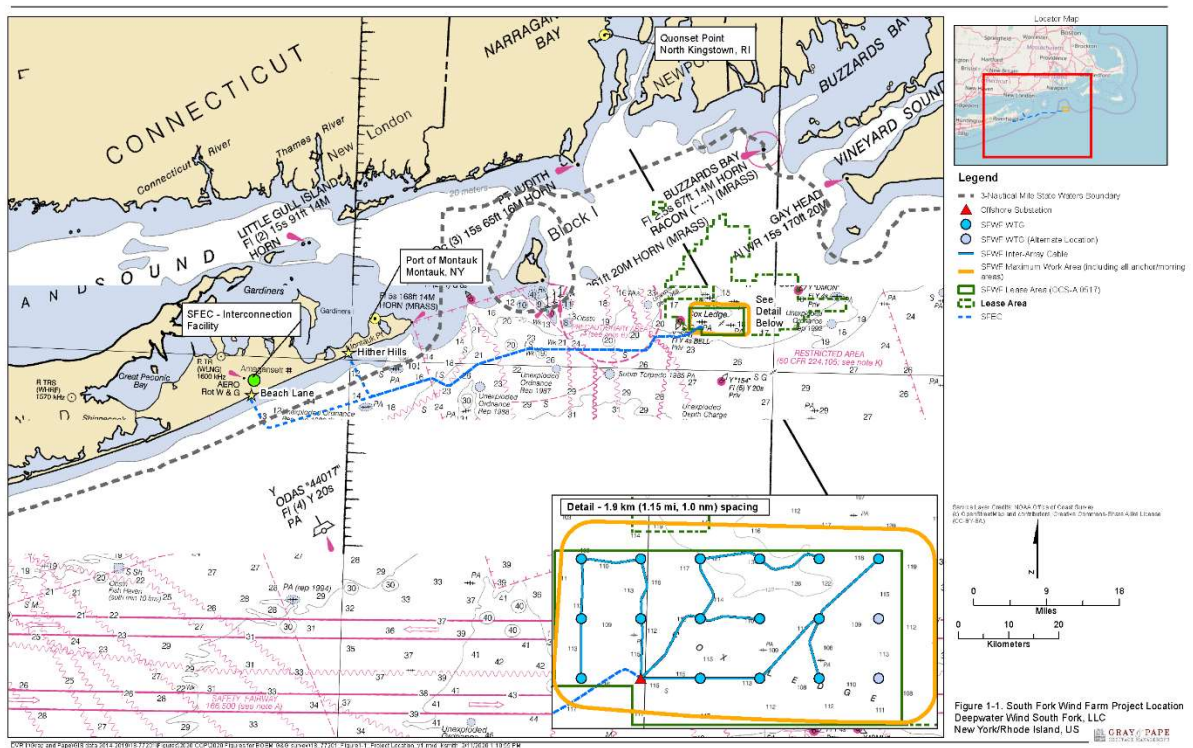
Historically, the study area was transited from the earliest periods of European exploration and settlement. Numerous ships were lost in the Rhode Island Sound and eastern Long Island regions. Shipwrecks have been reported in and near the SFWF area and numerous wrecks are reported to lie between the SFWF and the eastern portions of southern Long Island, near the SFEC route. Additionally, there are reported wrecks off the south shore of Long Island. Geophysical data confirms this historic documentation. Side scan sonar located four shipwrecks or potential scatters, designated as Wreck 28, Wreck 30, Wreck 32, and Wreck 112, within the SFWF and two additional wrecks/scatters, designated as Wreck 82 and Wreck 218, in reconnaissance survey areas. No wrecks were located along the SFEC route.

CONCLUSIONS & RECOMMENDATIONS

Gray and Pape's analyses indicate a potential for preserved, pre-contact Native American sites within ancient submerged landforms identified in the 2017 and 2018 surveys. Along the SFEC, these potentially sensitive settings are confined to incised stream or river channels and their margins on the formerly exposed landscape. Within the SFWF, potentially sensitive ancient submerged landforms include post-glacial channel features and a possible estuary in the north-central section of the wind farm. Two larger landscape features, the Block Island Channel southwest of Block Island and the Mud Hole channel southeast of the island, are associated with the drainage of Glacial Lakes Block Island and Rhode Island that once covered the areas between the wind farm and mainland sections of Rhode Island and southeastern Massachusetts. These large lakes formed south of the melting glaciers by approximately 24,000 years ago and likely drained between 16,000 and 15,000 years ago. The large channels cut into the ancient landscape by the drainage of the glacial lakes extend across the SFEC corridor. Smaller, more recent channels likely associated with southward draining freshwater streams or rivers are also present within the SFEC. In the SFWF, the largest and deepest channels were formed beneath the glaciers, between 26,000 and 24,000 thousand years ago, when the ice had advanced across the proposed wind farm area. A second generation of smaller channels were incised into the tunnel valley fills following deglaciation.

While no direct evidence of pre-contact Native American settlements or other types of cultural sites was identified within the survey areas, the survey did indicate that the that

the SFWF project area was an exposed terrestrial landscape following the retreat of the last glaciers approximately 24,000 years ago, and before marine transgression began approximately 12,000 to 10,000 years ago. Portions of the SFEC were exposed subaerial landforms between 17,000 and 11,000 years ago. This suggests that the landscape could have supported Native American populations during the Paleoindian period. The identified ancient submerged landforms within the SFWF and SFEC have the potential to contain Native American sites associated with settlements or other uses of the formerly terrestrial landscapes. Gray & Pape recommends avoidance of the eight identified ancient submerged landforms features located within the combined SFWF and SFEC APEs. Further consultations among BOEM, South Fork Wind, Native American tribes, and other parties are needed if the landforms cannot be avoided as part of the Section 106 process.



Documentary evidence indicates several shipwrecks and aircraft losses in Rhode Island Sound and off the coast of Long Island, with a limited number of shipwrecks reported within or near the SFWF and the SFEC. Geophysical survey located four shipwreck sites (Wreck 28, Wreck 30, Wreck 32, and Wreck 112), within the SFWF APE and two additional wrecks/scatters (Wreck 82 and Wreck 218) in reconnaissance survey areas. Gray & Pape recommended that all identified shipwreck sites be avoided by at least 50 m (164 ft) from their maximum visible extent, and that potential shipwreck scatters be avoided by at least 100 m (328 ft) from their maximum visible extent to avoid potential adverse effects to these resources. No further archaeological investigations of the shipwrecks or possible shipwrecks are recommended unless these resources cannot be avoided.