The Area of Potential Effect (APE) for terrestrial archaeological resources includes areas potentially impacted by any ground disturbing activities. For the terrestrial archaeological resources, the APE is presented as a conservative estimate and includes the Landfall Sites, underground cable routes, the substation site and equipment laydown areas. The depth and breadth of potential ground disturbing activities is described below for each location. Selected plans and figures are also included in Attachments 1-4 to provide a visual representation of the APE.

**Landfall Site - Covell’s Beach (Preferred Route)**

The APE for the Covell’s Beach landfall site is specified as follows. At the Covell’s Beach landfall site, the horizontal directional drilling (HDD) rig and its supporting equipment will occupy approximately 0.8 acres of the paved staging area in the eastern end of the two acre Covell’s Beach parking lot. As shown on Sheets 15-17 in Attachment 1, the following Project elements will require excavation into the parking lot:

1. At the upper end of the parking lot, two transitional cable joint bays (one per landfall power cable), each approximately 6 m wide by 18.9 m long (20 feet (ft) wide by 62 ft long) by 2 m (6.5 ft) deep.
2. Immediately adjacent to each joint bay, two fiber optic cable vaults (one fiber optic cable per landfall power cable), each approximately 1.8 m (6 ft) long by 1.2 m (4 ft) wide by 1.5 m (5 ft) deep.
3. Approximately 9.1 m (30 ft) from the seaward edge of the parking lot, two HDD entry pits (one per landfall cable duct), each approximately 1.5 m (5 ft) wide by 1.5 m (5 ft) long by 1 m (3.3 ft) deep.
4. From each temporary HDD entry pit, a 46 cm – 76 cm (18-30 inch) diameter High-Density Polyethylene (HDPE) pipe with a ground disturbance diameter of 91 cm (36 inches) will be installed via HDD for use in housing the export cables which will intersect with the onshore cable route. As shown on the attached Figure 1-5 in Attachment 1, HDPE conduits will run beneath the parking lot, beach and intertidal zone, emerging at an exit point approximately 305 m (1,000 ft) offshore. The HDD conduit will be approximately 6.7 m (22 ft) beneath the middle of the beach; and at its deepest point, the conduit will be approximately 9.1 m (30 ft) below the seafloor.
5. Between the HDD entry pit and the joint bay, the two export cables will be installed in open trenches measuring approximately 1.8 m (6 ft) in depth, 1.2 m (4 ft) in width at the bottom and 2.4 m (8 ft) in width at the top.
6. After the export cables leave the two joint bays, they will be housed inside the proposed concrete encased duct bank of 8 ducts in a 4 x 2 array (6 for cables + 2 spares). Overall
concrete duct bank width will be 1.5 m (5 ft) and overall duct bank height will be 0.8 m (2.5 ft). The duct bank leaving Covell’s Beach will be installed with 0.9 m (3 ft) of cover in an open trench with approximate trench depth of 1.7 m (5.5 ft) and approximate trench width (at the top) of 3 m (10 ft). The duct bank will leave the paved parking area, cross a short segment of unpaved area between Craigville Beach Road and the northwest corner of the parking lot. The duct bank will then follow roadways, and the dimensions will be as described below under “Onshore Cable Routes.”

Landfall Site - New Hampshire Avenue (Noticed Alternative Route)

The Proponent is proposing open-trenching at the New Hampshire Avenue Landfall Site, but is maintaining a short HDD as an alternative approach. Both options are described below.

As shown on Sheet 16 in Attachment 2, at the New Hampshire Avenue Landfall Site, the in-water work area for open trenching would be enclosed with temporary sheet piling and is approximately 9.1 m (30 ft) wide and extending up to 61 m (200 ft) from shore, with a maximum depth of approximately 6.1 m (20 ft) mean sea level. A landfall transition vault would be located approximately 39.6 m (130 ft) from the landward edge of the sea wall; the vault’s expected outer dimensions are 10.8 m (35.5 ft) long by 2.8 m (9.5 ft) wide by 2.9 m (9.5 ft) tall. Each landfall cable would be installed in a 46 cm – 76 cm (18-30 inch) HDPE conduit with a ground disturbance diameter of 91 cm (36 inches) that would be trenched in from the in-water work area to the landfall transition vault; the trench dimensions for these two transfer conduits will be about 2.4 m (8 ft) in depth, 1.2 m (4 ft) in width at the bottom and 2.4 m (8 ft) in width at the top. Landward of the transition vault, the dimensions for cable installation will be as described below under “Onshore Cable Routes.”

If HDD were to be used at the New Hampshire Avenue Landfall Site instead of open trenching, the HDD rig and its supporting equipment will be set up using an up to 0.25-acre staging area near the southernmost end of New Hampshire Avenue. As shown on Sheet 18 in Attachment 2, the HDD would extend approximately 91.4 m (300 ft) offshore (total length of approximately 126 m [415 ft] long), with a 46 cm – 76 cm (18-30 inch) HDPE conduit with a ground disturbance diameter of 91 cm (36 inches) and a maximum depth of 4 m (13 ft) below mean sea level. A landfall transition vault (as described in the preceding paragraph) will be installed near the landward end of the HDD. Landward of the transition vault, the dimensions for cable installation will be as described below under “Onshore Cable Routes.”

Cable Routes - Covell’s Beach (Preferred Route)

The APE for the preferred onshore cable route associated with the Covell’s Beach Landfall Site is the Town of Barnstable right-of-way along the proposed onshore cable route (shown on Figure 1-2 in Attachment 4). As described further below, the disturbance within the right-of-way will range from 3.4 m (11 ft) wide and 2.4 m (8 ft) deep for the typical trench width to install the duct bank, or up to 10.9 m (36 ft) wide and 3.7 m (12 ft) deep where splice vaults are necessary. Both the duct bank and the splice vaults may be installed anywhere within the Town of Barnstable right-of-way; therefore,
the entire right-of-way along the onshore export cable route is considered the APE, though only a portion of the right-of-way will actually be disturbed.

At either the Preferred Route or Noticed Alternative (described in the following section), the proposed underground cable routes will be installed within HDPE or PVC pipes or sleeves encased in concrete duct banks connecting from the selected Landfall site to the Substation site. The proposed duct banks will be formed using cast-in-place concrete installed in open trenches measuring approximately 2.4 m (8 ft) in depth, 1.8 m (6 ft) in width at the bottom and 3.4 m (11 ft) in width at the top. Existing conditions within paved roadways will dictate the orientation of the duct bank, which will be either: 0.8 m (2.5 ft) wide by 1.5 m (5 ft) deep or 1.5 m (5 ft) wide by 0.8 m (2.5 ft) deep. In locations where splice vaults are necessary, the excavated area will be larger, approximately 11 m (36 ft) wide by 15.2 m (50 ft) long and 3.7 m (12 ft) deep, to accommodate pairs of pre-cast concrete splice vaults, which typically are 2.9 m (9.5 ft) wide by 10.8 m (35.5 ft) long and up to 2.9 m (9.5 ft) deep (outer dimensions). Thus, the maximum extent of disturbance within the APE (the Town of Barnstable right-of-way along the onshore cable route) is 11 m (36 ft) wide and 3.7 m (12 ft) deep.

The Preferred Route also includes Variant 1 along a utility ROW. This Variant would include the same dimensions for the duct banks or the splice vaults that are described in the preceding paragraph. For the purposes of defining the APE, an area of potential ground disturbance measuring 3.7 m (12 ft) in depth and 11 m (36 ft) in width for the entirety of Variant 1 should be considered the APE.

Cable Routes - New Hampshire Avenue (Noticed Alternative Route)

The APE for the alternative onshore cable route associated with the New Hampshire Avenue Landfall Site is the Town of Yarmouth and/or Town of Barnstable right-of-way along the proposed onshore cable route (shown on Figure 1-2 in Attachment 4). As described in the previous section for Covell’s Beach, the disturbance within the right-of-way will range from 3.4 m (11 ft) wide and 2.4 m (8 ft) deep for the typical trench width to install the duct bank, or up to 10.9 m (36 ft) wide and 3.7 m (12 ft) deep where splice vaults are necessary. Both the duct bank and the splice vaults may be installed anywhere within the Town of Yarmouth and/or Town of Barnstable right-of-way; therefore, the entire right-of-way along the onshore export cable route is considered the APE, though only a portion of the right-of-way will actually be disturbed.

The Noticed Alternative Route also includes portions that are unpaved or do not have a defined roadway right-of-way; and all or parts of Variants 2, 3, and 5 are either unpaved or do not have a defined roadway right-of-way. For the purposes of defining the APE for areas without a defined roadway right-of-way, an area of potential ground disturbance measuring 3.7 m (12 ft) in depth and 11 m (36 ft) in width should be considered the APE.

Substation Site

The APE for the Substation site is 5.9 acres of the total 6.35 acre site with a maximum ground disturbance of 4.6 m (15 ft) below the high peak of existing grade for the entirety of the roughly 5.9-acre area. The same substation site would be used regardless of the Landfall Site and onshore route
chosen. Approximately 5.9 acres of the substation site will be cleared and graded; this proposed land clearing is limited only to what is needed to accommodate the substation. To complete finished site grades, and to balance earth cuts and fills, several retaining walls will be required and excavation for and construction of these walls will be required as part of completing the site grading effort. Construction at the substation site will also require excavation of areas required for major component foundations/footings and full volume containment, excavation of the drainage swales and basins required for site drainage, and excavation of the trench for the portions of the duct bank within the substation site. As shown on Sheet 4 in Attachment 3, ground disturbing activities will vary across the site and are anticipated to be a maximum of 4.6 m (15 ft) below the high peak of existing grade for the entirety of the roughly 5.9-acre area.

Equipment Laydown and Staging Areas – Covell’s Beach Landfall Site to Substation (Preferred Route)

Equipment laydown and staging areas will be set up along the proposed routes.

As mentioned previously, for the Covell’s Beach landfall site, the HDD rig and its supporting elements will be set up using an approximately 0.8 acre staging area in the eastern end of the two-acre paved Covell’s Beach parking lot. Additional staging areas may be necessary along the onshore export cable route. Any additional staging areas will either be paved or, if unpaved, will be previously-established, well-known staging areas that are already used to support construction projects. Within these established staging areas, no excavation or vegetation clearing will be required. It is expected that, if additional staging areas are used, they will temporarily store items such as typical roadway construction equipment (excavators, backhoes, dump trucks, etc.), lengths of pipe, framing/support materials, etc. Since any additional unpaved staging areas used will be existing, previously-established staging areas that are used for multiple projects, it is not expected that these staging areas need to considered part of the specific APE for the Vineyard Wind Project.

Equipment Laydown and Staging Areas – New Hampshire Avenue Landfall Site to Substation (Noticed Alternative Route)

As mentioned previously, for the New Hampshire Avenue Landfall Site, the HDD rig and its supporting elements will be set up using an up to 0.25-acre staging area near the southernmost end of New Hampshire Avenue (as shown on Sheet 18 and on Sheet entitled “Proposed Rig Side HDD Equipment Layout (Horizontal Directional Drilling) New Hampshire Ave” in Attachment 2). For existing paved areas such as those mentioned for the Landfall Sites, no ground disturbance is expected at equipment laydown and staging areas.

As shown on Sheet 10 in Attachment 2, an equipment staging area with dimensions of approximately 0.22 acres (19.5 m [64 ft] wide by 45.7 m [150 ft] long by <0.3 m [1 ft] deep) is also proposed along the inactive extension of Higgins Crowell Road where a MassDOT bike path parking lot is proposed. As shown on Sheet 12 in Attachment 2, two additional staging areas are town-owned parcels within the Eversource ROW that while partially disturbed from the existing utility line, are unpaved. These areas are approximately 0.6 acres in size (Area 3 is approximately 22.9 m [75 ft] wide by 113 m [370 ft] long and Area 4 is approximately 30 m [100 ft] wide by 84 m [275 ft] long) and may require
minimal grading for level storage of materials. For unpaved equipment areas, the depth of potential disturbance is expected to be a maximum of 0.3-0.9 m (1-3 ft).

GIS Files
GIS files for all onshore routes and variants are attached. GIS files for the defined roadway rights-of-way where present along the onshore cable routes are also attached.
Attachment 1

Selected Plans - Covell’s Beach Landfall Site
COVELL'S BEACH SUBSEA CABLE LANDING TRANSITION PLAN

1. JOINT BAYS (3'± DEEP) TO BE BACKFILLED WITH 3" MINUS THERMAL BACKFILL. REMAINING BACKFILL TO BE SAND AND PARKING LOT BASE AS REQUIRED.

2. JOINT BAYS AREA SHALL BE COVERED BY APPROPRIATE MAGNETIC SHIELDING (IF REQUIRED) AND PROPERLY MARKED ON PARKING LOT SURFACE TO PREVENT EXTERNAL MECHANICAL DAMAGE FROM EXCAVATIONS OR FROM INSTALLATION OF OTHER UTILITIES.

3. ALL VAULTS AND CONCRETE STRUCTURES WITH ACCESS COVERS IN THE JOINT BAYS AREA SHALL BE DESIGNED FOR H-25 VEHICLE LOADINGS.

NOTES:

- 2.5' NAVD88 HIGH TIDE LINE
- APPROXIMATE LOCATION OF MAIN NORTHERN DEER

LEGEND:

- START OF CONTRACT WORK

APPROXIMATE LOCATION OF MEAN HIGH WATER

- APPROXIMATE LOCATION OF MEAN LOW WATER
COVELL'S BEACH LANDING HDD LAYOUT -
DRILL PATH 2 - 017

NOTES:

LEGEND:

1. THESE SKETCHES ARE CONCEPTUAL IN NATURE AND ARE NOT FOR CONSTRUCTION. THEY SHOULDN'T BE USED TO MAKE ANY STAKING OR EARTHWORK DECISIONS. THEY ARE TO BE CONSIDERED APPROXIMATE. THE ACTUAL LOCATIONS SHOWN WILL BE DETERMINED BY THE JOB CONTRACTOR.

2. THE CONTRACTOR IS UNOBLIGATED TO CONSIDER ANY EXISTING CONDITIONS WHICH MAY BE LOCATED PRIOR TO STARTING THE HDD. THE CONTRACTOR IS RESPONSIBLE FOR ANY EXISTING CONDITIONS AS PROVIDED FOR IN THE CONTRACT DOCUMENTS.

3. THIS LAYOUT HAS BEEN BASED ON THE CONTRACTOR'S GEOPHYSICAL SURVEY IN THE ENTRY PITS. THE CONTRACTOR IS TO VERIFY LAUNCH AND RECOVERY PITS. THE ENTRY PIT AND RECOVERY PIT LAYOUT WILL BE COMPLETED BY THE JOB CONTRACTOR FOR approve by VINEYARD WIND.
Figure 1-5
Approximate HDD Trajectory beneath Covell’s Beach

Vineyard Wind Connector
Attachment 2

Selected Plans – New Hampshire Avenue Landfall Site
PROPOSED CONSTRUCTION STAGING AREA AS ON TOWN LAND ALONG HIGGINS CROWELL ROAD. OVERALL WIDTH OF 64-FT +/- OVERALL LENGTH OF 500-FT +/- (SEE NOTE 1)

ZONE I

2x4 DUCT BANK

4x2 DUCT BANK

VAULTS #11A & #11B

STA. = 169+70

2,100' FROM PRIOR VAULT

REFERENCE DWGS:

NOTES:

LEGEND:

CLIENT/PROJECT:

SHEET

OF

REV:

DWG NO:

APPROVED:

DRAWN:

DESIGNED:

SCALE:

CHECKED:

CHECKED:

DESCRIPTION

DRAWING REVISIONS

REV.

DATE

PROJECT NO:

APPRVD

CHKD

DRAWN

DESIGNED

SCALE

CHECKED

CHECKED

COORD

COPYRIGHT RESERVED

SEAL

TITLE:

FILE NAME:

Stantec Consulting Services Inc.

IND. REVIEW

A

B

C

D

E

VINEYARD WIND

YARMOUTH, MASSACHUSETTS

AS SHOWN

M.S.B

L.K.H

198802613 33

PROPOSED DUCTBANK LAYOUT

FOR PERMITTING PURPOSES ONLY: THESE PLANS SHALL NOT BE UTILIZED FOR CONSTRUCTION UNTIL WRITTEN AUTHORIZATION IS OBTAINED FROM THE ENGINEER.
PROPOSED TEMPORARY COFFER DAM
TEMPORARY REMOVAL AND REPLACEMENT OF RIP RAP
SEE NOTES 2 & 5.

18"-30" DIA. HDPE CONDUITS WITH CABLES (2 TOTAL)

NEW HAMPSHIRE AVE
200'+/-

SHORE DRIVE

PROPOSED LANDFALL TRANSITION VAULTS
-2+14
-2+00
-1+00
0+00
1+00
2+00

EXISTING SEA WALL (COASTAL BANK)

LEWIS BAY

TOP OF HDPE CONDUITS TO BE 6-FT BELOW BOTTOM OF BAY

PROPOSED 18"-30" DIA. HDPE CONDUIT (SEE NOTE 4)

coordinates
0+00
0+50
1+00
1+50
2+00

LAND UNDER OCEAN 150' +/-

TEMPORARY COFFER DAM (5' ABOVE MLLW)

LEWIS BAY

PROPOSED NEW HAMPSHIRE AVE LANDFALL DETAILS

FOR PERMITTING PURPOSES ONLY:
THESE PLANS SHALL NOT BE UTILIZED FOR CONSTRUCTION UNTIL WRITTEN AUTHORIZATION IS OBTAINED FROM THE ENGINEER.
Figure of Onshore Routes and Variants
Vineyard Wind

Figure 1-2
Onshore Routing and Variants