OCS-A 0501 MASS USA

VINEYARD WIND

BOEM NEPA Scoping Meetings
Construction and Operations Plan Overview
April 16-19, 2018

OWNERS AND PARTNERS

LOCAL EXPERTISE, WORLD WIDE EXPERIENCE, TECHNICAL + FINANCIAL CAPABILITY

AVANGRID RENEWABLES

- **Leading provider of renewable power in the United States**
  - More than **6,500 MW** of owned and operated facilities in 22 states.
- Part of Iberdrola, the **world leader in the renewable energy industry** (30+ GW in operation)
  - 10 GW of offshore wind under development, construction, or operations.

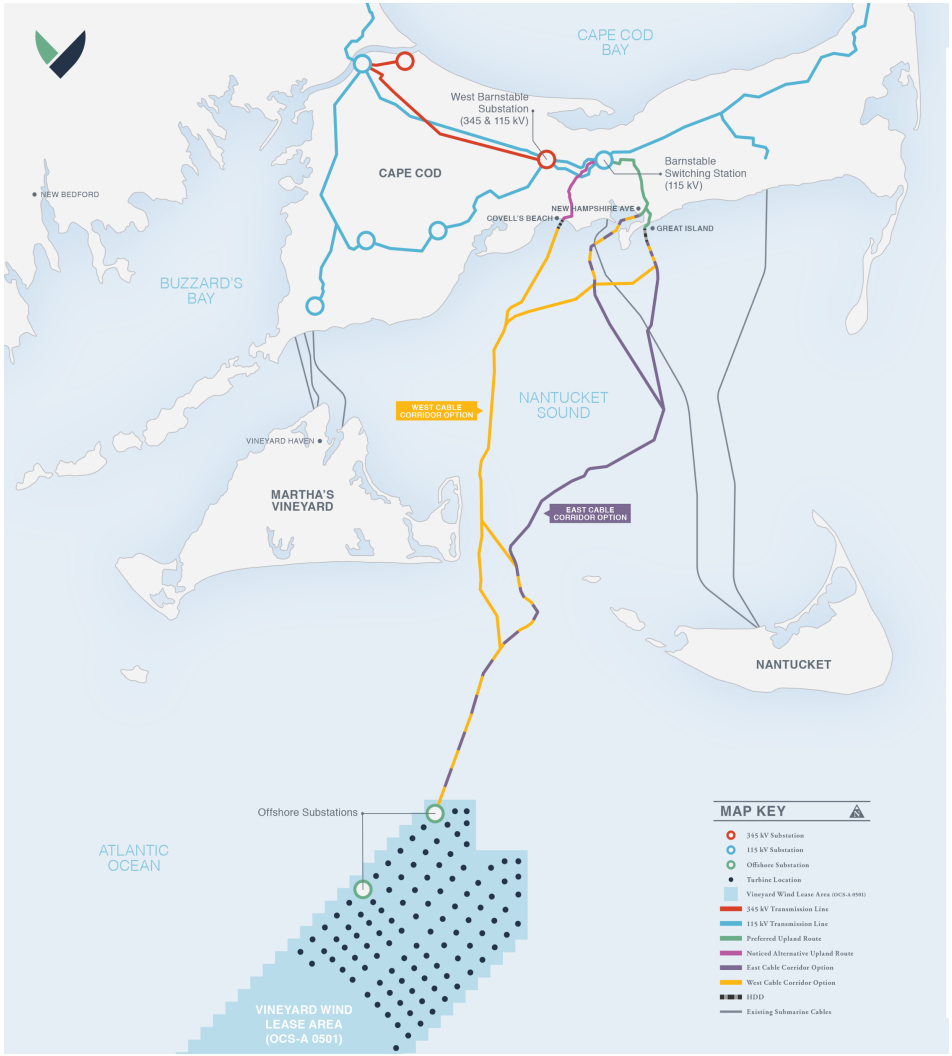
CIP
COPENHAGEN INFRASTRUCTURE PARTNERS

- **Long-term, clean energy investment** focus with 6,000+ MW offshore development portfolio in North America, Europe, Asia and Australia
- **Executive team has extensive offshore wind experience:** First projects, largest projects, most recent projects

VINEYARD POWER
A PARTNER OF VINEYARD WIND

- **Local, non-profit partner**: mission of more, community oriented renewable energy projects
- **Provides real community participation in project**:
  - Closely involved in day-to-day development activities
  - Provides guidance regarding important local issues
  - Identifies opportunities to benefit local communities

PROJECT OVERVIEW



- **Generation Capacity:** 800 MW
  - Enough energy for over 400,000 homes and businesses
  - Could be built in phases
- **Turbine area**: 14 miles from Martha's Vineyard and Nantucket
  - 106 positions being permitted, all with scour protection
- **Turbines**: Between 8 - 10 MW
- **Construction, staging and deployment base:** New Bedford
  - Support from other nearby ports
- **Operations & Maintenance:** Routine from Martha's Vineyard
  - Long-term from New Bedford or other nearby port
- **Electrical interconnection:** Barnstable Switch Substation
  - Cable landfall in Barnstable or Yarmouth
  - Up to 3 cables, in one corridor

ENVELOPE APPROACH TO PROJECT PERMITTING

Enhanced flexibility of "envelope approach" benefits all stakeholders

- **Ability to better respond to stakeholder input**: Stakeholder input during permitting process can be more readily adopted into project plans
- **Benefit from most recent experience**: Ability to incorporate latest technological improvements up until start of construction
- **Less expensive energy**: By not being locked into certain manufacturers early in the permitting process, the project can offer more competitive pricing

SCHEDULE AND CONSTRUCTION

- **Construction stages**: May occur in ~200 MW, ~400 MW, and ~800 MW increments
- **On-shore construction scheduled start**: Late 2019
- **Construction finished ("COD")**: End of 2021 - first 400MW
  - Construction of the remaining 400 MW may occur concurrently or after a gap of up to five years
- **Minimize anchoring:** Installation primarily with dynamic positioning and/or jack-up barges

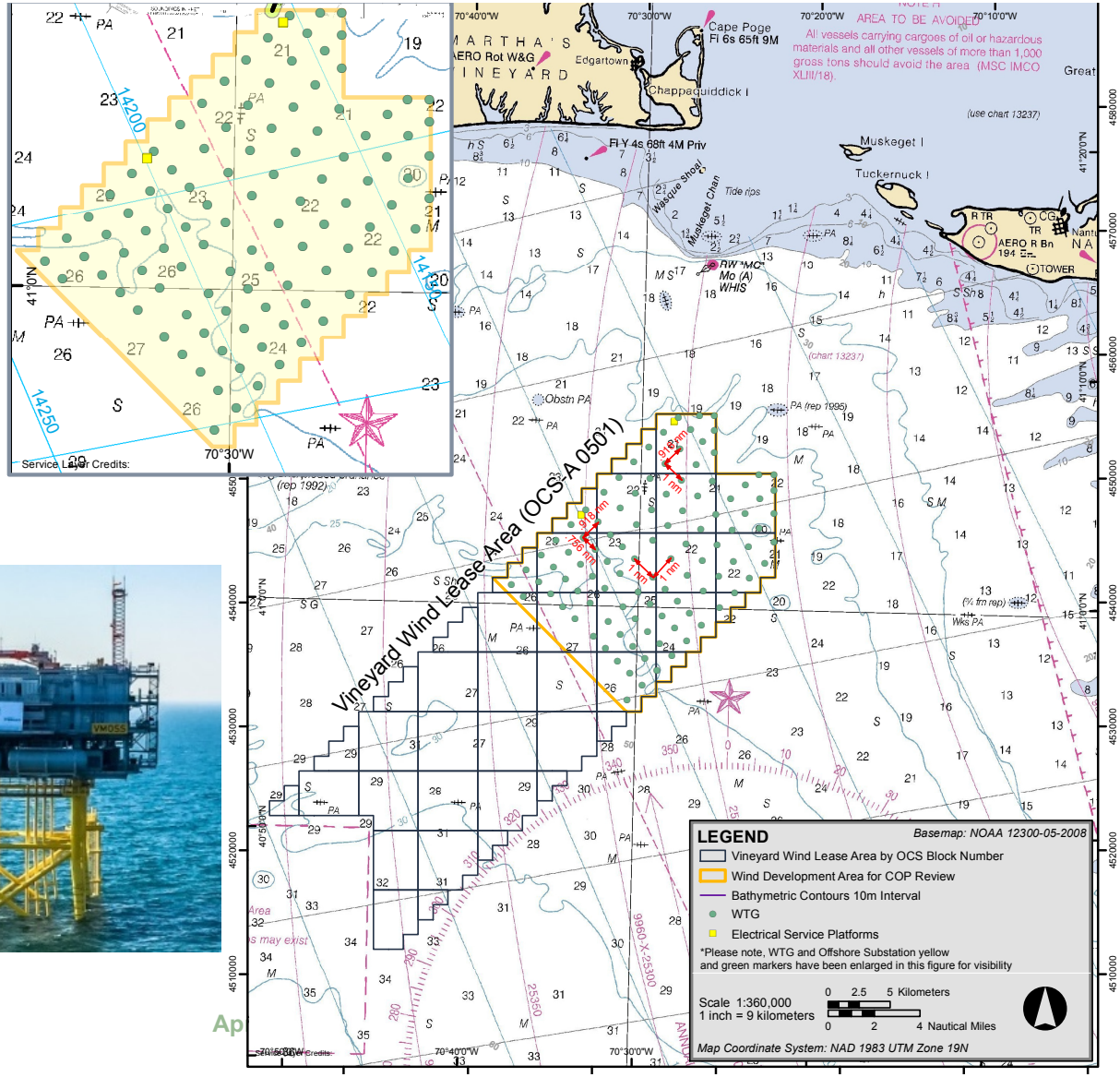
PROJECT LAYOUT

Turbines

- Fixed locations
- Spare locations
- Micro-siting expected
- 106 total (including spares)

Electric Service Platforms (ESP)

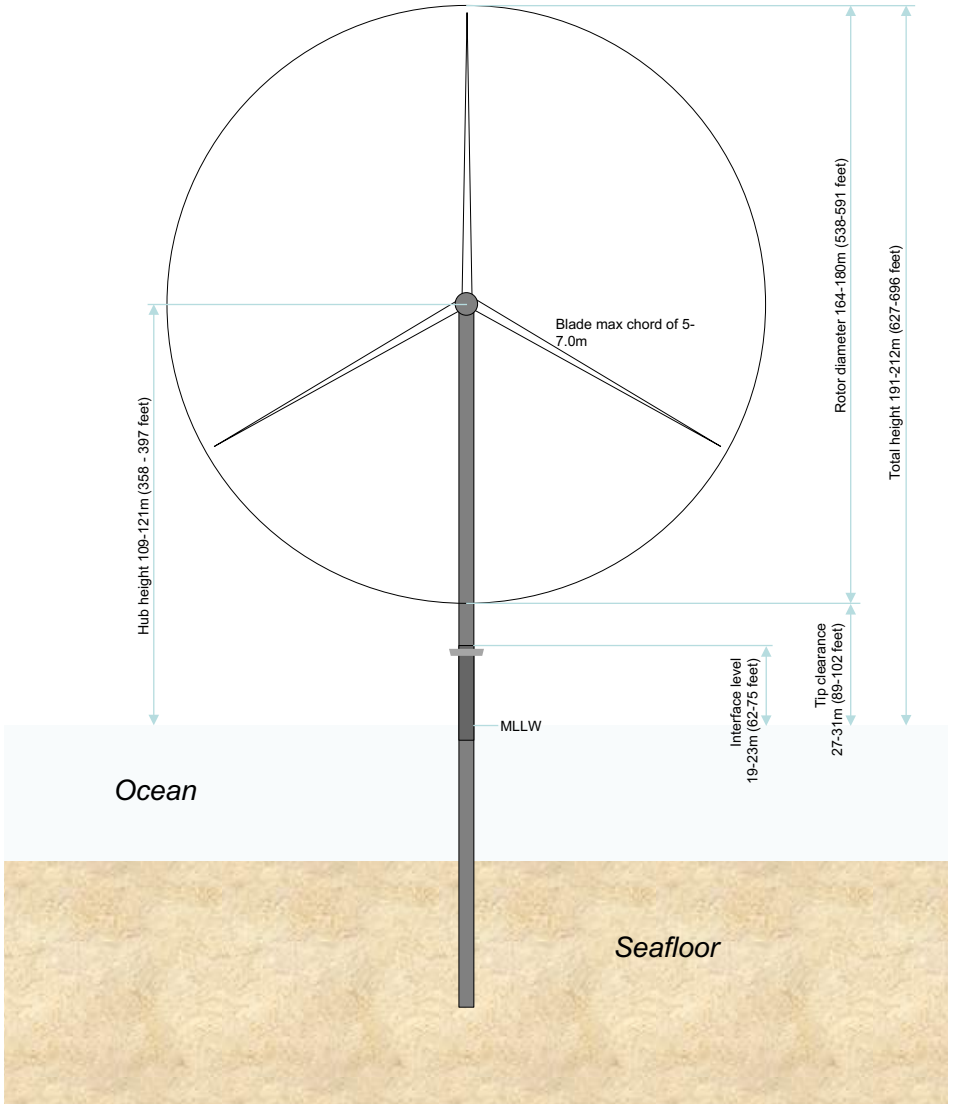
- Per 400 MW:
  - 1 traditional ESP
  - Or two lightweight ESPs
- 2 locations total
- Lightweight ESPs will be co-located



VINEYARD WIND

WIND TURBINE GENERATORS

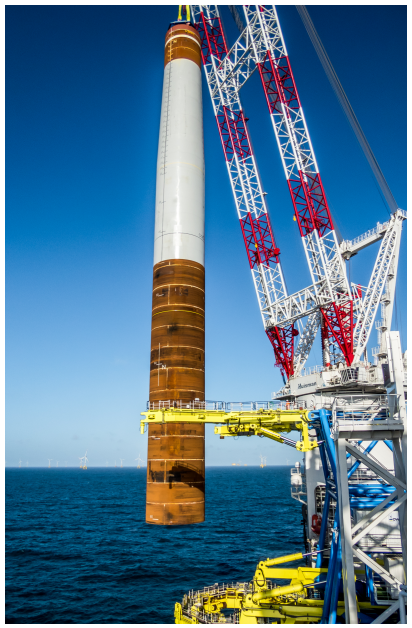
- 8 – 10MW WTG
- Rotor size of 164-180 m (538-591 ft)
- Hub height of 109-121 m (358-397 ft)

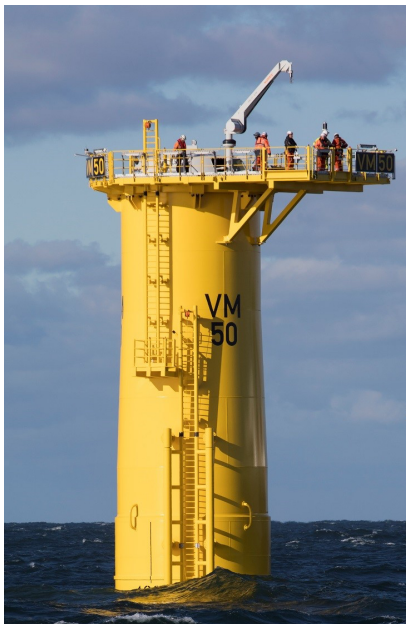


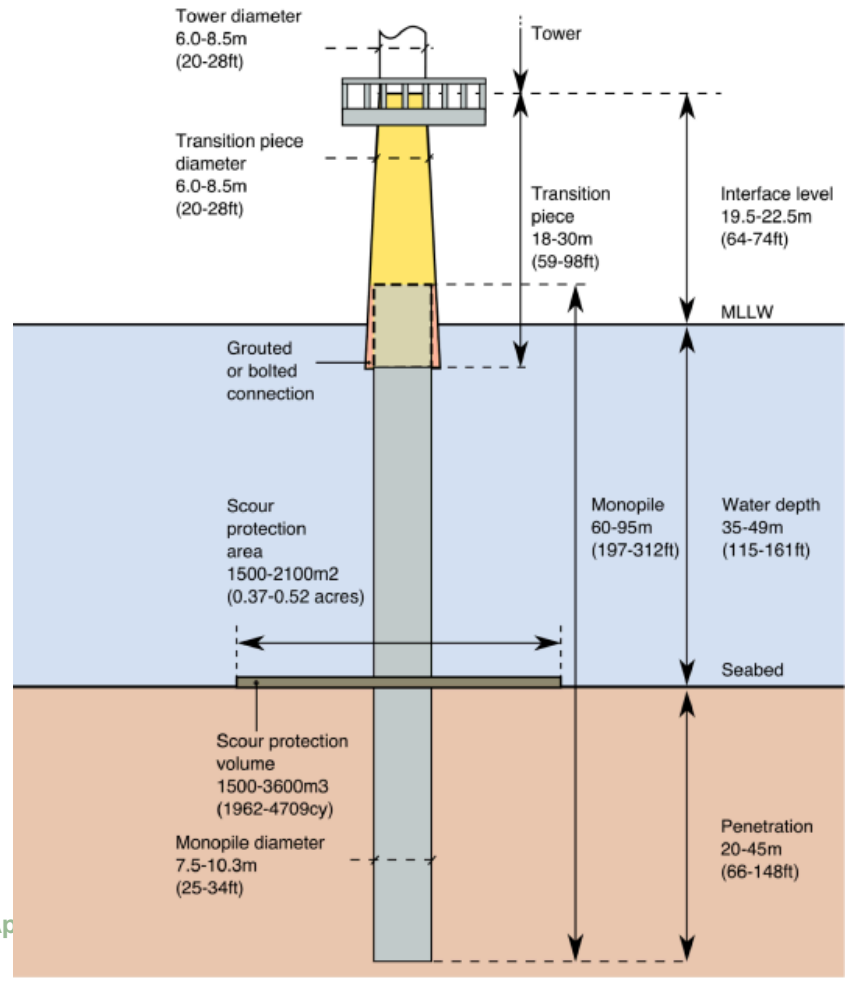
VINEYARD WIND

FOUNDATIONS

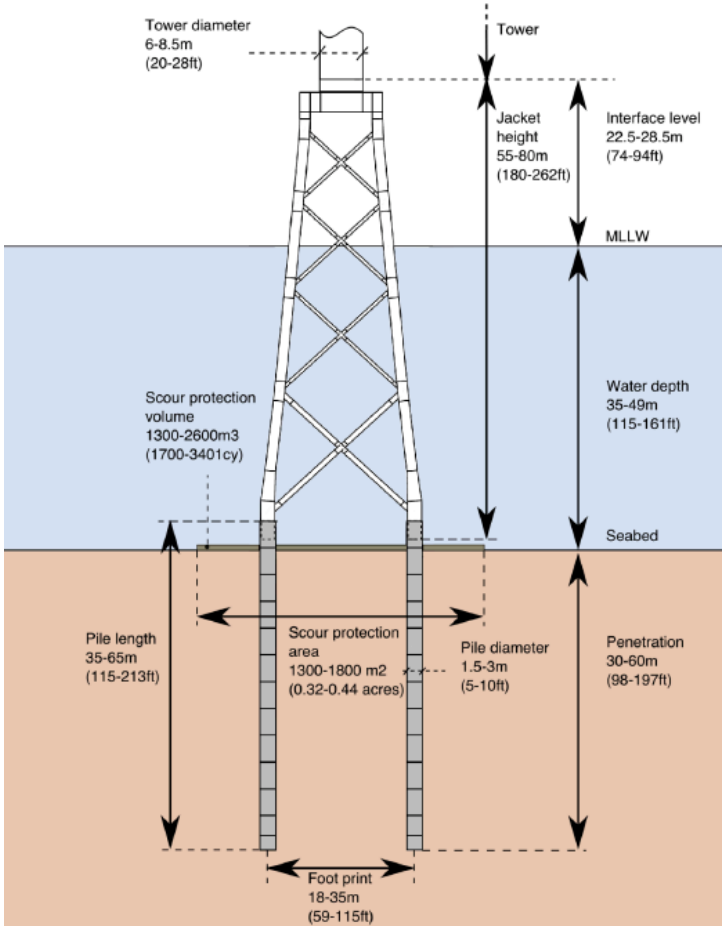
- 100% Monopiles or 50% Monopiles & 50% Jacket
- Scour protection at each location
  - Total footprint in wind farm area 0.4%
- Noise mitigation during pile driving
- Protected marine species (marine mammals & sea turtles)
  - Clear exclusion zone before initiation of pile driving





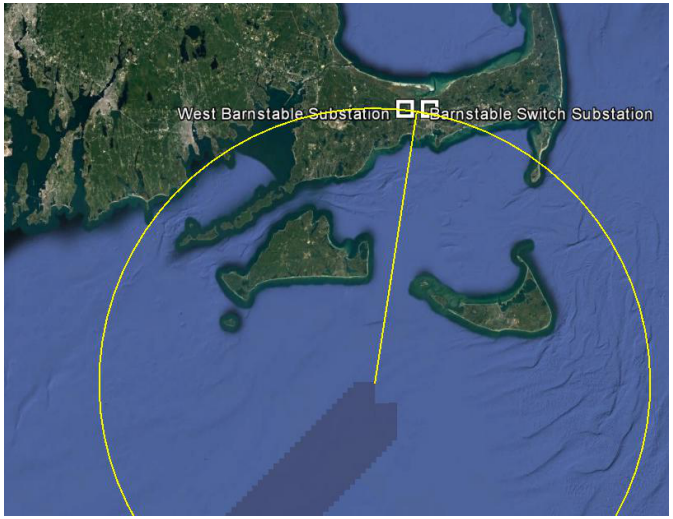


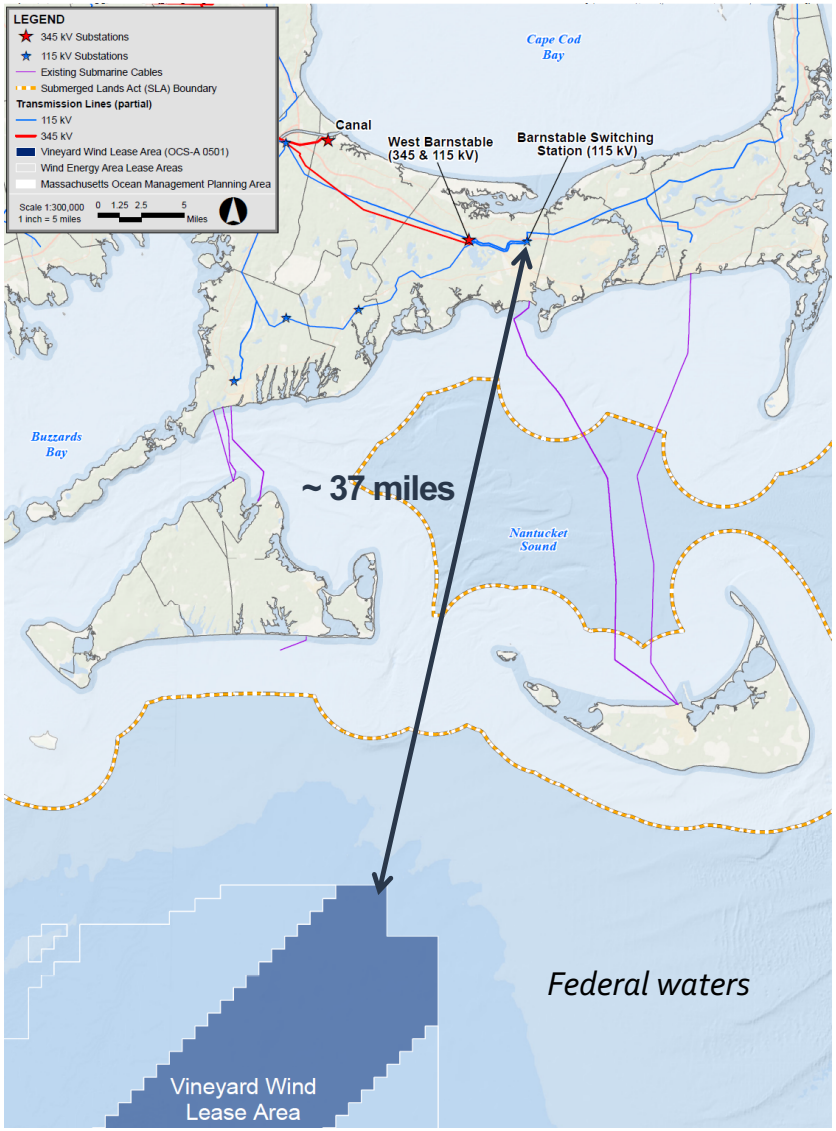
FOUNDATIONS (continued)



GRID CONNECTION

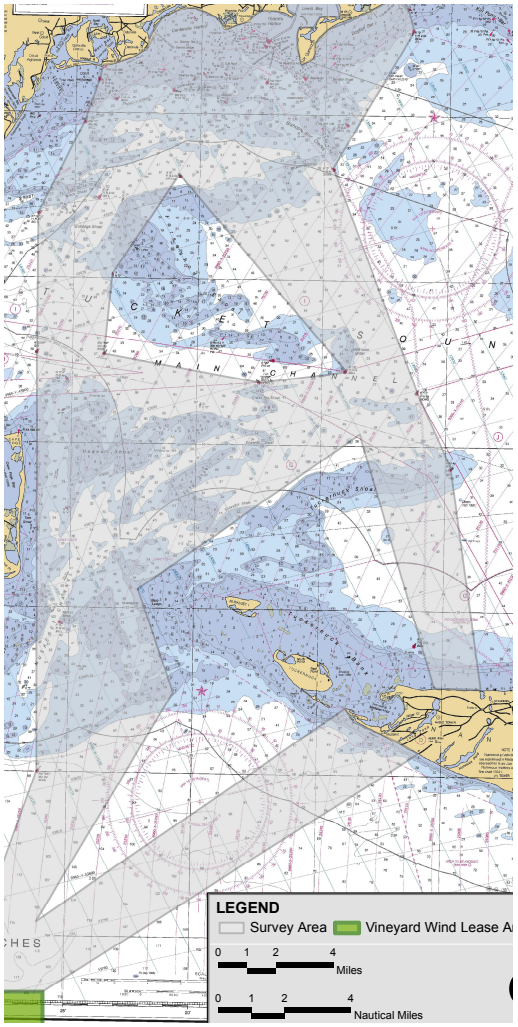
- Nearest suitable existing substations are in Barnstable
- Minimizes amount of cable installed
- No changes to existing transmission system will be required
- Connection location enhances grid reliability by providing power at edge of grid system

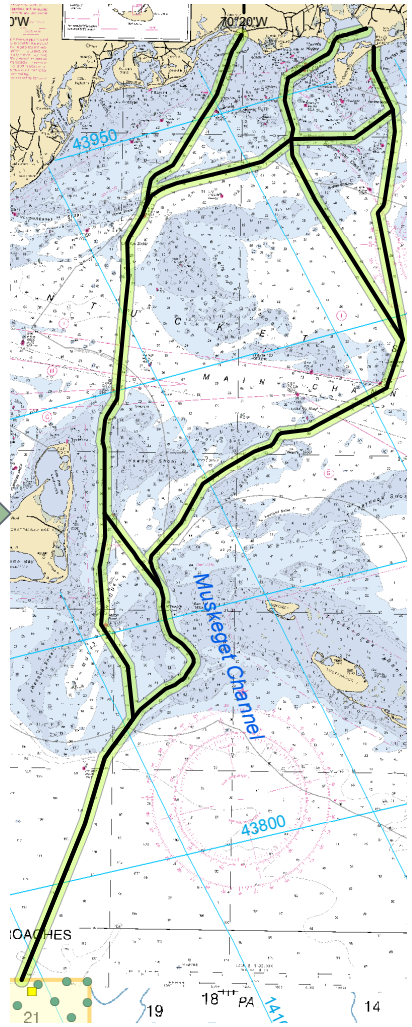




OFFSHORE CABLE CORRIDORS

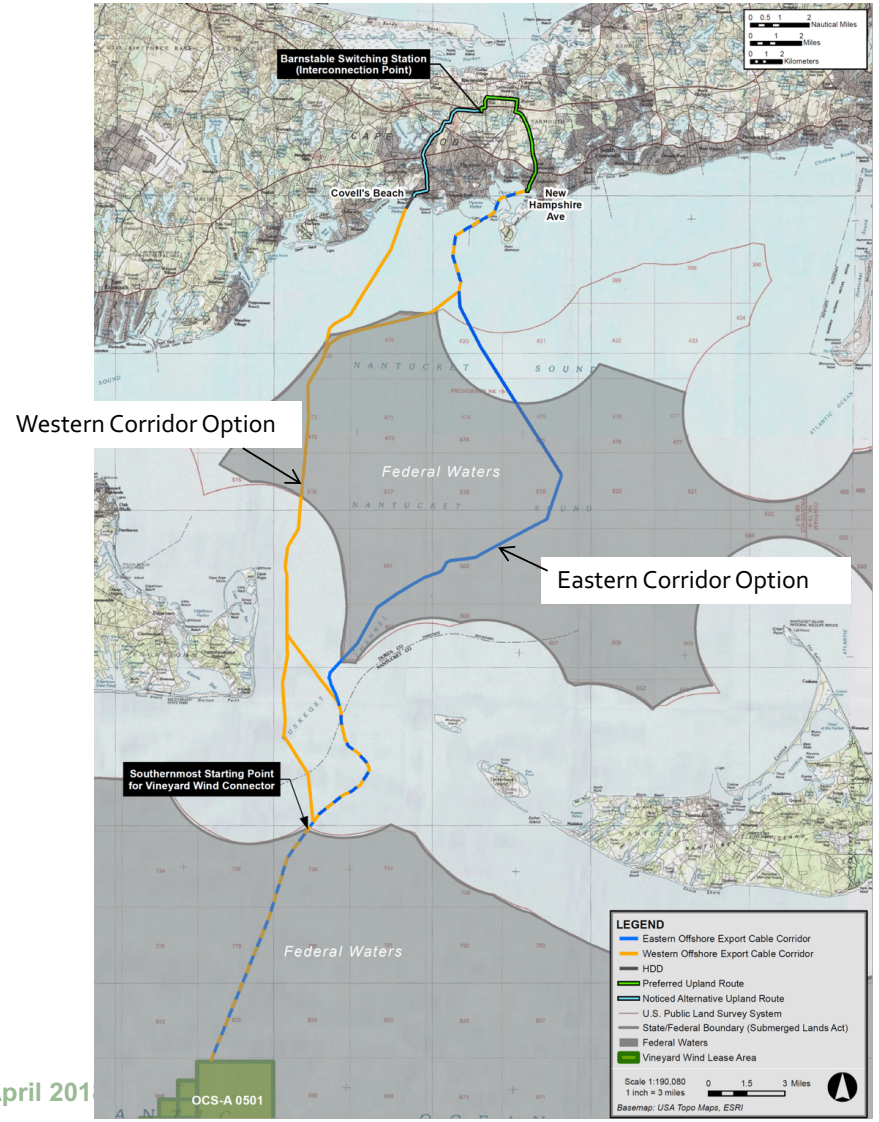
- Two possible corridors: only one will be used
  - Multiple options through Muskeget Channel
  - Landfall location
  - 2017 & 2018 offshore studies inform selection
- Routing
  - Considerations include water depth, bathymetry, sensitive habitat areas, etc.
  - Avoidance of mapped eelgrass beds
  - Minimization of potential impacts to hard/complex bottom areas
- Installation via jet-plow, plow, or mechanical trenching
  - Up to three cables in single 810m corridor
  - Target burial depth = 5 to 8 feet (1.5 to 2.5 m)
  - 6-foot-wide swath affected by trenching
  - Where sand waves are present, dredging will be used to achieve target burial depth





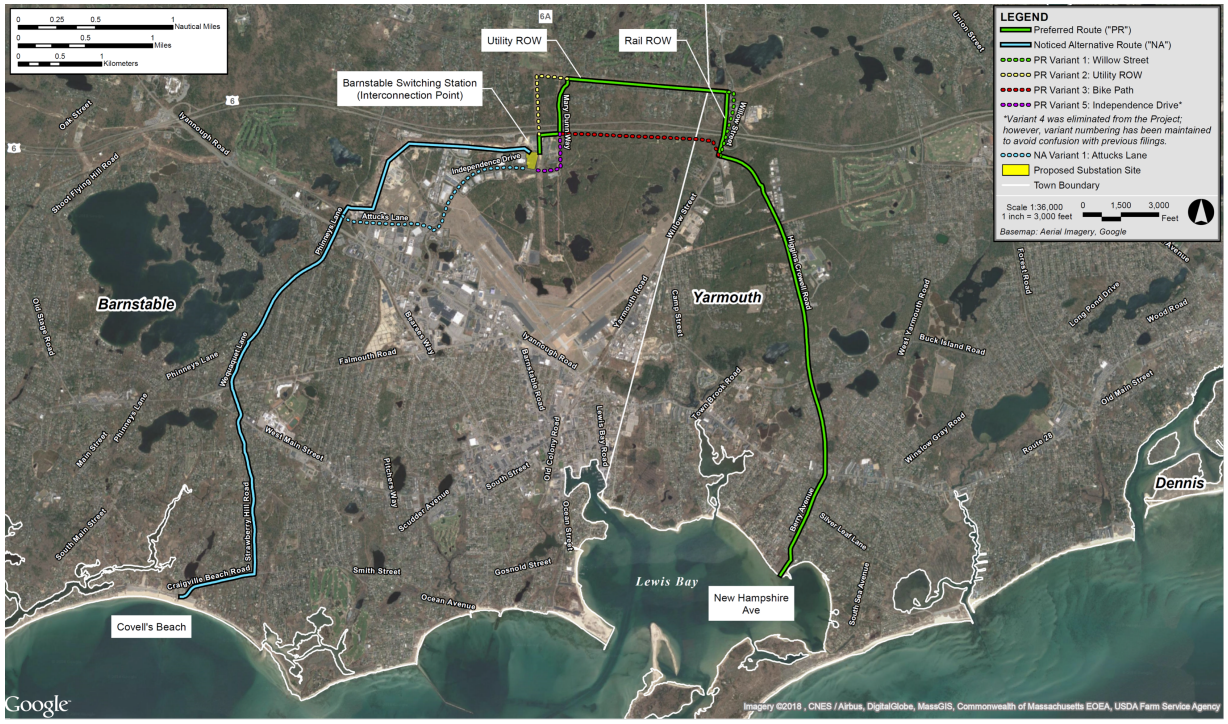
VINEYARD WIND CONNECTOR
(also under state / local permitting reviews)

- Extensive routing analysis
  - Minimize environment and community impacts
  - Landfall sites
  - Grid interconnection points and substation location
  - Route length
- Offshore export cables
  - 220 kV, solid, no liquids
  - Up to 3 cables, all in one corridor
  - ~35-40 miles (~21 in state waters)
- Onshore export cables
  - 220 kV, solid, no liquids
  - All underground, installed in concrete duct bank
  - ~6 miles
- Onshore substation
  - Stepdown (220/115 kV) transformers
  - Located adjacent to existing substation in industrial park
  - Full dielectric fluid containment



ONSHORE CABLE ROUTE OPTIONS

- **Preferred Route and Good Alternative**
  - Variants also under consideration
- **Cables entirely underground**
  - Installed in concrete duct bank
  - Predominantly beneath existing roadways
  - Some existing railroad and utility ROW
  - No mapped rare species habitat
  - Only inland wetland resource areas are Land Subject to Coastal Storm Flowage and Riverfront Area
  - Installed via open trenching
  - Possible HDD at cable landfall
- **Onshore substation:**
  - Stepdown (220/115 kV) transformers
  - Located immediately south of existing substation in industrial park
  - No rare species habitat or wetlands
  - Full dielectric fluid containment

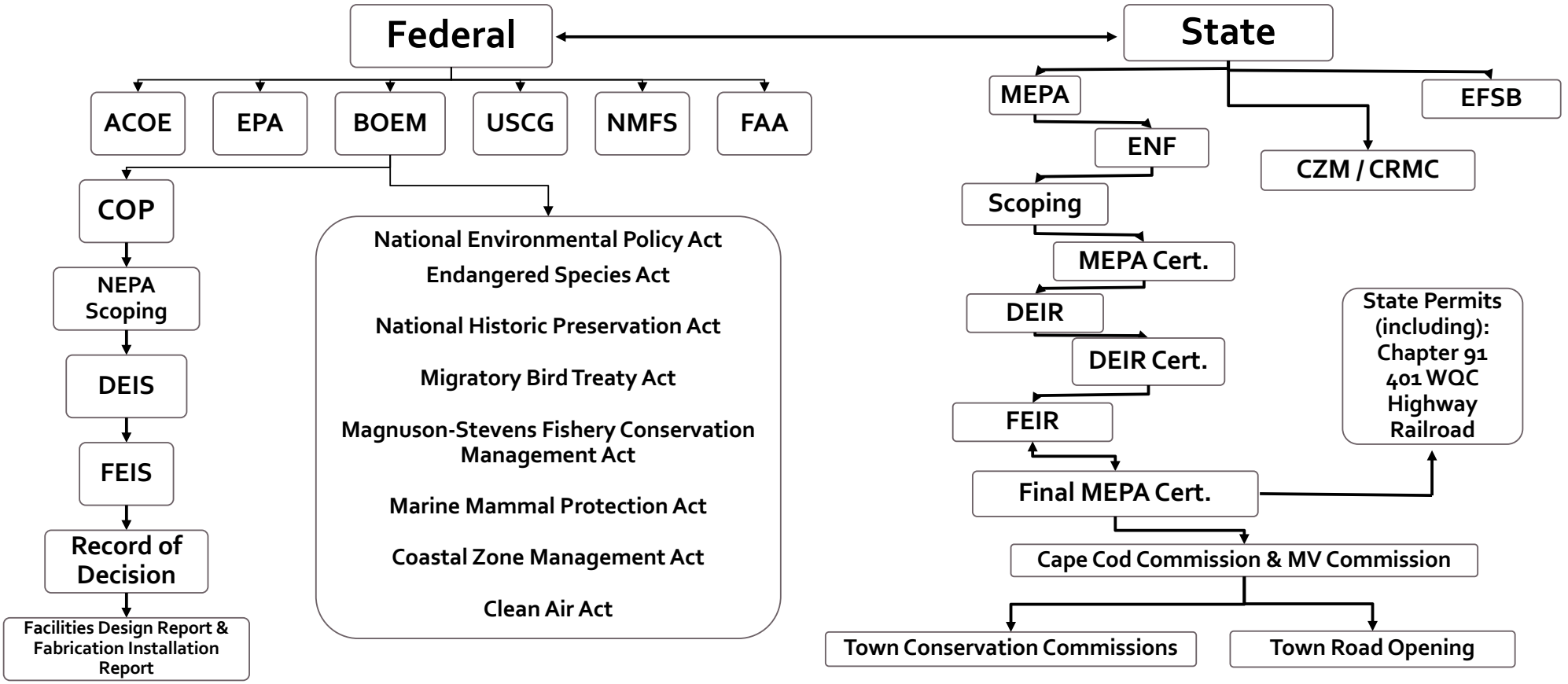


CONSTRUCTION AND OPERATIONS PLAN (COP) CONTENTS

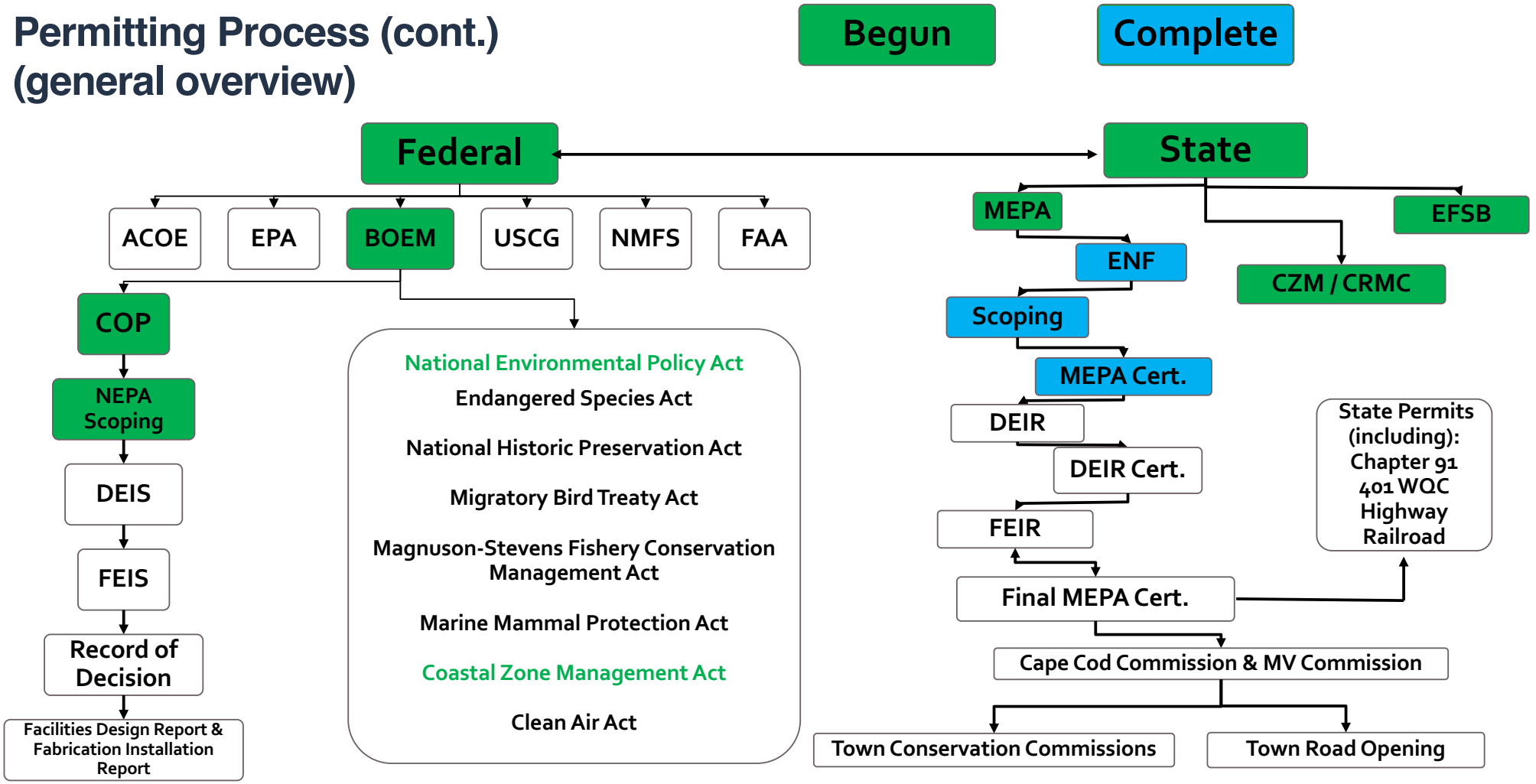
VOLUME I	VOLUME II	VOLUME III
Project Description • Overview • Location • Structures • Activities (Installation) • Regulatory Framework • Agency Contacts and Stakeholder Coordination **Appendices** • Draft Oil Spill Response Plan • Draft Safety Management System • CVA Statement of Qualifications • CVA Scope of Work • Hierarchy of Standards	**Survey Results** • Site Geology and Environmental Conditions • Shallow Hazards Assessment • Geological Results Relevant to Siting and Design • Results of Biological Surveys • Archaeological Resource Report **Appendices (Summarized)** • Geological Survey Results • Benthic Reports • Grab Sample and Grain Size Analysis • Vibracore Analysis	**Impact Assessment and Analysis** • Applicant Purpose & Need • Project Summary • Project Evolution • Benefits, Impacts, & Mitigation • Physical Resources • Biological Resources • Socioeconomic Resources **Appendices (Summarized)** • Hydrodynamic / Sediment Dispersion • Air Emissions • Avian & EFH • Benthic Monitoring Plan • Fisheries Communication Plan • Archaeology and Visual Reports • Marine and Air Navigation Reports • Scour

Permitting Process (general overview)

Review universe of technical options and locations → Define project envelope → Submit federal and state applications



Permitting Process (cont.) (general overview)



CONSULTATIONS ON-GOING

- Alliance to Protect Nantucket Sound;
- Association to Preserve Cape Cod;
- Cape and Islands Self-Reliance;
- Cape and Vineyard Electrical Cooperative;
- Cape Cod Fishermen's Alliance;
- Cape Light Compact;
- Climate Action Business Association;
- Coalition for Social Justice;
- Conservation Law Foundation;
- Coonamessett Farm Foundation;
- Eastern Fisheries;
- Environment Massachusetts;
- Environmental Business Council of New England;
- Environmental League of Massachusetts;
- Hercules SLR;
- Long Island Commercial Fishing Association;
- Martha's Vineyard Fishermen Preservation Trust;
- Massachusetts Audubon Society;
- Massachusetts Clean Energy Center;
- Massachusetts Fisheries Institute;
- Massachusetts Fisheries Working Group;
- Massachusetts Fishermen's Partnership and Support Services;
- Massachusetts Habitat Working Group;
- Massachusetts Lobstermen's Association;
- Nantucket Rotary Club;
- National Academies of Sciences, Offshore Renewable Energy Development and Fisheries Conference;
- National Wildlife Federation;
- Natural Resources Defense Council;
- New Bedford Port Authority;
- New England Aquarium;
- New England Energy and Commerce Association;
- New England Fishery Management Council;
- Northeast Fisheries Sciences Center;
- Northeast Fishery Management Council;
- Northeast Fishery Sector Managers X, XI, XIII, VII, VIII;
- Port of New Bedford;
- Recreational Fishing Alliance;
- Rhode Island Fishermen's Advisory Board;
- Rhode Island Habitat Advisory Board;
- Scallop Industry Advisors Meeting;
- Seafreeze
- Sierra Club;
- Stoveboat - Saving Seafood;
- The Nature Conservancy;
- Town Dock;
- University of Massachusetts (various campuses); and
- Woods Hole Oceanographic Institute.

ACTIVE CONSULTATION WITH FISHERMEN

Early and on-going engagement with fishing community

- **Most important**: On-going participation in working groups and individual/small group meetings
  - Detailed and candid conversations
  - Logistically easier to arrange (more of them, less difficult to participate)
- **Construction studies**: Agreement with SMAST for pre- and post-construction fishery studies
  - SMAST will consult with fishing industry, regulators and academia - on what should be studied
  - Data will be publicly available
- **Transparent plan**: Active and continuously updated fisheries communication plan reviewed by regulators, fishermen and fishing organizations (and on website)
- **People facilitate communication**: Fishery Liaison (FL) and Fishery Representatives (FR)
  - First Fisheries Representative in the nation for offshore wind (2010)
  - Full-time Fisheries Liaison (May 2018)
  - Always seeking to expand FR network
- **Taking communication into action - Continuous Improvement**:
  - Changes to project design already made, and more under consideration
  - Ready to participate, e.g. central clearinghouses for fisheries information and gear loss/damage compensation

ON-GOING FISHERIES CONSULTATIONS I: ACTIONS ALREADY TAKEN

- Align turbines (grid pattern) to facilitate transit
  - As opposed to random layout which produces more power
- 1nm transit corridors NW/SE
- Add Loran lines to all project charts (included in COP)
- Include AIS on all turbines
- Provide electronic chart of lease area for plotters
- Pre, during, and post construction studies
  - Agreement with SMAST to decide what to study (using expert/scientist input) and carry out study
  - Collecting recommendations for study (e.g. rock box and squid mops)
  - Make data public
- Input to Fisheries Communication Plan (current version always available on vineyardwind.com)
  - Implement a way to test how the communication is working
  - Plan for additional communication with recreational fishing
  - Communicate more through the Management Councils (and various subgroups)
  - Look for multiple avenues to reach fishermen
  - Ensure we reach both state and federally permitted fisheries
  - Continue to address and refine *how* each of the goals will be implemented and flexible to address feedback
  - Further development to add in details as communications, permitting, and construction plans evolve
- Input regarding better notification of survey work (also helps for construction communications and learning what works and what doesn't):
  - Fliers
  - Email lists (e.g. DMF, NMFS, RIDEM)
  - Newspaper ads
  - Meetings
  - Notification to fishing organizations (to reach membership)
  - Physical mailings
  - Electronic ads on frequently visited websites (e.g. fisherynation.com)
  - USCG Notice to Mariners
  - Special, continuously updated section of website

ON-GOING FISHERIES CONSULTATIONS II: ACTIONS UNDERWAY OR INVESTIGATION

- **Turbine lay-out:**
  - Remove turbines along 20 fathom line ?
  - E/W and N/S corridors ?
  - Active review of adjacent layouts with USCG and other wind project developers
- **Construction planning:**
  - Use agreed transit corridors for construction vessels so fixed gear can avoid conflict
  - Planning for coordination within port during construction
  - On-going notifications and communication avenues
- **Larger sized rocks for scour protection so as to increase lobster habitat**
  - Differing requests from among fishing industry
  - Negative impacts due to technical limitations of installation of larger sized scour protection
- **Minimize silting caused by installation**
  - Ongoing discussions of best installation techniques with cable installers and inclusion of many techniques in the COP
- **Addressing direct impacts**
  - Ready to discuss options such as central clearinghouse for gear / loss damage and measuring fishing effort

DATA SOURCES FOR FISHING ACTIVITY

(other data sources used for biology and habitat information)

- More data sources on fishing activity are always welcome -

- **Socio-Economic Impact of Outer Continental Shelf Wind Energy Development on Fisheries in the U.S. Atlantic (2017)** Volume 1, Volume 2
  - http://www.data.boem.gov/PI/PDFImages/ESPIS/5/5580.pdf
  - https://www.boem.gov/ESPIS/5/5581.pdf
- **The Northeast Ocean Data Commercial Fishery Datasets:** http://www.northeastoceandata.org/data-explorer/
  - http://www.northeastoceandata.org/files/metadata/Themes/CommercialFishing/VMSCommercialFishingDensity.pdf
- **Spatiotemporal and Economic Analysis of Vessel Monitoring System Data Within Wind Energy Areas in the Greater North Atlantic**
  - https://epsilon.sharefile.com/d-s3834a6315404a28b
  - This is RI DEM's report based on VMS, trip and dealer reports.
- **Massachusetts Ocean Management Plan:**
  - https://www.mass.gov/files/documents/2016/08/qh/2015-ocean-plan-v1-complete.pdf
  - https://www.mass.gov/files/documents/2016/08/pp/2015-ocean-plan-v2-complete.pdf
- **Rhode Island Ocean Special Area Management Plan (SAMP):**
  - http://seagrant.gso.uri.edu/oceansamp/pdf/samp_crmc_revised/RI_Ocean_SAMP.pdf

THANK YOU

For the latest project information and document access please visit:

www.vineyardwind.com

We can be reached at:

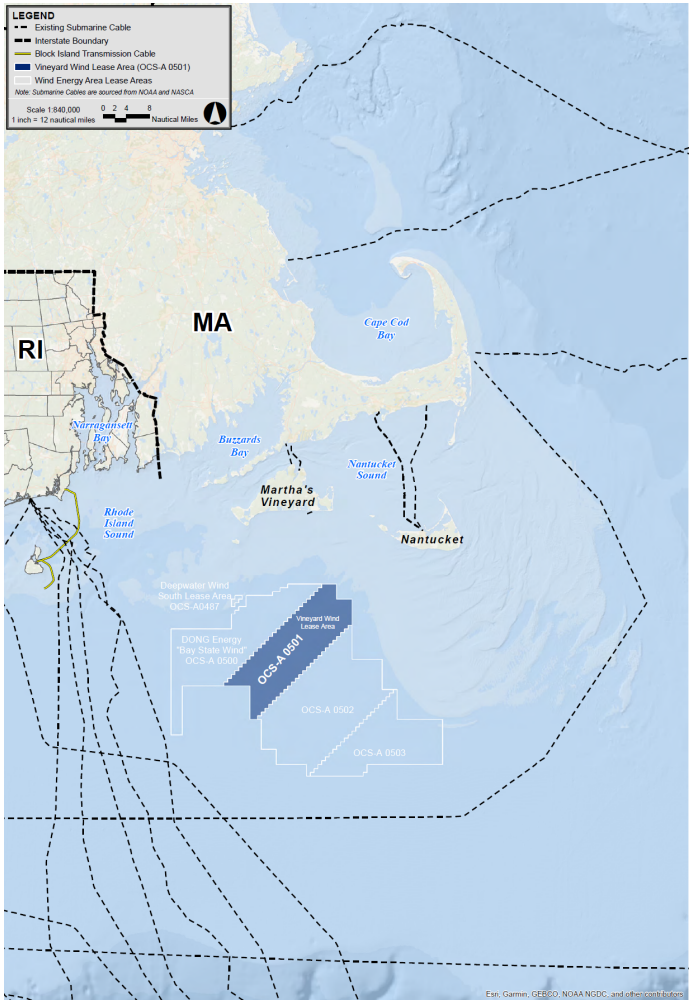
Info@vineyardwind.com
508-717-8964

Fishermen please contact us via:

fisheries@vineyardwind.com

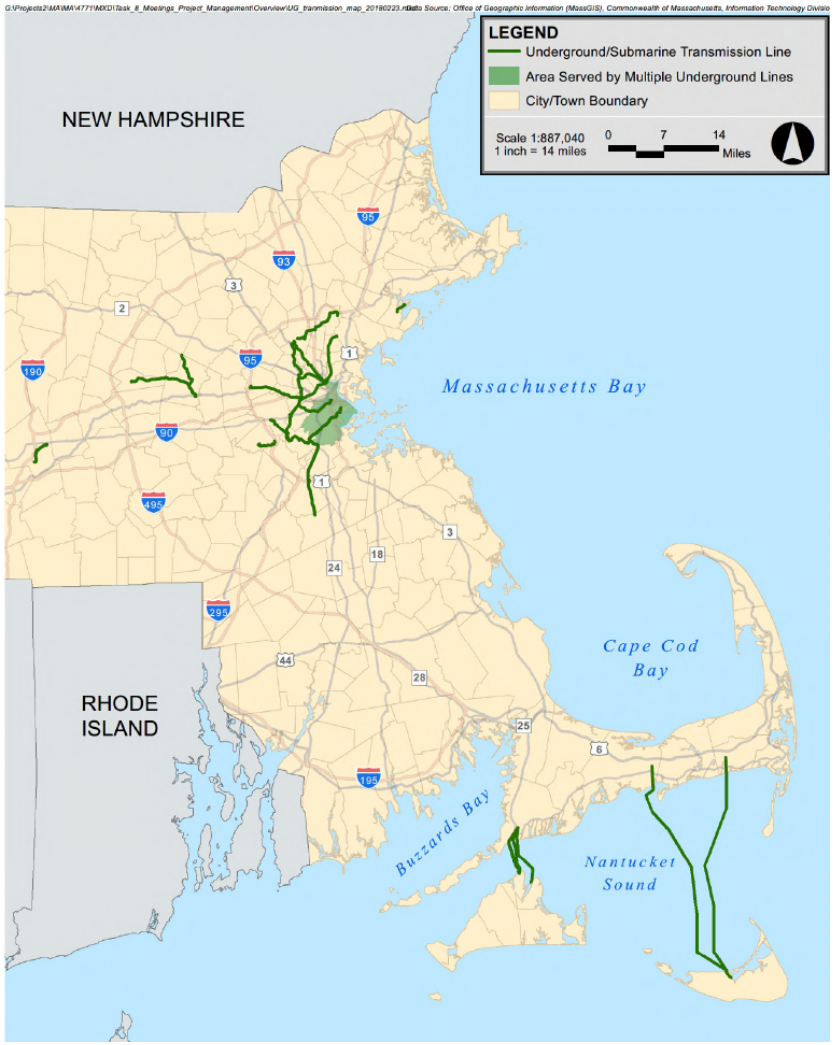
EXISTING SUBMARINE CABLES

- 2 power cables to Nantucket
  - each ~28 miles long
- 3 power cables to Martha's Vineyard
- Cable to Block Island
  - ~20 miles
- 2 cables between New Haven and Long Island
  - ~25 mi, ~15 years ago
- Sayreville NJ to Long Island
  - 50 miles of submarine cable
  - 15 mile underground on Long Island
- Many communications cables
  - Decades old in many cases



EXISTING BURIED POWER CABLES in Massachusetts

- 125 miles of high-voltage buried cables in Massachusetts today
- Onshore and offshore
- Located in 34 towns
- All of which have operated safely for many years (decades)



EXISTING CABLE LANDING IN BARNSTABLE (Kalmus Beach)

- Cable under Ocean Street
- ~ 5 miles under roads
- Installed 2005
- Serves Nantucket

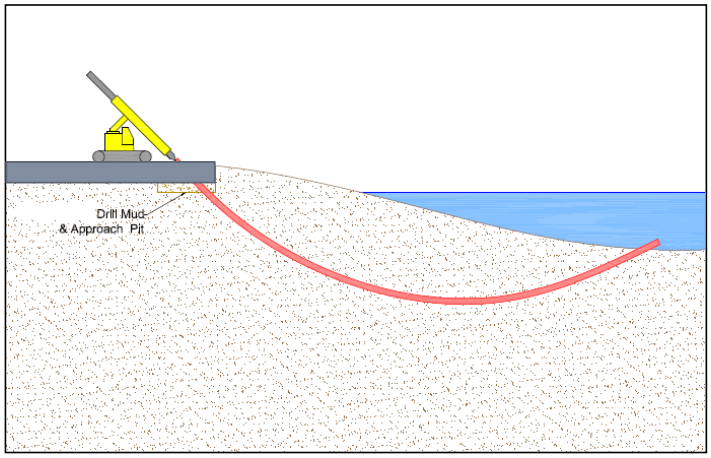
PREFERRED LANDFALL SITE: New Hampshire Avenue, Yarmouth

- No currently mapped eelgrass near site
- No sensitive habitat / endangered species
- Fully submerged at high tide:
  - Bounded by existing bulkheads
  - Backed by a degraded concrete seawall
- Adjoining residential area with large amount of summer season only occupancy
- Open trench installation proposed
  - Less space used in roadway/parking area
  - Faster installation
  - In-water works about the same
  - Short HDD also being considered

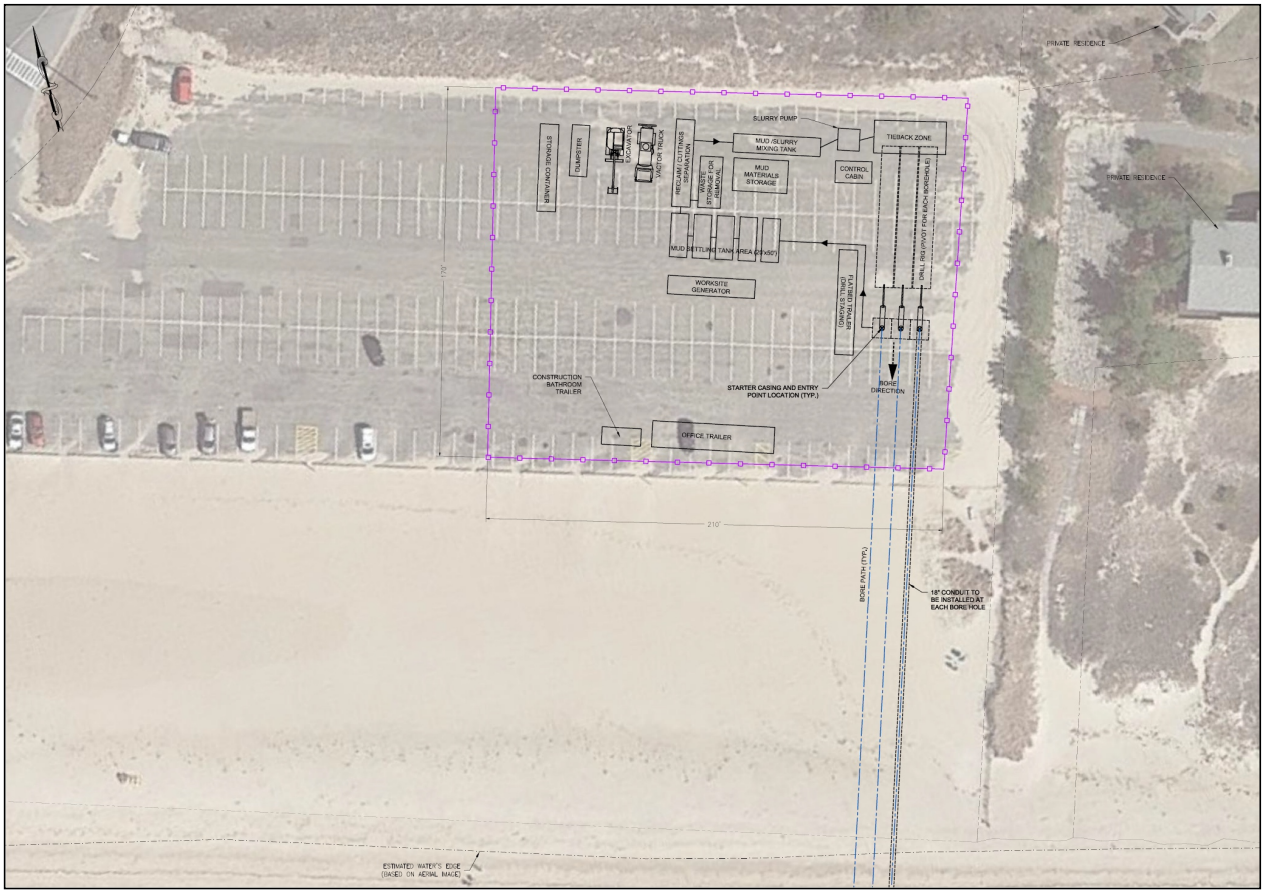
VINEYARD WIND

ALTERNATIVE LANDFALL SITE: Covell's Beach, Barnstable

- No mapped eelgrass offshore
- Horizontal directional drilling
  - No impacts to beach
  - Temporary use of existing parking lot, off-season work
  - Cable deep under beach
- Propose to repave entire parking lot



Schematic of typical land-based HDD setup and trajectory
Not to scale



Schematic of HDD Layout

LEWIS BAY

- No eel grass beds
- Cable won't impact Bay's main ecological challenges: Nutrient pollution from on-site septic, increased fine sediment, vessel traffic
- Consideration of local fisheries:
  - Seasonal Bay Scallop fishery
  - Four active aquaculture grants
  - Recreational and commercial quahog resources
- Bathymetric study of Bay ongoing
- Working with Town of Yarmouth on mitigation measures for any short-term impacts
- Fisherman access considered in traffic plan
- Additional safeguards for fisheries under discussion
- Avoid beach landings with sensitive habitat or need to HDD