

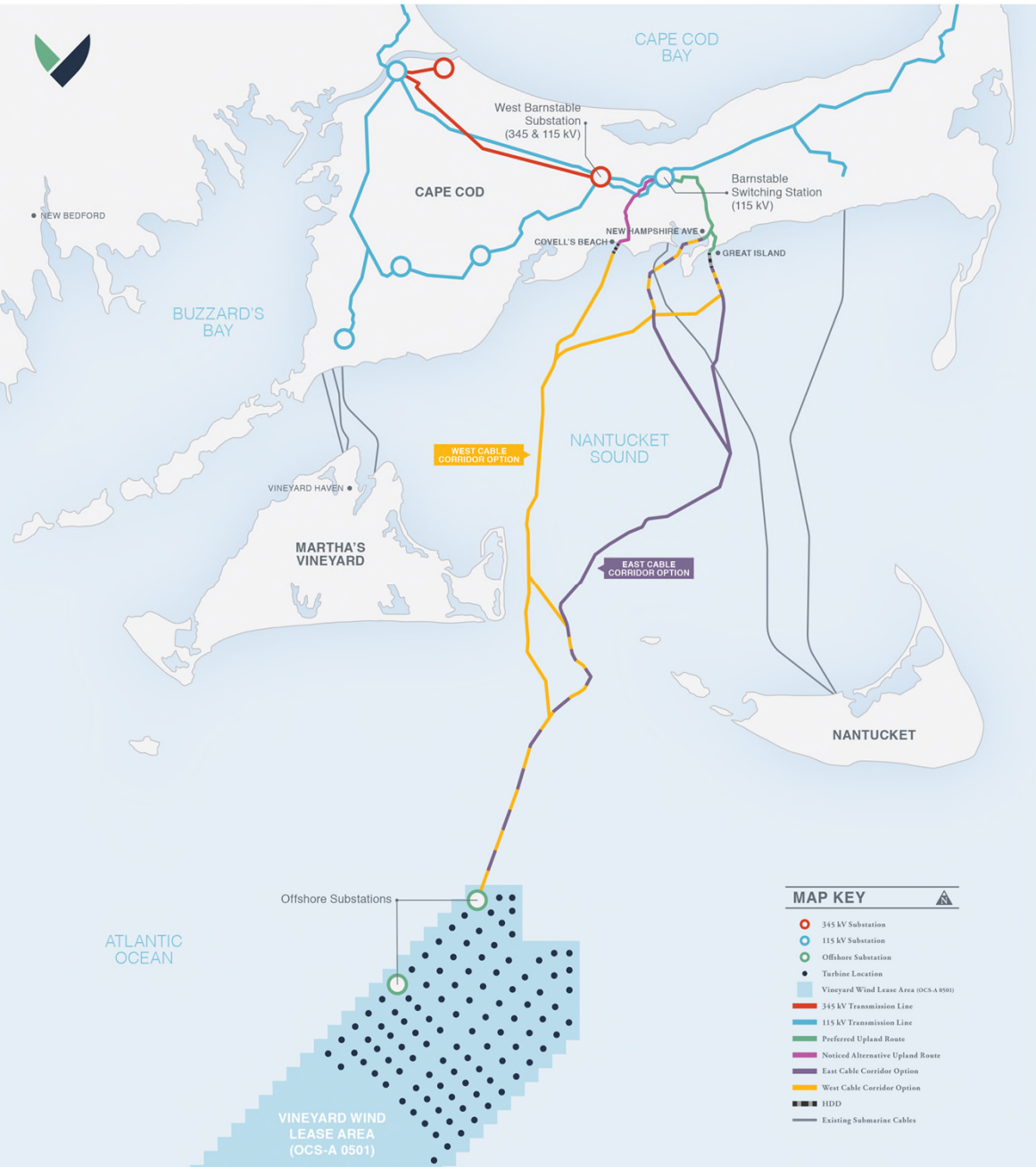


VINEYARD WIND

Fisheries Working Group

May 7, 2018

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

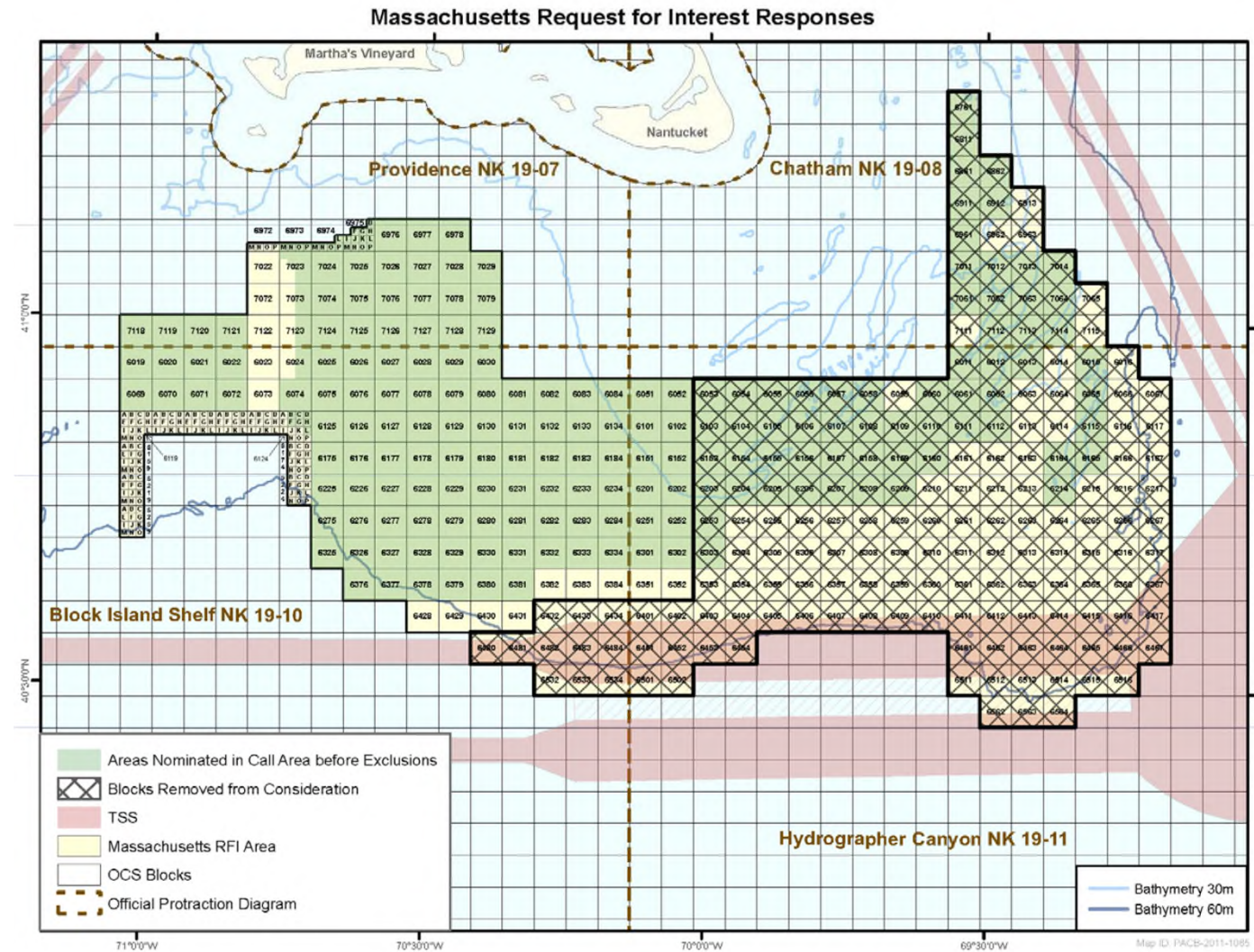
SCHEDULE AND CONSTRUCTION



- **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

TURBINE SITE IDENTIFIED BY MULTI-YEAR STAKEHOLDER PROCESS

- BOEM – Federal Process
 - 2010 BOEM Task Force
 - Local government representatives
 - Multiple stakeholder meetings
 - Habitat and fisheries working groups
 - 2011: Request for Interest
 - 2012: Environmental Assessment & Call for Information
 - 2014: Lease Sale Notices
 - 2015: Auction and Lease issuance
 - 2015 – Present: Task Force & Working Groups on-going guidance and consultation
- Massachusetts Policy
 - Energy Diversity Act of 2016
 - Utilities procure total of 1600MW of offshore wind



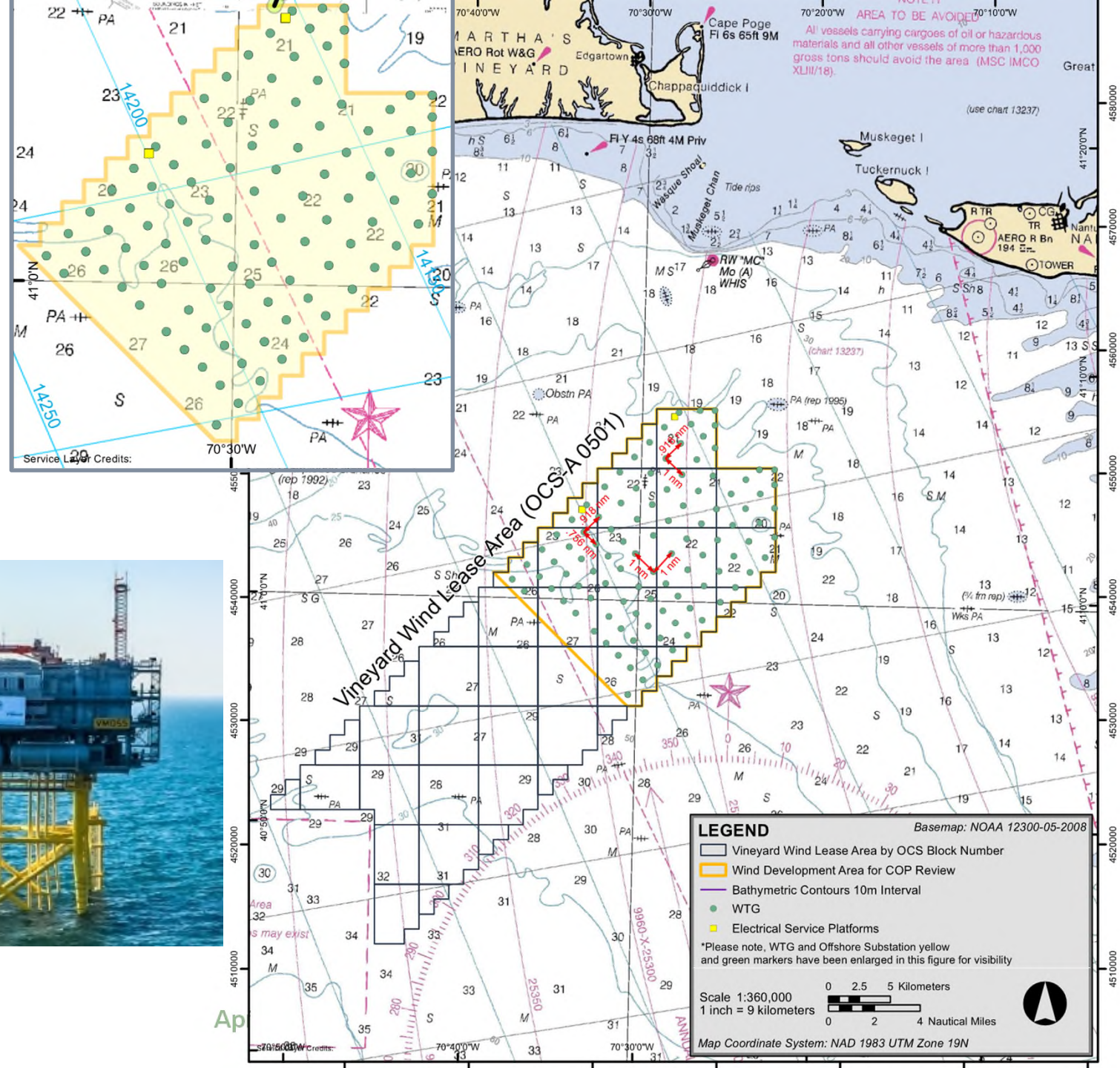
PROJECT LAYOUT

Turbines

- Fixed locations
- Spare locations
- Micro-siting expected
- 106 total (including spares)
- 0.8nm average distance, 1nm corridors

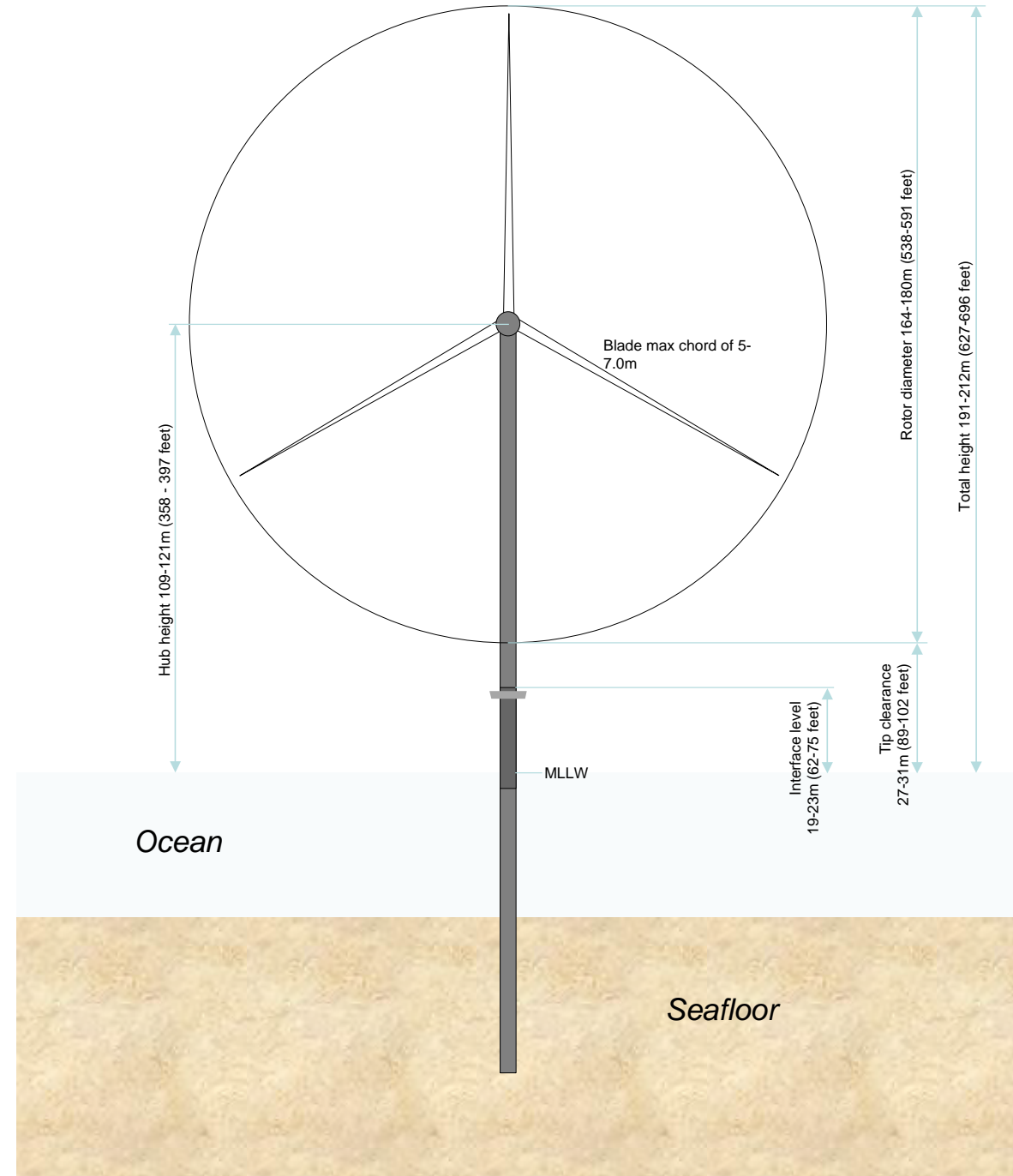
Electric Service Platforms (ESP)

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



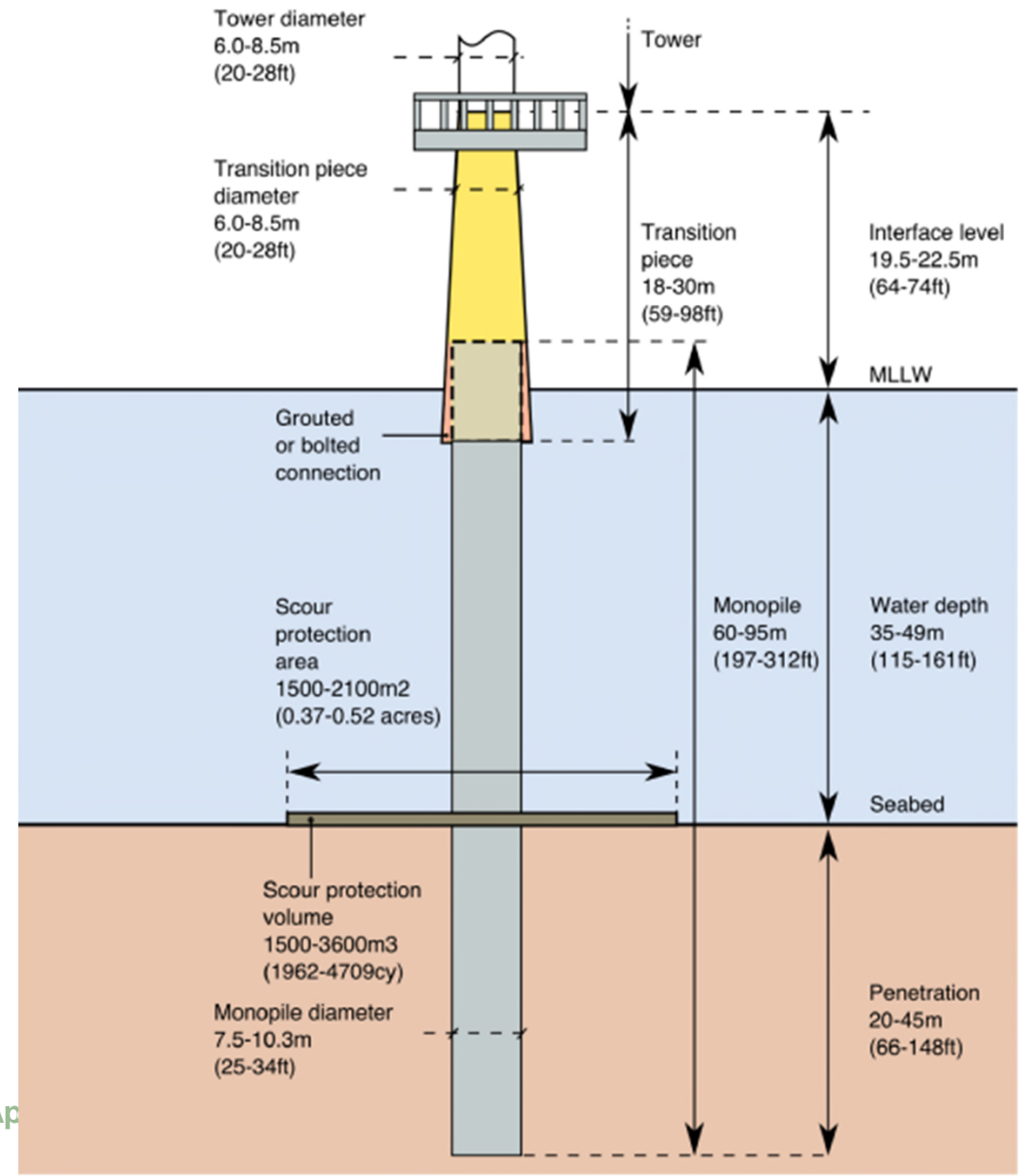
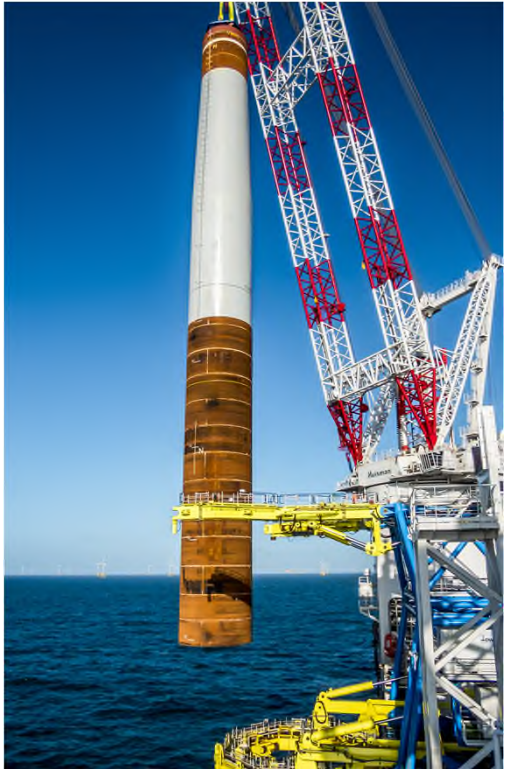
WIND TURBINE GENERATORS

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

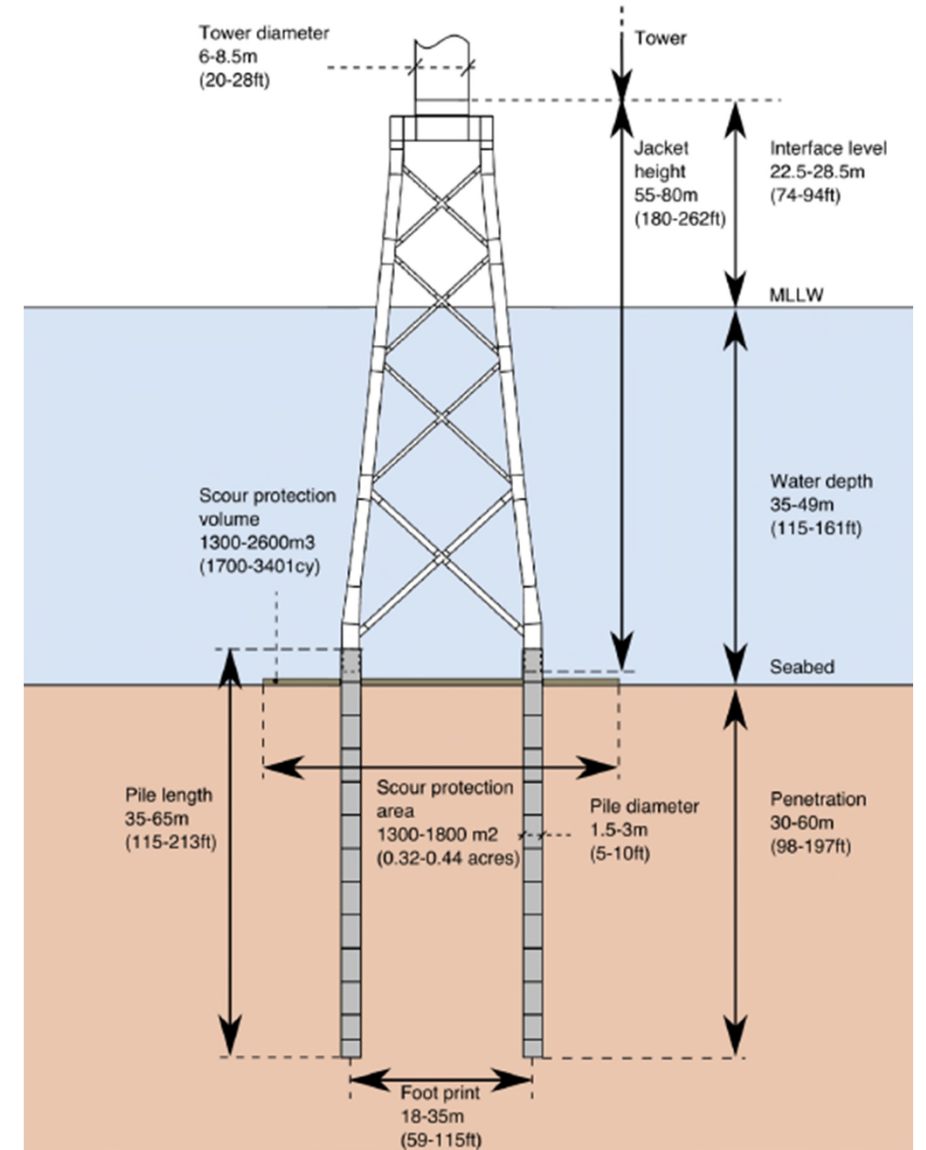


FOUNDATIONS

- 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

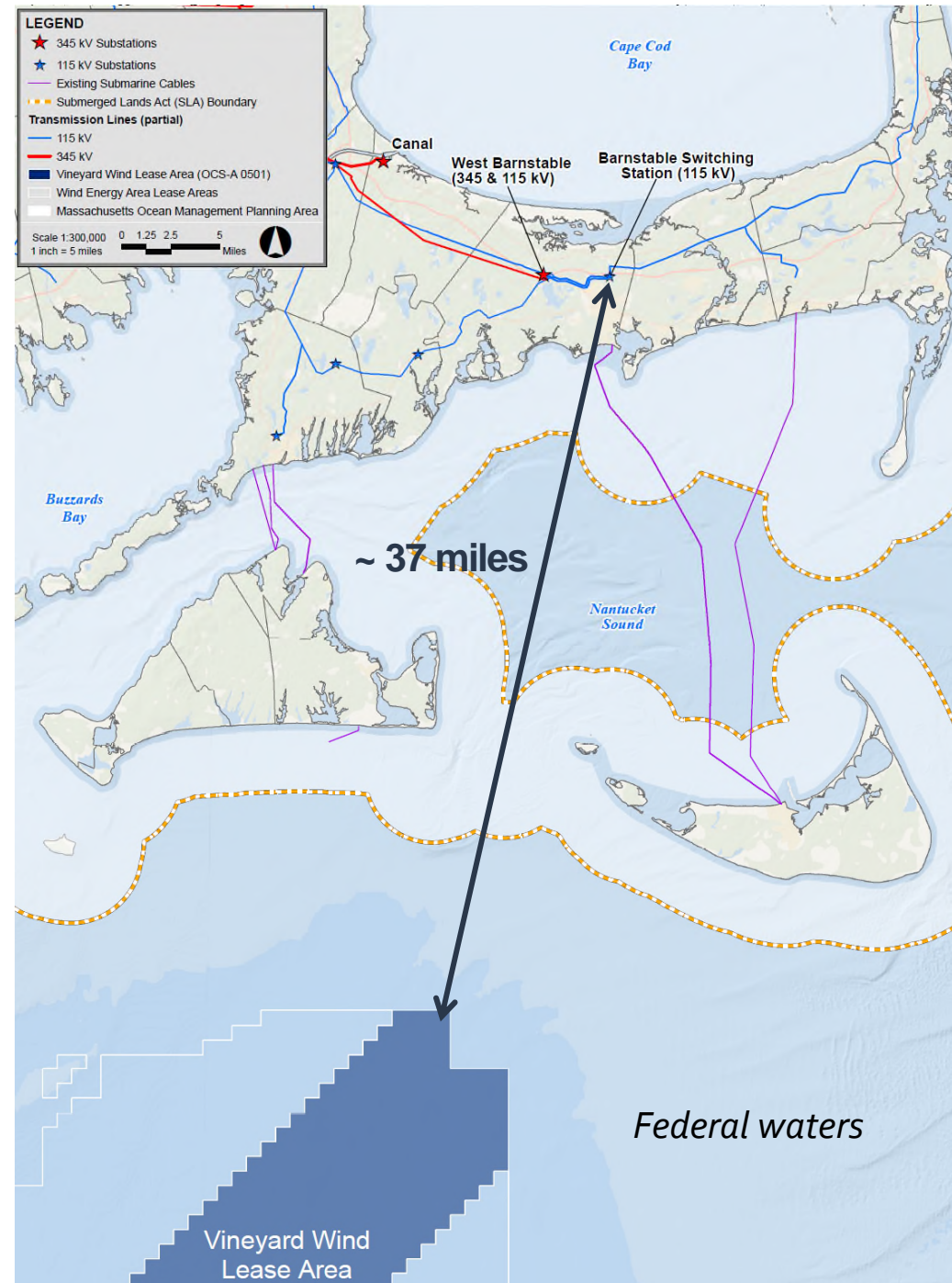
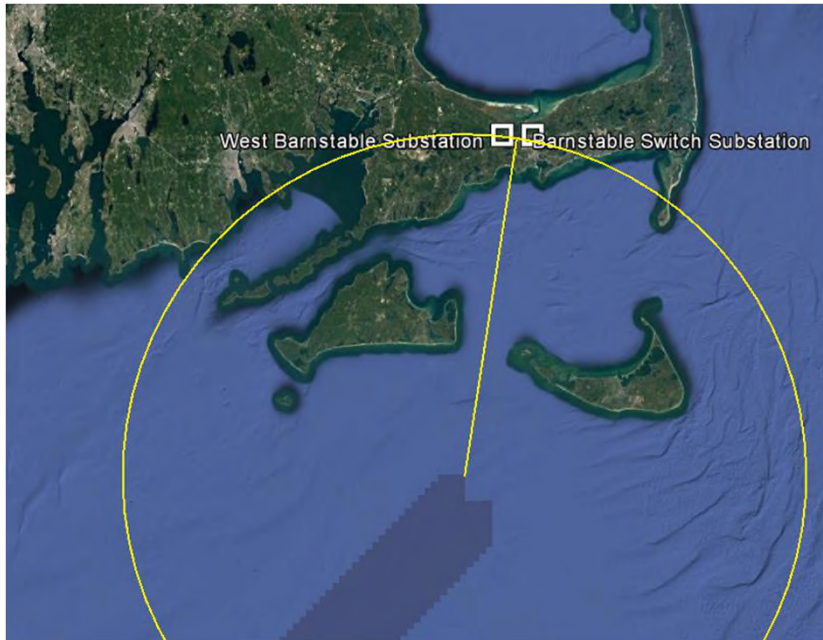


FOUNDATIONS (continued)



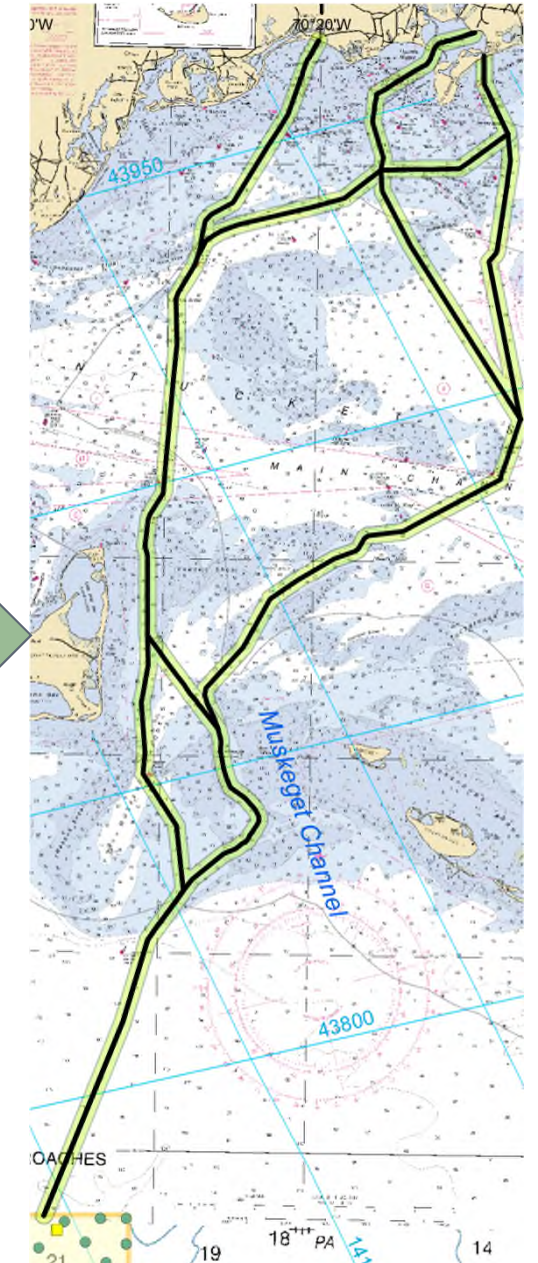
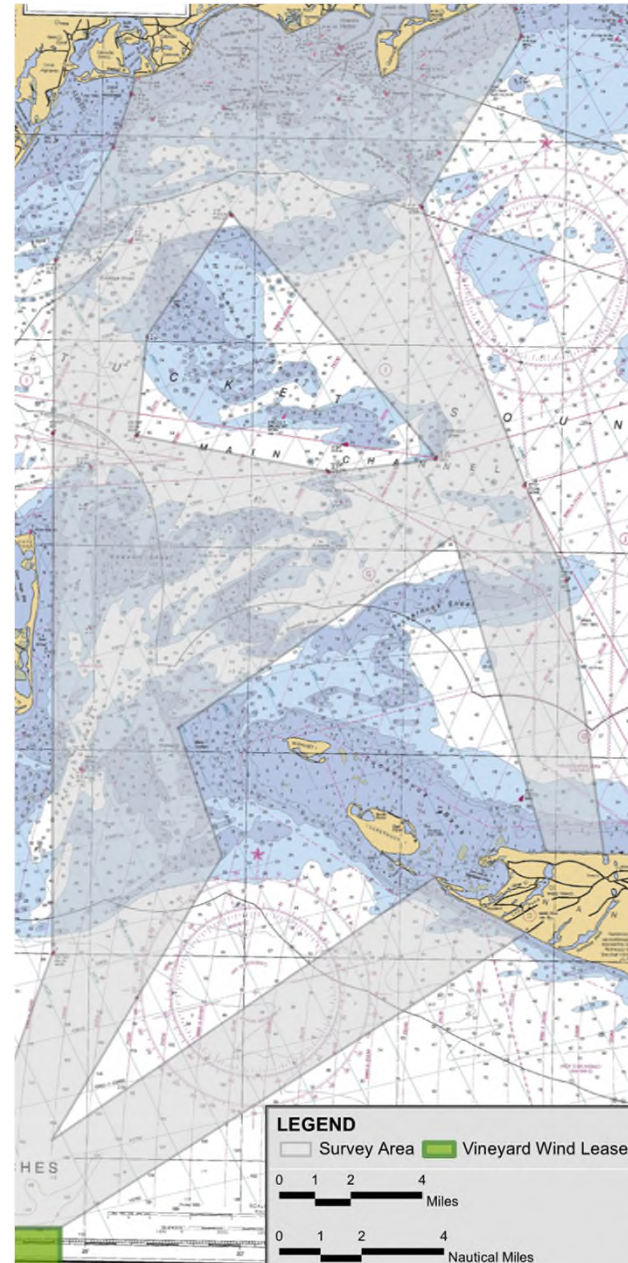
GRID CONNECTION

- 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

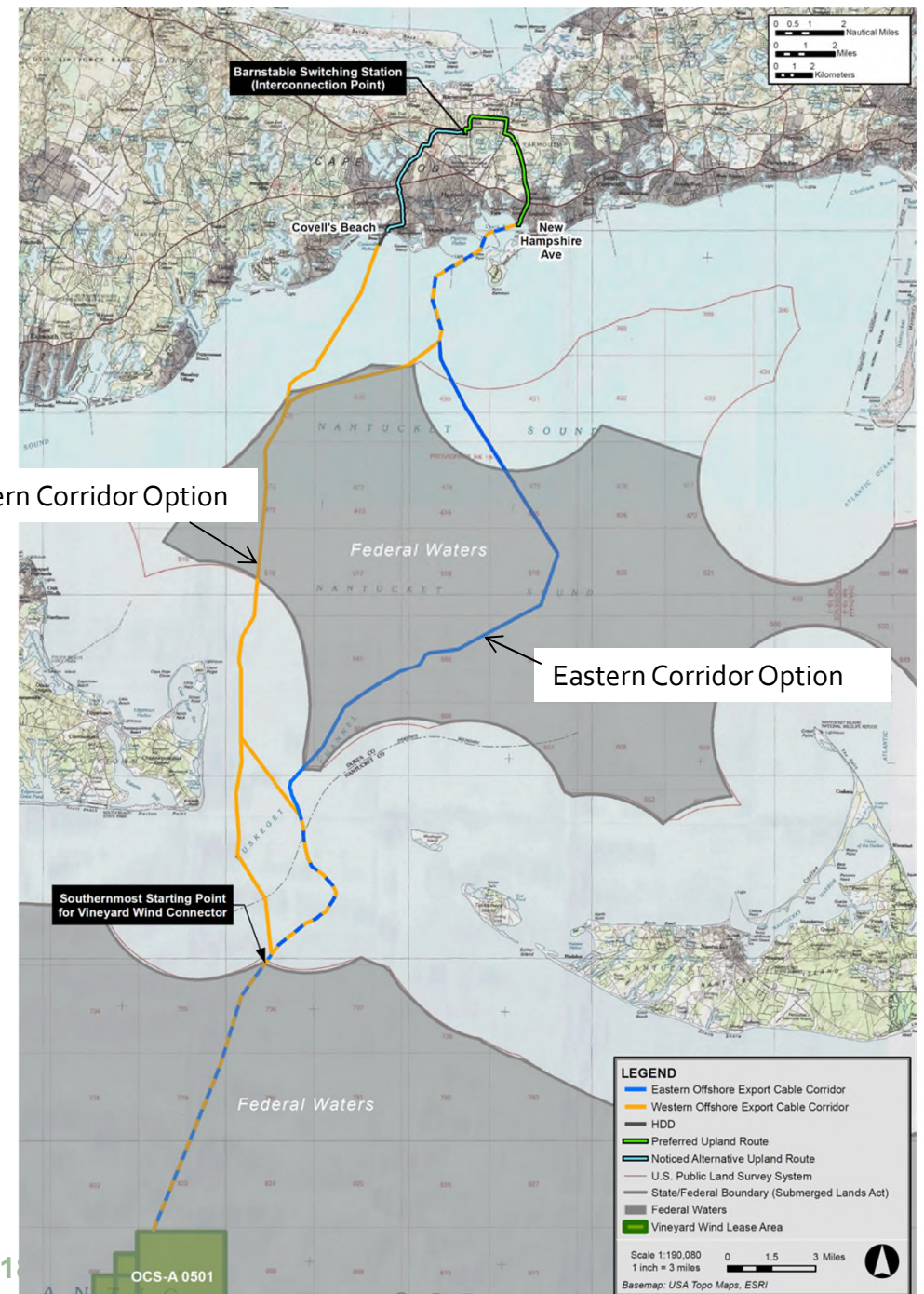
- Two possible corridors: only one will be used
 - Multiple options through Muskeget Channel
 - Landfall location
 - 2017 & 2018 offshore studies inform selection
- Routing
 - Considerations include water depth, bathymetry, sensitive habitat areas, etc.
 - Avoidance of mapped eelgrass beds
 - Minimization 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

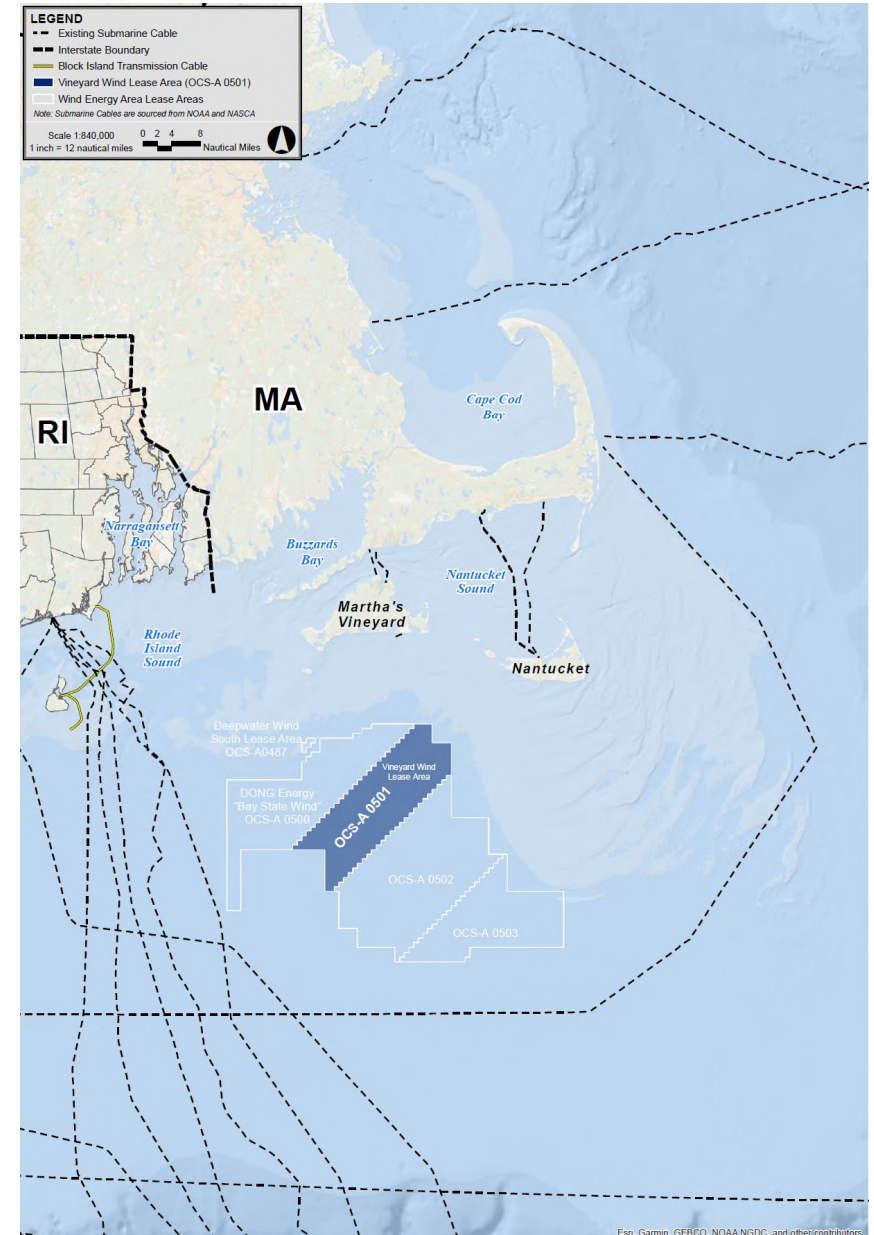
(also under state / local permitting reviews)

- 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



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



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

CONSTRUCTION AND OPERATIONS PLAN (COP) CONTENTS

VOLUME I	VOLUME II	VOLUME III
<p>Project Description</p> <ul style="list-style-type: none"> • Overview • Location • Structures • Activities (Installation) • Regulatory Framework • Agency Contacts and Stakeholder Coordination <p>Appendices</p> <ul style="list-style-type: none"> • Draft Oil Spill Response Plan • Draft Safety Management System • CVA Statement of Qualifications • CVA Scope of Work • Hierarchy of Standards 	<p>Survey Results</p> <ul style="list-style-type: none"> • Site Geology and Environmental Conditions • Shallow Hazards Assessment • Geological Results Relevant to Siting and Design • Results of Biological Surveys • Archaeological Resource Report <p>Appendices (Summarized)</p> <ul style="list-style-type: none"> • Geological Survey Results • Benthic Reports • Grab Sample and Grain Size Analysis • Vibracore Analysis 	<p>Impact Assessment and Analysis</p> <ul style="list-style-type: none"> • Applicant Purpose & Need • Project Summary • Project Evolution • Benefits, Impacts, & Mitigation • Physical Resources • Biological Resources • Socioeconomic Resources <p>Appendices (Summarized)</p> <ul style="list-style-type: none"> • Hydrodynamic / Sediment Dispersion • Air Emissions • Avian & EFH • Benthic Monitoring Plan • Fisheries Communication Plan • Archaeology and Visual Reports • Marine and Air Navigation Reports • Scour

BENTHIC DATA

Sampling and video available from:

- SMAST
- Coonamessett Farm Foundation
- NEFSC
- Vineyard Wind
- Cape Wind

Side Scan Sonar & Bathymetry data throughout WDA and cable routes



From COP:

- Impact area: 0.4% of Wind Development Area
- Data used to describe benthic resources (grab and image) in the Offshore Project Area came from a robust dataset and previous studies conducted within or near the Project Area between 2012-2017
- Data allowed for the characterization of abundance, diversity, community composition, and percent cover of benthic macrofauna and macroflora, both within the Project Area and surrounding area.
- Seafloor conditions within the WDA are very homogenous, dominated by fine sand and silt-sized sediments that become finer in deeper water.
- Overall, the simulations show that sediment is not transported far from the route and resettles rapidly due to the high proportion of coarse sand throughout the route.

Proposed Mitigation:

- Siting of cables with sensitive habitat avoided as much as possible
- Utilize widely-spaced WTGs, so that the foundations (and associated scour protection) for the WTGs, along with the ESPs, inter-link cables, and inter-array cables, only occupy a minimal portion of the WDA, leaving a huge portion of the WDA undisturbed
- Conduct post-construction monitoring to document habitat disturbance and recovery.
- Where feasible and considered safe, use mid-line buoys on anchor lines to minimize impacts from anchor line sweep.

FISHERIES (BIOLOGIC) DATA

Data resources:

- Northeast Fisheries Science Center multispecies bottom trawl surveys
- Massachusetts Department of Marine Fisheries Trawl surveys
- School of Marine Science and Technology (SMAST) Survey of the WDA
- Southern New England Industry-Based Yellowtail Flounder Survey
- Northeast Area Monitoring and Assessment Program



From COP:

- Total biomass of fish is low across the Project Area, while species richness is relatively high. High species richness has been linked to increased ecosystem resilience or the ability of an ecosystem to recover from disturbance
- Many of the fish species found off the Massachusetts coast are important due to their value as commercial and/or recreational fisheries.
- Wind Development Area: Sediment dispersion modeling indicates that deposition of 0.2 mm or greater is centered around the cable trench and no deposition over five millimeters occurs.
- Cable Routes: The simulations show that sediment is not transported far from the route and resettles rapidly due to the high proportion of coarse sand throughout the route.
- The low total fish biomass and high species richness in the Project Area makes this location ideal for wind energy as it reduces impacts to individual organisms and targets an area which will likely be able to recover following any potential Project-related disturbances.

Proposed Mitigation:

- To mitigate the potential impacts of injury to fish from pile driving, the Project will apply a soft-start procedure to the pile driving process, which delivers initial pile drives at a lower intensity, allowing fish to move out of the activity area before the full-power pile driving begins.
- Impacts to benthic organisms may be minimized through the use of mid-line buoys, if feasible and safe, and installation equipment that minimizes installation impacts, such as a jet plow. In nearshore areas where sensitive resources are located, horizontal directional drilling may be used to minimize impacts.
- Vineyard Wind is developing a framework for a pre- and post-construction fisheries monitoring program to measure the Project's effect on fisheries resources. Vineyard Wind is working with the Massachusetts School for Marine Science and Technology (SMAST) and local stakeholders to inform that effort and design the study.

FISHERIES (SOCIO-ECONOMIC) DATA

Data resources:

- Northeast Fisheries Science Center multispecies bottom trawl surveys
- Massachusetts Department of Marine Fisheries Trawl surveys
- VMS Trip & Dealer Reports (2011 – 2016)
- Vessel Trip Reports (2011-2016)
- NE Fisheries Observer Program Database
- RI-SAMP
- MA Ocean Management Plan

From COP:

- Commercial fishing revenue generated from within the MA WEA constitutes small percentages of each fishery's total revenue
- Silver Hake was the most abundant landing of the small mesh species sourced from the MA WEA based on percentage of revenue.
- The annual average revenue of over \$212 million for lobster harvested between 2007 and 2012, approximately \$300,000 per year was harvested from the MA WEA.
- Squid vessels are active throughout the WDA and along portions of the offshore export cable corridor through Nantucket Sound.
- Vessels targeting Monkfish are trawling portions of the WDA, though vessel density increases to the north of the WDA, in the areas on either side of Muskeget Channel.

Proposed Mitigation:

- Siting of cables with sensitive habitat avoided as much as possible
- Conduct post-construction monitoring to document habitat disturbance and recovery.
- Grid pattern and transit corridors in wind turbine layout
- Utilizing suspended sediment minimizing installation techniques for cable installation

PERMITTING PROCESS: General Overview)

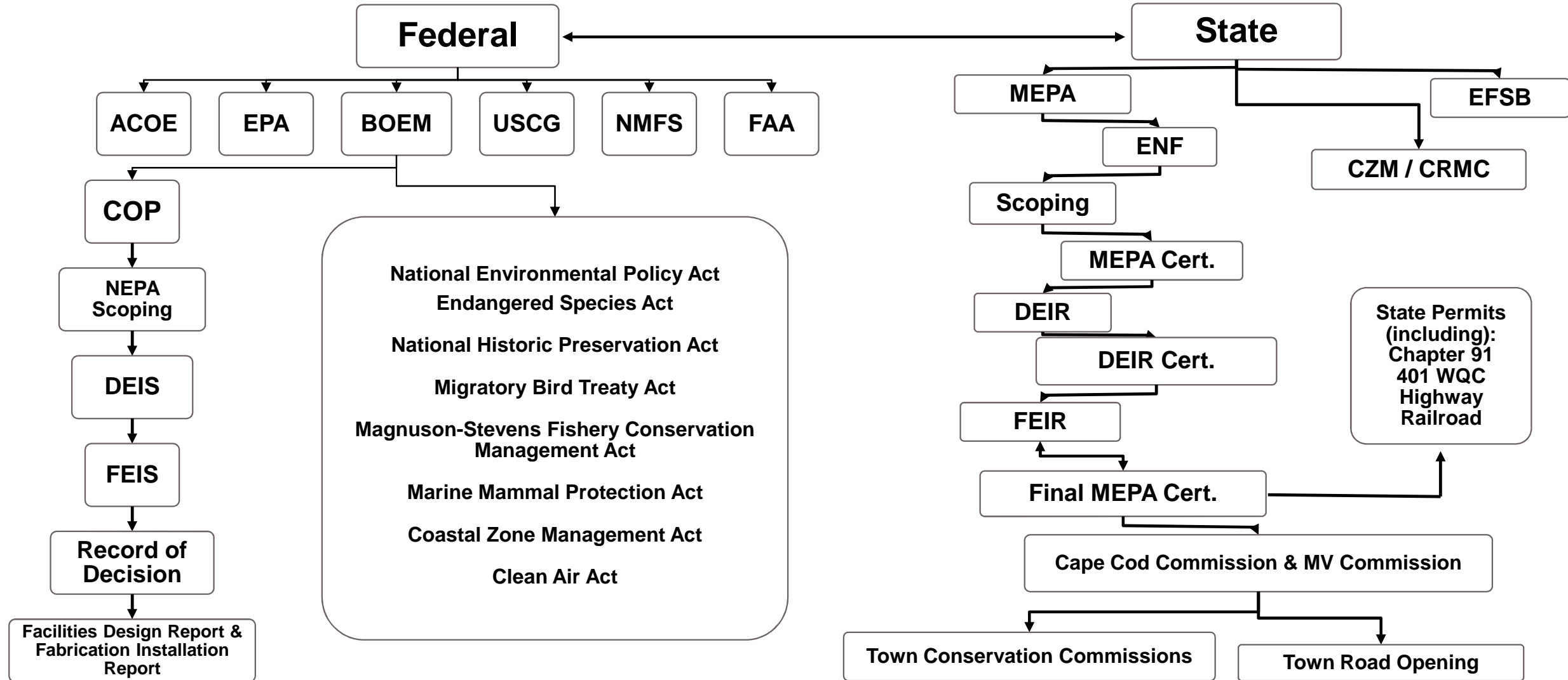
Review universe of technical options and locations



Define project envelope



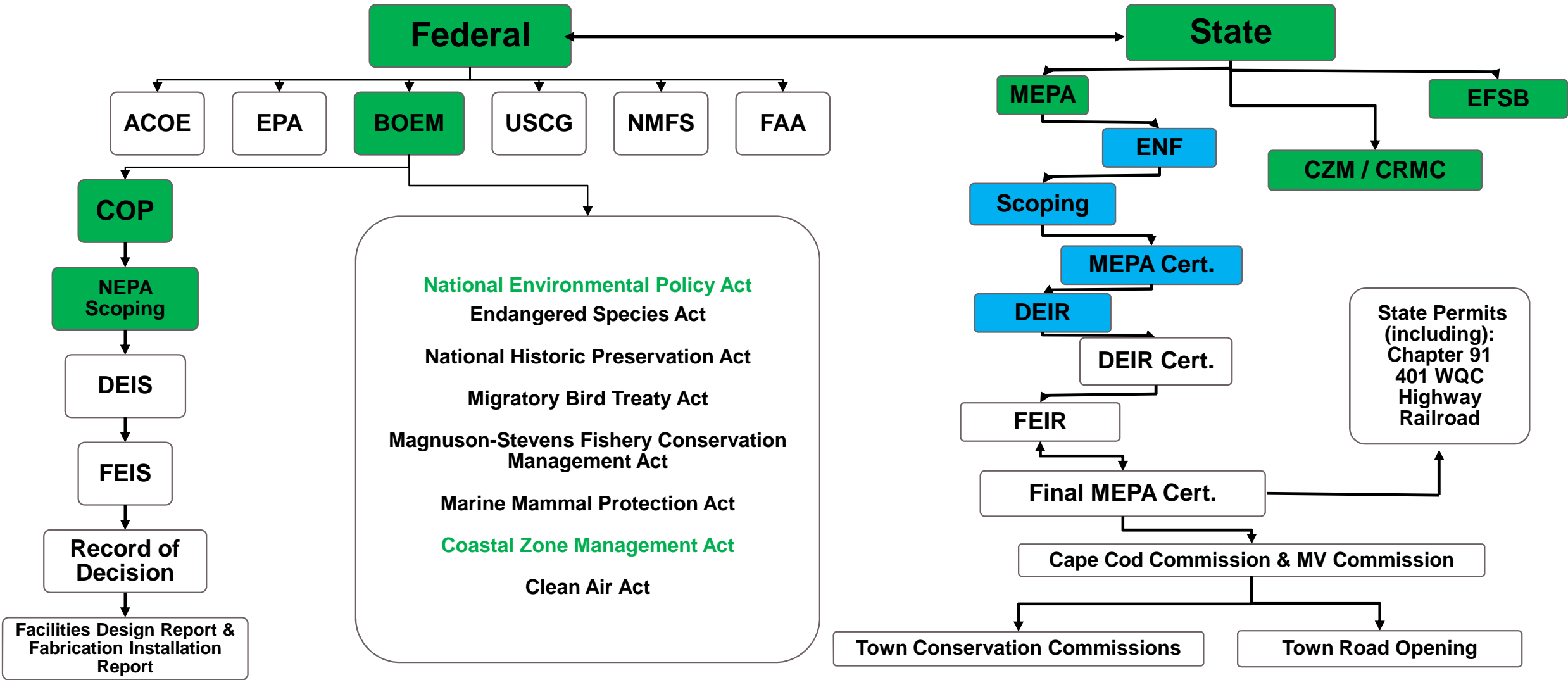
Submit federal and state applications



PERMITTING PROCESS: High Level Status

Begun

Complete



ACCESSING THE FORMAL PERMIT PROCESS

Our website will always have information to submit comment to an any open public comment opportunity:
www.vineyardwind.com/permitting/

	Federal (NEPA)	State (MEPA, EFSB)
CURRENT	April 30, 2018: Comments on scope of Environmental Impact Statement due, but BOEM will take late comments	May 8, 2018: Comments to EFSB filings due
UP NEXT	Fall 2018: Draft Environmental Impact Statement available for review and comment:	May 9 through June 8, 2018: Comment period on Draft Environmental Impact Report:

INFORMAL CONSULTATIONS CONTINUE through out permitting process, and are just as important - if not more important - as submitting formal comments as part of formal review process.

DATA SOURCES FOR FISHING ACTIVITY

(other data sources used for biology and habitat information)

Public data sources accessed, in addition to collected from direct consultations

- **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_crnc_revised/RI_Ocean_SAMP.pdf

- More data sources on fishing activity are always welcome -

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

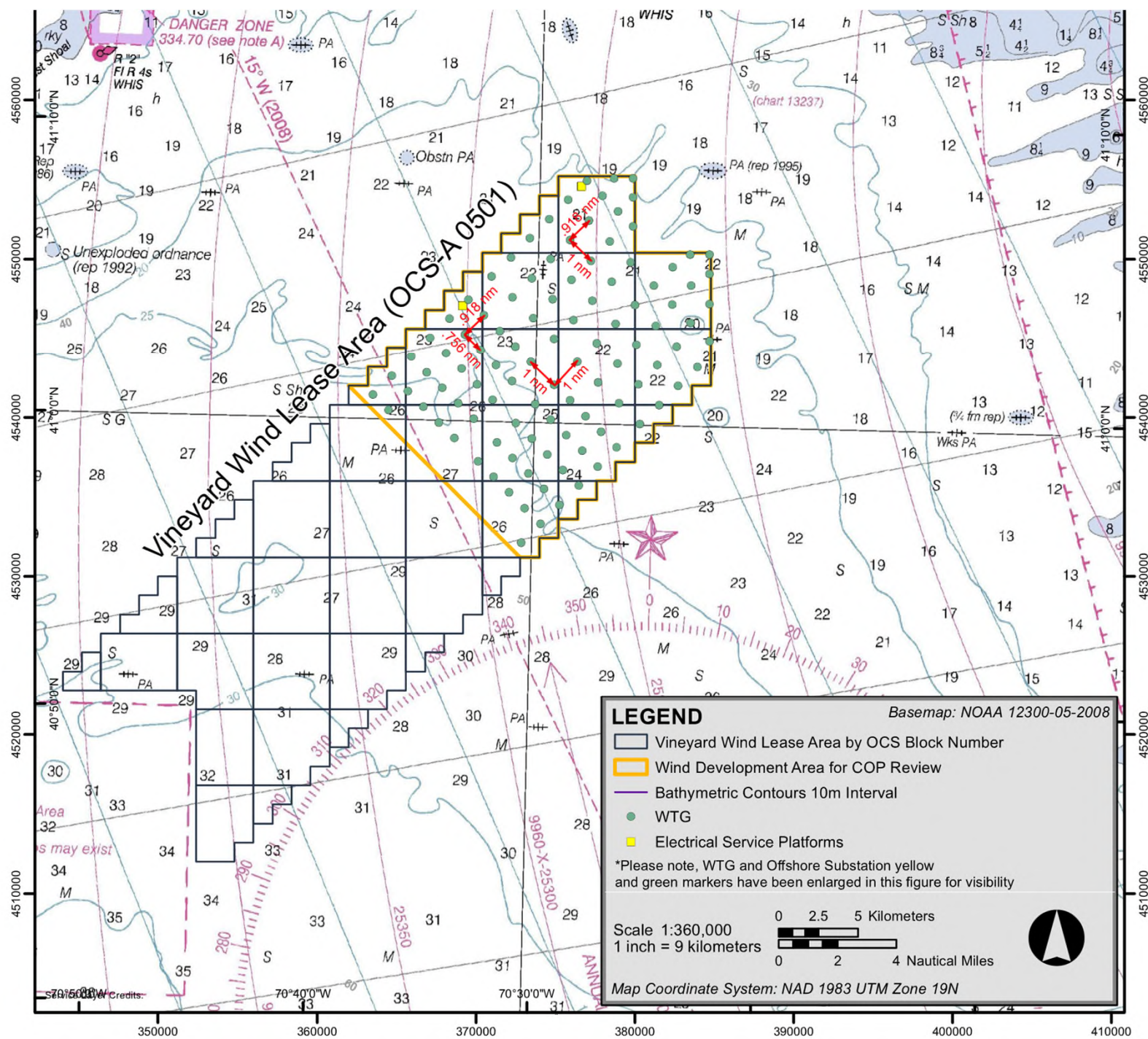
Outreach Ongoing

Includes over 100 meetings with fishermen and fishing organizations to date

- 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 Harbor Development Commission;
- 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;
- Sierra Club;
- Stoveboat - Saving Seafood;
- The Nature Conservancy;
- Town Dock;
- University of Massachusetts (various campuses); and
- Woods Hole Oceanographic Institute.

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
- **Others issues under discussion**

Thoughts on mutually beneficial topics for discussion

Gear loss / damage reporting clearing-house

- Efficient for fishermen
 - Advocate and follow-up
- Effective for project
 - Confident project will be responsive
- Fair to everyone
 - Third party referee
 - Uniform treatment

Third-party data collection (from source) and analysis

- Efficient for fishermen and project
- Ensure confidentiality
- High confidence in results for everyone
- Mostly for future planning (VMS data was used to prepare COP)

Role of Fisheries Representative

THANK YOU

Latest info and document access: www.vineyardwind.com/fisheries/

Fisheries Liaison: Crista Bank, cbank@vineyardwind.com, 508-525-0421

Fisheries Representative: Jim Kendall, nbsc@comcast.net, 508-287-2010

Fisheries team: fisheries@vineyardwind.com