New England Wind

AVANGRID RENEWABLES

Construction and Operations Plan

Lease Area OCS-A0534

Volume I Appendices

February 2024

Submitted by
Park City Wind LLC

Submitted to
Bureau of Ocean Energy Management
45600 Woodland Rd
Sterling, VA 20166

Prepared by
Epsilon Associates, Inc.

New England Wind Construction and Operations Plan for Lease Area OCS-A 0534

Volume I Appendices

Submitted to:
BUREAU OF OCEAN ENERGY MANAGEMENT
45600 Woodland Rd
Sterling, VA 20166

Submitted by:
Park City Wind LLC

Prepared by:
Epsilon Associates Inc.

In Association with:

Baird & Associates
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Geo SubSea LLC
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JASCO Applied Sciences
Public Archaeology Laboratory, Inc.
RPS
Saratoga Associates
SEARCH, Inc.
Wood Thilsted Partners Ltd

February 2024

Appendix I-F

Draft Oil Spill Response Plan

DRAFT

OIL SPILL RESPONSE PLAN

For

NEW ENGLAND WIND

PARK CITY WIND LLC

125 High Street, 6th Floor
Boston, MA 02110

August 2023

A Response Plan Cover Sheet, presenting basic information regarding New England Wind is provided below:

Response Plan Cover Sheet

Owner/operator of facility:	Park City Wind LLC		
Facility name:	New England Wind		
Facility mailing address:	125 High Street, 6th Floor, Boston, MA 02110		
Facility phone number:	(971) 269-8929	Latitude:	N 40.973
SIC code:	4911	Longitude:	W -70.562
Dun and Bradstreet number: TBD			
Largest aboveground oil storage capacity (gals):	76,994 for 804 Megawatt Electrical Service Platform [MW ESP] and 115,491 for 1,200 MW ESP] (power transformer, 2 units)	Maximum oil storage capacity (gals):	124,097 (per 804 MW ESP) and 185,978 (per 1,200 MW ESP)
Number of aboveground oil storage tanks:	5,468 for 804 MW ESP and 8,202 for 1,200 MW ESP (day tanks and diesel tank)	Worst case oil discharge amount (gals):	124,097 for 804 MW ESP and 185,978 for 1,200 MW ESP
Facility distance to navigable water. Mark the appropriate line:			
0-1/4 mile: **X**	1/4-1/2 mile:	1/2-1 mile	> 1 mile:

Applicability of Substantial Harm Criteria:				
Does the facility transfer oil over water to or from vessels and does the facility have a total oil storage capacity greater than or equal to 42,000 gallons?	**YES**	**X**	NO	
Does the facility have a total oil storage capacity greater than or equal to 1 million gallons and, within any storage area, does the facility lack secondary containment that is sufficiently large to contain the capacity of the largest aboveground oil storage tank plus sufficient freeboard to allow for precipitation?	YES		**NO**	**X**
Does the facility have a total oil storage capacity greater than or equal to 1 million gallons and is the facility located at a distance such that a discharge from the facility could cause injury to fish and wildlife and sensitive environments?	YES		**NO**	**X**
Does the facility have a total oil storage capacity greater than or equal to 1 million gallons and is the facility located at a distance such that a discharge from the facility would shut down a public drinking water intake?	YES		**NO**	**X**
Does the facility have a total oil storage capacity greater than or equal to 1 million gallons and has the facility experienced a reportable oil spill in an amount greater than or equal to 10,000 gallons within the last 5 years?	YES		**NO**	**X**

Management Certification

This plan has been developed for New England Wind to prevent and/or control the spills of oil. Park City Wind LLC herein commits the necessary resources to fully prepare and implement this plan and has obtained through contract the necessary private personnel and equipment to respond, to the maximum extent practicable, to a worst-case discharge or substantial threat of such a discharge.

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and that based on my inquiry of those individuals responsible for obtaining information, I believe that the submitted information is true, accurate and complete.

Signature: ______________________ Title: _

Name: ______________________ Date: _

Plan Distribution

Plan Number	Plan Holder	Location
1	Qualified Individual	Park City Wind LLC 125 High Street, 6th Floor Boston, MA 02110
2	Alternate Qualified Individual	Park City Wind LLC 125 High Street, 6th Floor Boston, MA 02110
3	Operations Center	TBD
4	BOEM Gulf of Mexico OCS and Atlantic Activities	BOEM Atlantic OCS Region 1201 Elmwood Park Boulevard New Orleans, LA 70123-2394
5	Bureau of Safety and Environmental Enforcement (BSEE) Supervisor – Oil Spill Preparedness Division Gulf of Mexico Region OSP Section – GE 921	BSEE Oil Spill Preparedness Division Gulf of Mexico Region OSP Section – GE 921 1201 Elmwood Park Boulevard New Orleans, LA 70123-2394
6	EPA Region 1	EPA Region 1 Emergency Planning and Response Branch 5 Post Office Square Suite 100 (OSRR02-2) Boston, MA 02114-2023
7	USCG First Coast Guard District (D1)	USCG D1 408 Atlantic Avenue Boston, MA 02110
8	USCG Sector Southeastern New England	USCG Sector Southeastern New England 30 Little Harbor Road Woods Hole, MA 02543
9	Massachusetts Department of Environmental Protection (MassDEP)	MassDEP 1 Winter Street Boston, MA 02108

30 CFR 254.30(a): Biennial OSRP Review

Date	Name of Reviewer &Title	Signature

30 CFR 254.30(b): Revision Record

Revision Number	Revision Date	Pages and/or Sections Affected	Description of Revision

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List of Acronyms

ACP	Area Contingency Plan
AQI	Alternate Qualified Individual
bbls	Barrels
BOEM	Bureau of Ocean Energy Management
BSSE	Bureau of Safety and Environmental Enforcement
COP	Construction and Operations Plan
COTP	Captain Of The Port
CFR	Code of Federal Regulations
CTV	Crew Transfer Vessels
DOI	Department of the Interior
EPA	Environmental Protection Agency
ERMA	Environmental Response Management Application
ESI	Environmental Sensitivity Index
ESP	Electrical Service Platform
FOSC	Federal On-Scene Coordinator
gals	Gallons
GRP	Geographic Response Plan
GRS	Geographic Response Strategy
ICS	Incident Command System
IMT	Incident Management Team
MA	Massachusetts
MassDEP	Massachusetts Department of Environmental Protection
MW	Megawatt
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NIMS	National Incident Management System
NOAA	National Oceanic & Atmospheric Administration
NRC	National Response Center
OCS	Outer Continental Shelf
OECC	Offshore Export Cable Corridor
O&M	Operation and Maintenance
OSHA	Occupational Safety & Health Administration
OSPD	Oil Spill Preparedness Division
OSRO	Oil Spill Removal Organization
OSRP	Oil Spill Response Plan
OSRV	Oil Spill Recovery Vessel
PDE	Project Design Envelope
PPE	Personal Protective Equipment

QI	Qualified Individual
RCP	Regional Contingency Plan
RRT	Regional Response Team
SERO	Southeast Regional Office of Massachusetts Department of Environmental Protection
SHPO	State Historical Preservation Officer
SOSC	State On Scene Coordinator
SOV	Service Operations Vessels
SPCC	Spill Prevention, Control, and Countermeasures
SWDA	Southern Wind Development Area
TBD	To Be Determined
UC	Unified Command
USCG	United States Coast Guard
Vol	Volume
WTG	Wind turbine generators

1. Plan Introduction Elements

1.1 Purpose and Scope of Plan Coverage

New England Wind is the proposal to develop offshore renewable wind energy facilities in Bureau of Ocean Energy Management (BOEM) Lease Area OCS-A 0534 along with associated offshore and onshore cabling, onshore substations, and onshore operations and maintenance (O&M) facilities. New England Wind will be developed in two Phases with a maximum of 130 WTG and ESP positions. Five offshore export cables will transmit electricity generated by the WTGs to onshore transmission systems in the Town of Barnstable, Massachusetts. Each Phase of New England Wind will be developed and permitted using a Project Design Envelope (the Envelope). Park City Wind LLC, a wholly owned subsidiary of Avangrid Renewables, LLC, is the Proponent and will be responsible for the construction, operation, and decommissioning of New England Wind.

This Oil Spill Response Plan (OSRP) covers New England Wind's offshore facilities. The OSRP provides clear notification and activation procedures and identifies shore-based resources to respond to an oil spill or the substantial threat of an oil discharge from any New England Wind offshore wind turbine generator (WTG) and electrical service platform (ESP). This OSRP describes the oil spill response for spills from the WTGs and ESPs located in the Southern Wind Development Area (SWDA)[1]. This current OSRP is a draft plan. The OSRP will be finalized for Bureau of Safety and Environmental Enforcement (BSEE), an agency of the Department of the Interior (DOI), and BOEM review and approval prior to construction.

New England Wind's offshore renewable wind energy facilities are located immediately southwest of Vineyard Wind 1, which is located in Lease Area OCS-A 0501. New England Wind will occupy all of Lease Area OCS-A 0534 and potentially a portion of Lease Area OCS-A 0501 in the event that Vineyard Wind 1 does not develop "spare" or extra positions included in Lease Area OCS-A 0501 and Vineyard Wind 1 assigns those positions to Lease Area OCS-A 0534. For the purposes of the COP, the Southern Wind Development Area (SWDA) is defined as all of Lease Area OCS-A 0534 and the southwest portion of Lease Area OCS-A 0501.

The SWDA may be approximately 411–453 square kilometers (km^2) (101,590– 111,939 acres) in size depending upon the final footprint of Vineyard Wind 1. At this time, the Proponent does not intend to develop the two positions in the separate aliquots located along the northeastern boundary of Lease Area OCS-A 0501 as part of New England Wind. The SWDA (excluding the separate aliquots that are closer to shore) is just over 32 kilometers (km) (20 miles [mi]) from the southwest corner of Martha's Vineyard and approximately 38 km (24 mi) from Nantucket. The WTGs and ESPs in the SWDA will be oriented in an east-west, north-south grid pattern with one nautical mile (NM) (1.85 km) spacing between positions.

Phase 1, which includes Park City Wind, will be developed immediately southwest of the Vineyard Wind 1 project. The Phase 1 Envelope allows for 41 to 62 WTGs. Depending upon the capacity of the WTGs, Phase 1 will occupy 150–231 km^2 (37,066– 57,081 acres) of the SWDA. Phase 1 includes one or two ESPs, and the largest ESP expected to be included in Phase 1 is an 804 MW ESP. The worst-case oil discharge associated with Phase 1 is conservatively assessed as a catastrophic release of all oil contents from the topple of an 804 MW ESP located closest to shore within the Phase 1 portion of the SWDA.

When constructed, Phase 2, which includes Commonwealth Wind, will be immediately southwest of Phase 1 and will occupy the remainder of the SWDA. Phase 2 may include one or more projects, depending on market conditions. The footprint and total number of WTG and ESP positions in

[1] The OSRP does not include response actions for New England Wind-related vessels operating within the Offshore Development Area, as it is anticipated that such vessels would manage a spill based on their Vessel Response Plans.

Phase 2 depends upon the final footprint of Phase 1; Phase 2 will occupy an area ranging from 222–303 km^2 (54,857– 74,873 acres). Phase 2 is expected to contain 64 to 88 WTG/ESP positions (up to three positions will be occupied by ESPs). The largest ESP expected to be included in Phase 2 is a 1,200 MW ESP[2]. The worst case oil discharge associated with Phase 2 is conservatively assessed as a catastrophic release of all oil contents from the topple of a 1,200 MW ESP located closest to shore within the Phase 2 portion of the SWDA.

The oil sources in the WTGs include the generator oil and transformer oil, which total approximately 3,162 gallons for the largest WTG included in the Phase 1 and Phase 2 Envelope. Oil sources in the ESPs include power transformers, reactors, auxiliary/earthing transformers, diesel tanks, an emergency generator day tank, an emergency generator, and naphthenic oil for a platform crane. Oil sources presented in this document are associated with the single largest ESPs, which are either an 804 MW ESP (for Phase 1) or 1,200 MW ESP (for Phase 2). The oil sources associated with one 804 MW ESP and one 1,200 MW ESP total approximately 124,097 gallons (2,955 barrels [bbl]) and 185,978 gallons (4,428 bbl), respectively.

The SWDA is located in the Outer Continental Shelf (OCS), as defined by 30 CFR 254.6 and Section 2 of the Submerged Lands Act (43 U.S.C. 1301). Therefore, this plan was written in accordance with the requirements of 30 CFR Part 254, Subpart B, Oil Spill Response Plans for Outer Continental Shelf Facilities. In accordance with 30 CFR 254, the OSRP demonstrates that the Proponent can respond effectively in the unlikely event that oil is discharged in the SWDA. In addition, the Commonwealth of Massachusetts does not require planning and response submittals for review and approval with regards to offshore oil.

The purpose of this OSRP is to provide a written procedure for directing a plan of action in the event of a discharge of oil in the SWDA. The discharge may be the result of a spill, accident, natural disaster, or civilian threat. This OSRP adopts procedures to allow for a uniform plan of action that will assist in a systematic and orderly manner of response to any oil discharge incident. This plan of action will minimize confusion and indecision, prevent extensive damage to New England Wind's offshore facilities or injury to personnel, and minimize exposure to personnel within or outside of the SWDA. Routine training and exercises regarding the content of this plan will provide the confidence needed for employees to perform their assigned duties if such an event occurs. The designated Qualified Individual (QI) and Alternate Qualified Individuals (AQI) are considered Emergency Coordinators. In addition, a Spill Response Coordinator and alternate Spill Response Coordinator will be identified to lead any spill response effort. Personnel, through the use of this OSRP, will utilize all resources necessary to bring any discharge under control. In order to prepare for such control, all personnel will be well trained and knowledgeable as to their various roles during a release.

The OSRP was prepared considering the National Oil and Hazardous Substances Pollution Contingency Plan (40 CFR §300), or NCP, the Region I Regional Response Team (RRT) Regional Contingency Plan (RCP), and the Rhode Island and Southeastern Massachusetts Area Contingency Plan (ACP). The ACP is also commonly referred to as the Southeastern New England Area Contingency Plan.

- The RRT1 RCP is available at: https://www.nrt.org/sites/38/files/2016%20Regional%20Contingency%20Plan%20Region%201.pdf.

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[2] The term 1200 MW ESP is used to refer to an ESP containing the oil quantities defined herein; results could also be applicable to a larger capacity ESP (1300-1500 MW) provided that ESP did not exceed the maximum oil quantities listed herein.

- The Rhode Island and Southeastern Massachusetts Area Contingency Plan (ACP) is available at: https://homeport.uscg.mil/Lists/Content/Attachments/2471/2015%20RI%20and%20SE%20MA%20Area%20Contingency%20Plan.pdf

The OSRP is consistent with these plans in that it provides a method and process for communication, coordination, containment, removal, and mitigation of pollution and other emergencies. The preparation of this plan utilized the detailed information provided in the Region 1 RCP and the Rhode Island and Southeastern Massachusetts ACP. The specific guidelines presented in this plan have been carefully thought out, prepared in accordance with safe practices, and are intended to prepare personnel to respond to oil spills and other environmental emergencies. The Proponent commits to provide and coordinate the necessary resources to implement this plan.

Specifically, this OSRP:

- Identifies the QIs or Person in Charge having full authority to implement this response plan;
- Requires immediate communication with the appropriate federal, state and local officials, and entities/persons providing personnel and equipment;
- Identifies, and ensures by contract or other means, the availability of personnel and equipment necessary to remove a worst-case discharge and mitigate or prevent a substantial threat of such a discharge; noting that the specific Oil Spill Removal Organizations (OSROs) need to be selected; and
- Describes training, equipment testing, periodic unannounced drills, and response actions.

1.2 Regulatory Applicability

The NCP, RRT 1 RCP, and the Rhode Island and Southeastern Massachusetts ACP were reviewed, and this plan was written to comply with all federal, state, and local oil spill response regulations.

1.3 General Facility Information

The SWDA is located on property in the OCS in BOEM Lease Area OCS-A 0534. The SWDA is just over 32 kilometers (km) (20 miles [mi]) from the southwest corner of Martha's Vineyard and approximately 38 km (24 mi) from Nantucket, Massachusetts. New England Wind is depicted in Figures A1-1 and A2-2 (Annex 1). The mailing address for the Proponent is 125 High Street, 6th Floor, Boston, MA 02110.

New England Wind consists of WTGs, ESPs, and associated foundations; inter-array and inter-link cables; offshore export cables; and onshore facilities, including onshore substations. The sources of oil in the WTGs include the generator and 66kV transformer, which total approximately 3,162 gallons (75 bbl) for the largest WTG included in both the Phase 1 and Phase 2 Envelope. Oil sources in the ESPs include power transformers, reactors, auxiliary/earthing transformers, diesel tanks, an emergency generator day tank, an emergency generator, and naphthenic oil for a platform crane. Oil sources associated with one 804 MW ESP and one 1,200 MW ESP total approximately 124,097 gallons (2,955 bbl) and 185,978 gallons (4,428 bbl), respectively.

Table 1-1 provides general information for New England Wind as it pertains to planning for potential oil spills. Annexes 1, 3, and 7 provide discussion of facility operations in greater detail regarding equipment description, drainage, secondary containment, and emergency planning scenarios.

1.4 Plan Review and Revision

In accordance with 30 CFR 254.30, this OSRP will be reviewed at least every two years from its effective date. It is important to note that this is a living document that will be updated as project details change.

Documentation of this review will be provided in the Review Table presented at the front of this OSRP. If the review does not result in modifications to the OSRP, the Chief of BSEE Oil Spill Preparedness Division (Chief of OSPD) or designee will be notified in writing that there are no changes.

The OSRP will be modified and submitted to the Chief of OSPD for approval within 15 days when the following occurs:

- A change occurs which significantly reduces response capabilities;
- A significant change occurs in the worst-case discharge scenario or in the type of oil being handled, stored, or transported at the facility;
- A change in the name(s) or capabilities of the OSROs cited in the OSRP;
- A significant change to the ACP(s) for the region; or
- The Chief of OSPD requires that the OSRP be resubmitted if it becomes outdated, numerous revisions make its use difficult, or if the OSRP contains significant inadequacies.

Table 1-1 Facility Summary Information

Facility Owner	**Park City Wind, LLC**
Facility Name	New England Wind
Facility Mailing Address	700 Pleasant Street, Suite 510 New Bedford, MA 02740 75 Arlington Street, 7th Floor Boston, MA 02116
Facility Qualified Individual	Sy Oytan
Facility Phone Number	(971) 269-8929
E-mail Address	soytan@vineyardwind.com; sy.oytan@avangrid.com (email of Qualified Individual)
Latitude	N 40.973
Longitude	W 70.562
SIC Code	4911
Wind Turbine Generators (WTGs)	Largest oil source in the Phase 1 and Phase 2 WTGs is the 66-kilovolt transformer: 3,012 gallons Total oil storage is 3,162 gallons WTGs are equipped with secondary containment which is sized according with the largest container.
Electrical Service Platforms (ESPs): Emergency Generators	Emergency generators contain diesel day tanks and lubrication oil totaling 1,018 gallons per 804 MW ESP and 1,527 gallons per 1,200 MW ESP Largest oil source in the generator is the diesel day tank: 1,004 gallons for per 804 MW ESP and 1,506 gallons for per 1,200 MW ESP
ESP: Diesel Tank	Diesel storage tank: 4,463 gallons per 804 MW ESP and 6,695 gallons per 1,200 MW ESP
ESP: Transformers	ESP will have power transformers and auxiliary/earthing transformers Total oil storage is 79,226 gallons per 1,200 MW ESP Largest oil source is power transformers: 76,994 gallons per 804 MW ESP and 115,491 gallons per 1,200 MW ESP
ESP: Reactors	Reactors: 39,055 gallons per 804 MW ESP and 58,582 gallons per 1,200 MW ESP
ESP: Other	Naphthenic oil for platform crane: 335 gallons
Operations and Maintenance (O&M) Facilities	Bridgeport, CT and/or Vineyard Haven, MA
Materials Stored / Oil Storage Start-Up Date	Petroleum-based and synthetic oil / Proposed 2024
Worst Case Discharge Volume[1]	124,097 gallons per 804 MW ESP,185,978 gallons per 1,200 MW ESP
Maximum Most Probable Discharge Volume (United States Coast Guard [USCG]) [2]	12,410 gallons per 804 MW ESP,18,598 gallons per 1,200 MW ESP
Average Most Probable Discharge Volume (USCG) [2]	1,241 gallons per 804 MW ESP, 1,860 gallons per 1,200 MW ESP
Oil Spill Removal Organization (OSRO)	To Be Determined (TBD)

Notes:

1. The BSEE/BOEM "Oil Spill Response Plan (OSRP) for Offshore Wind Facilities Discussion Handout" provided guidance on worst-case discharge volume for an offshore wind facility.
2. Definitions in 33 CFR 155.1020 are based percentage of cargo from a vessel during oil transfer operation.

2. Core Plan Elements

2.1 Oil Spill Detection, Notifications, and Initial Response

Detection of a spill or emergency is the first step in a response. There are several methods by which an emergency situation at the SWDA may be discovered including the following:

- Reported by company personnel;
- Abnormal operating conditions observed by operator; or
- Reported by private citizens or by public officials.

In every case, it is important to collect accurate information and immediately notify the On-Duty Supervisor and any affected area personnel. Initial response will take place as indicated in Table 2-1 Initial Response Actions Checklist. The Initial Notification Data Sheet Form (Annex 4) will be completed by the On-Duty Supervisor while discussing the incident when it is initially reported by the person detecting the spill/discharge. Information not immediately known may be added to the form as it becomes available.

The On-Duty Supervisor will notify the QI or AQI upon receiving notification of an emergency event. The QI, AQI, or designee will make notifications as discussed in Section 2.2 to federal, state, and local agencies (Figure 2-1 and Table 2-3) immediately and shall assure that all required documentation is kept.

When making the initial notifications to the On-Duty Supervisor and affected personnel, one should attempt to provide the following information:

- Name of caller and callback number;
- Exact location and nature of the incident (e.g. fire, oil spill);
- Time of incident;
- Name and quantity of material(s) involved, or to the extent known;
- The extent of personal injuries, damage and/or fire, if any;
- The possible hazards to human health, or the environment, outside the facility;
- Body of water or area affected;
- Quantity in water (size and color of slick or sheen) or amount discharged to the land or atmosphere;
- Present weather conditions–wind speed and direction, movement of slick or sheen, current/tide;
- Potential for fire; and
- Action being taken to control the discharge

A log will be maintained documenting the history of the events and communications that occur during the response (see Annex 4). It is important to remember that the log may become instrumental in legal proceedings, therefore:

- Record only facts, do not speculate.
- Do not criticize the efforts and/or methods of other people/operations.

- Do not speculate on the cause of the spill.
- If an error is made in an entry, do not erase; draw a line through it, add the correct entry above or below it and initial the change.
- Always evaluate safety throughout the response actions.

Table 2-1 Initial Response Checklist

Action	Comments
First Person on Scene	
Take personal protective measures and/or distance.	
Identify and control source if possible (close valve, turn off pump, blind the flange). Eliminate ignition sources.	
Notify the On-Duty Supervisor.	
Notify the affected personnel of the incident.	
Warn personnel in the area and enforce safety and security measures.	
If possible, implement countermeasures to control the emergency. If personal health and safety is not assured, do not attempt to reenter the emergency site.	
Designate a Staging Area where the Emergency Response personnel and equipment can safely report to without becoming directly exposed to the emergency release (until QI arrives).	
On-Duty Supervisor	
Activate local alarms and evacuate non-essential personnel.	
Notify QI.	
Initiate defensive countermeasures and safety systems to control the emergency (booms, sorbent material, loose dirt, sandbags, or other available materials). Eliminate ignition sources.	
Initiate Emergency Response notification system.	
Dispatch response resources as needed.	
Monitor and or facilitate emergency communications until QI arrives.	
Keep the public a safe distance from the release.	
Qualified Individual (QI) or Designee	
Notify federal, state and local agencies and other external stakeholders.	
Establish On-Scene Command and an Incident Command Post.	
Assess situation and classify incident.	
Perform air monitoring surveys prior to entering a release area.	
Determine extent and movement of the release.	
Identify sensitive areas and determine protection priorities.	
Request additional or specialized response resources.	
Establish Isolation Zones (Hot, Warm, Cold) and Direct On-Scene Response Operations.	
Keep the public a safe distance from the spill.	
Form Unified Command with the USCG, Federal On-Scene Coordinator (FOSC), and State On Scene Coordinator (SOSC). Direct operations until relieved by Incident Management Team's Incident Commander, Owner's Representative, or the incident response is complete.	

2.2 Notifications

2.2.1 When to Notify

When there is a discharge of oil, a substantial threat of a discharge of oil, or a sheen observed in or outside the SWDA, the notifications described in Sections 2.2.2 and 2.2.3 must be made.

2.2.2 Internal Notifications

The individual that discovers the spill will call the On-Duty Supervisor immediately and report initial facts about the incident. The On-Duty Supervisor will record the facts (see forms in Annex 4) and immediately (within 15 minutes) notify the QI. Table 2-2 lists the various key personnel and their 24-hour contact information. The QI or designated alternate on duty will be available 24-hours per day and capable of arriving to the Proponent's facility to establish the initial incident command and begin coordinating a response within a reasonable amount of time after contacting. A Spill Response Coordinator and Alternate Spill Response Coordinator will also be available to assist in the oil spill response effort. The Spill Response Coordinators will be members of a Spill Management Team (SMT) that will be available to mobilize to the incident 24 hours a day, 7 days a week. This SMT will staff an incident response organization set up in a standard National Incident Management System Incident Command System organization with appropriate positions activated, as needed. A Spill Response Operating Team will also be available on a 24-hour basis to deploy and operate spill-response equipment at the SWDA.

Other than the Spill Response Operating Team, these Park City Wind response personnel will manage any incident from the O&M facility, which will act as the Spill-Response Operations Center and will include provisions for primary and alternate communications systems available for use in coordinating and directing spill-response operations.

Table 2-2 Park City Wind Internal Notification List

Name	Position	Cell	Email
Sy Oytan	Qualified Individual, Park City Wind	+1 (971)269-8929	soytan@vineyardwind.com sy.oytan@avangrid.com
Iker Garcia Magrach	Alternate Qualified Individual, Park City Wind	+1 (617) 721-1843	igmagrach@vineyardwind.com iker.garcia@avangrid.com
Person C	Spill Response Coordinator, Park City Wind	(XXX) XXX-XXXX	XXX@XXX.com
Person D	Alternate Spill Response Coordinator, Park City Wind	(XXX) XXX-XXXX	XXX@XXX.com
Persons E-Z	Other Spill Management Team Members, Park City Wind	(XXX) XXX-XXXX	XXX@XXX.com

2.2.3 External Notifications

- Any person or organization responsible for an oil spill is required to notify the federal government when the amount reaches a federally-determined limit. This federally-determined limit is based on the “Discharge of Oil” regulation. The Discharge of Oil regulation is more commonly known as the "sheen rule." Under the Clean Water Act, this rule provides the framework for determining whether an oil spill should be reported to the federal government. In particular, the regulation requires the person in charge of a facility or vessel responsible for discharging oil that may be "harmful to the public health or welfare" to report the spill to the federal government. The regulation establishes the criteria for determining whether an oil spill may be harmful to public health or welfare, thereby triggering the reporting requirements, as follows:
- Discharges that cause a sheen or discoloration on the surface of a body of water;
- Discharges that violate applicable water quality standards; and
- Discharges that cause a sludge or emulsion to be deposited beneath the surface of the water or on adjoining shorelines.

Anyone who discovers an oil spill meeting any of the above criteria must contact the National Response Center (NRC) at (800) 424-8802 as soon as knowledgeable of the spill. Notifying the NRC meets all federal reporting requirements, including reporting requirements to USCG, BSEE, and BOEM. Park City Wind LLC will provide the following information if it is known:

- Name, location, organization, and telephone number
- Name and address of the party responsible for the incident; or name of the carrier or vessel, the railcar/truck number, or other identifying information
- Date and time of the incident
- Location of the incident
- Source and cause of the spill
- Types of material(s) spilled
- Quantity of materials spilled
- Medium (e.g., land, water) affected by spill
- Danger or threat posed by the spill
- Number and types of injuries or fatalities (if any)
- Weather conditions at the incident location
- Whether an evacuation has occurred
- Other agencies notified or about to be notified
- Any other information that may help emergency personnel respond to the incident

Once contacted, the NRC Duty Officer will guide the caller through a detailed series of questions based on the Standard Report Form to gather as much information as possible concerning the spill or release. The information is immediately entered into the Incident Reporting Information System (IRIS) and based on several pre-established criteria including material involved, mode of transportation, injuries, damage, and fatalities, select federal agency notification will take place within 15 minutes of receipt.

Several steps are followed for initial determination of external notifications, as outlined herein. **Initial calls to the Massachusetts Department of Environmental Protection (MassDEP) will be made**

within two hours of discovery of a spill of more than 10 gallons of gasoline or oil on land within a 24 hour period or a spill of any quantity of gasoline or oil that creates a sheen on a surface water body.

The Proponent will also notify the Massachusetts State Historic Preservation Officer (SHPO) in the event that sensitive historic and prehistoric resources could be impacted by the spill. The SHPO will evaluate areas where response actions are to be conducted for potential impact to historic and culturally sensitive sites.

Additional Notifications

The QI, AQI, or designee will make all initial and follow-up federal, state, and local agency notifications. The Proponent will use forms provided in Annex 4 to document details of notifications and ensure accurate information is being passed along. Although notification to NRC completes ALL federal agency notification requirements, the Proponent will follow-up directly with the appropriate agencies as needed. Specific phone numbers for initial federal, state, and local response agencies are included in Table 2-3. Although not required by regulations, courtesy calls can be placed directly to local offices of federal agencies in order to establish lines of communication, if desired. A complete list of phone numbers for agencies, resources, and stakeholders who may need to be contacted during a particular incident are provided in Annex 2.

The Proponent-contracted OSRO will be notified immediately following any oil spill that cannot be contained on the ESP or WTG. They may initially be placed on standby as more details are being gathered about the spill, or they may be immediately activated to the scene.

There are a number of other contacts that will be made if required, and they may include:

- Emergency Medical Personnel;
- Occupational Safety & Health Administration (OSHA); and
- Wildlife rehabilitation personnel.

Table 2-3 lists initial emergency notifications. Annex 2 provides a complete list of potential response resources, trustees, and federal, state, and local agencies.

Media

In the event that the media becomes interested in the oil spill response effort, be prepared to discuss the following:

- An explanation of any injuries or deaths and what safety measures were put in place to mitigate any further injuries/deaths;
- The nature and extent of the economic losses that have occurred or are likely to occur;
- The persons who are likely to incur economic losses;
- The geographical area that is affected or is likely to be affected;
- The most effective method of reasonably notifying potential claimants of the designated source; and
- Any relevant information or recommendations.

Table 2-3 Initial Agency Notifications

Agency	Phone	Requirements for Notifications
Federal Agencies		
National Response Center (NRC)	(800) 424-8802 (serves to notify all federal agencies)	Immediate notification is required for all discharges of oil sufficient to produce a sheen on navigable waters of the United States. Spills of dielectric insulating fluid or other synthetic oil may not produce a sheen capable of being detected visually. Known spills of these fluids must also be reported to the NRC immediately.
EPA Region 1	(888) 372-7341 or (617) 918-1111	NRC will notify EPA for all oil discharges into inland navigable waters of the United States sufficient to create a sheen. A written report is not required.
USCG Sector Southeastern New England	(508) 457-3211 or (508) 538-2300	NRC will notify the USCG for all oil discharges into coastal navigable waters of the United States sufficient to create a sheen. A written report is not required. The NRC will also provide details to the USCG Sector if the incident is a "serious marine incident" which is defined as (1) One or more deaths, (2) Injury to a crewmember, passenger, or other person which requires professional medical treatment beyond first aid, (3) Damage to property greater than $100,000, (4) Actual or total constructive loss of any vessel, or (5) Discharge of oil of 10,000 gallons or more into the navigable waters of the U.S.
BSEE Atlantic OCS Region	504-736-0557	Pursuant to 30 CFR 250.187(d) and 30 CFR 254.46(b), the Proponent will notify BSEE without delay for a spill that is one (1) barrel or more or, if the volume is unknown, is thought to be one barrel (1) or more.
BOEM Atlantic OCS Region	1-800-200-4853	The Proponent will directly notify BOEM for a spill on the OCS.
State Agencies		
Massachusetts Department of Environmental Protection (MassDEP)	(888) 304-1133	Immediate notification (less than two hours) is required for all discharges of oil to water resulting in a sheen on the water surface and any spill equal to or greater than 10 gallons on land. In addition, the local fire department should be notified.
Local Authorities		
Dukes County REPC	(508) 696-4240	Contact for any spill, fire, or explosion which could threaten human health, or the environment for Martha's Vineyard.
OSRO		
TBD		
Contact information for additional agencies or services that may become involved in an incident is provided in Annex 2.		

2.3 Establishment of a Unified Command

The QI at the facility will initially be the incident commander during any spill. As the incident escalates, personnel from the facility as well as federal, state, and local agencies will augment the response forming a Unified Command managed by an interagency Incident Management Team (IMT). The National

Incident Management System (NIMS) will be used by the facility, in concert with OSROs and federal, state, and local agencies. An outline of the Incident Command System (ICS) structure can be found in Annex 3. Because the use of NIMS ICS is mandated for all levels of government by Homeland Security Presidential Directive 5 (HSPD-5), the Proponent will ensure that this flexible system is implemented in the event of an incident. The designated QI or AQI for New England Wind is English-speaking, located in the United States, available on a 24-hour basis, familiar with implementation of this response plan, and trained in their responsibilities under the plan. The QI or designated AQI has full written authority to implement this response plan, including:

- Activating and engaging in contracting with identified oil spill removal organization(s);
- Acting as a liaison with the pre-designated FOSC and SOSC; and
- Obligating, either directly or through prearranged contracts, funds required to carry out all necessary or directed response activities.

2.4 General Spill Mitigation

The Proponent will ensure that spill containment measures (e.g., offshore-certified dry-break connectors and drip trays) are implemented for any temporary connections transporting oily substances (e.g., between diesel storage container and emergency generator).

All fluids used on the offshore structures are contained on the structure. The WTGs and ESPs are equipped with a secondary containment structure that will be sized according to the largest container. A simple oil spillage kit, sufficient to mitigate small, local spillage during maintenance, will be included during installation of the WTGs.

While the above design parameters will act to prevent spills, incidents can still occur. In case of an oil discharge, the highest priority is always the safety of the personnel. The mitigation procedures included in this section provide general guidance in responding to an oil spill. Training of the Spill Response Operating Team and onboard drills on all emergency procedures will be provided to mitigate the potential for environmental impact.

Maps of the facility showing spill response equipment storage sites and staging locations to be deployed in the event of a discharge will be provided prior to construction.

For New England Wind, discharge scenarios could occur at any of the different components of the offshore facility where oil is stored. It is important to note that New England Wind's offshore cables do not include fluids and there is no risk for an oil discharge from the offshore cables. General mitigation procedures by which the Proponent and the listed/contracted OSROs would respond to such discharges are included below. Annex 7 of this OSRP contains additional spill mitigation considerations.

(1) WTG spill – The largest potential spill from a total loss of a Phase 1 or Phase 2 WTG would be 3,162 gallons with 3,012 gallons of transformer oil (a dielectric or synthetic oil) as the largest source. The Phase 1 and Phase 2 WTGs would also contain 151 gallons of hydraulic oil (a petroleum-based oil). These quantities are relatively small. Sorbents, booms, and other methods that are appropriate for the type of oil spilled may be used to recover as much oil as possible (see Section 2.5). However, these small quantities of oil will quickly weather in the environment and will likely not impact the shoreline.

(2) ESP spill – The largest potential spill from a total loss of an 804 MW ESP would be 124,097 gallons. From the total loss of a 1,200 MW ESP, the largest potential spill would be 185,978 gallons of oil. The largest source of oil in each of these ESPs would be the power transformer oil which is a naphthenic oil; the 804 MW ESP would contain up to 76,994 gallons whereas the 1,200 MW ESP would contain up to 115,491 gallons. Overall, the oil mixture discharged from the loss of an entire ESP would be a combination of naphthenic oil, mineral oil, biodegradable oil, and diesel, with the majority of this mixture dominated by the naphthenic oil. For the trajectory analysis conducted at New England Wind, a maximum of 59.2% of this oil mixture reached the shoreline within 24 hours. This modeling did not consider response actions and thus is highly conservative. In any spill scenario, after securing the source, containing the oil on scene as soon as possible would be the most important response action to take. Oil Spill Recovery Vessels (OSRVs) should immediately be mobilized to the scene to recover the oil. The majority of the oil mixture contained in the ESPs is a dielectric or synthetic oil, which require different techniques for detection and response than petroleum oils. Containment and recovery methods for different oil types are detailed further in Section 2.5. Dispersant and in-situ burning should also be considered; these response measures are explained in detail in Sections 2.7 and 2.8, respectively. Smaller spills of the individual oils stored on the ESP must also be considered. The naphthenic oil would be more persistent in the environment than diesel oil, which would more readily evaporate.

2.4.1 Preliminary Assessment

To identify that a spill from a WTG or ESP has occurred, it is anticipated that the first indicator will be the detection of a spill via camera or a fluid level gauge/low fluid level indicator. Another sign of a discharge may be the creation of a visible sheen on the water's surface or a spill into secondary containment.

Following protecting the safety of responders and the public, taking action to secure the source of the spill is the main priority. After initial response is taken to secure the source of the spill, and notifications are made to the required agencies, further spill containment, recovery, and disposal operations can begin. It is important to first identify the magnitude of the problem and resources threatened. The QI or designee will:

1. Classify the type and size of spill.
2. Determine chemical and physical properties of spilled material for potential hazards (see Annex 10, Material Safety Data Sheets). Ensure that cleanup techniques and procedures selected are appropriate for the type of oil spilled.
3. Obtain on-scene weather forecast such as wind speed, wind direction, and tide schedules (12, 24, 48, and 72-hour).
4. Track oil movement or projected movement. Consider need for overflights and possible challenges in visually detecting spills of dielectric insulating fluid or synthetic oil.
5. Continuously assess human health and environmental concerns based on the type of oil spilled.
6. Determine extent of contamination and resources threatened (i.e., waterways, wildlife areas, economic areas).
7. Start chronological log of the incident.

As part of this Preliminary Assessment, the Proponent will classify the incident to quickly categorize the appropriate level of response, notifications, and resources that may be necessary to mitigate the emergency. The incident will be categorized based upon the nature of the incident, degree of containment and isolation, materials involved or size of the spill, and any other additional information provided by the person reporting the spill. Incident levels may be upgraded or downgraded from the initial determination as further information is determined or the situation changes. The Incident Classification levels are presented in Figure 2-1. A Level One incident will require only the mobilization of Proponent personnel.

Based on the preliminary assessment, additional cleanup personnel and equipment will be dispatched to the site and deployed to control and contain the spill.

Level One – Minimal danger to life and property and the environment. Project personnel are capable of responding to the incident. The problem is limited to the immediate work area or release site and spills are generally less than 55 gallons.

Level Two – Serious situation or moderate danger to life, property, and the environment. The problem is currently limited to the SWDA, but it does have the potential for either involving additional exposures or migrating offsite. The incident could involve a large spill of oil, a fire, and loss of electrical power.

Level Three – Crisis situation or extreme danger to life, property, and the environment. The problem cannot be brought under control, goes beyond the SWDA, and/or can impact public health and safety, and the environment, or a large geographic area for an indefinite period of time. Such incidents include a vessel fire or release of oil in a volume that can impact surrounding areas.

Figure 2-1. Guidelines for Determining Incident Classification.

2.4.2 Establishment of Objectives and Priorities

Emergency conditions will be managed in a controlled manner, and oil spill response operations will be conducted with the following objectives:

1. Provide for the safety and security of responders and maximize the protection of public health and welfare.
2. Initiate actions to stop or control the source, and minimize the total volume released.
3. Determine oil fate and trajectories.
4. Contain, treat, and recover spilled materials from the water's surface using techniques appropriate for the type of oil spilled.
5. Conduct an assessment and initiate shoreline cleanup efforts appropriate for the type of oil spilled.
6. Identify and protect sensitive sites, including wildlife, habitats, and historic properties. Develop strategies for protection and conduct pre-impact shoreline debris removal.
7. Identify threatened species and prepare to recover and rehabilitate injured wildlife.
8. Investigate the potential for and, if feasible, use alternative technologies to support response efforts.
9. Establish and continue enforcement of safety and security zones.
10. Manage a coordinated interagency response effort that reflects the composition of the Unified Command.
11. Inform the public, stakeholders, and the media of response activities.

During a major oil spill, resource, time, and various response constraints may limit the amount of areas that can be immediately protected. Every attempt should be made to prevent impacts to areas surrounding a spill site.

New England Wind is located in the OCS. The island of Martha's Vineyard, which is the closest land mass, is located approximately 31 km (19 mi) north of the SWDA. Martha's Vineyard is comprised of six towns and a sovereign tribal nation, the Wampanoag Tribe of Gay Head (Aquinnah). The towns of Chilmark, West Tisbury, Edgartown, and Aquinnah are located on the southern portion of the island. Resources of special economic or environmental importance located on Martha's Vineyard include:

- Public drinking water well and distribution systems;
- Primary schools located in Chilmark, West Tisbury, and Edgartown;
- Squibnocket Beach, Lucy Vincent Beach, Long Point Beach, Katama Beach, East Beach, Gay Head Beach and Gay Head Cliffs;
- Sovereign tribal nation of the Wampanoag Tribe of Gay Head (Aquinnah);
- Marinas of Edgartown, and Chilmark (Menemsha); and
- Long Point Wildlife Refuge and Cape Poge Wildlife Refuge.

The island of Nantucket is located approximately 38 km (23 mi) northeast of the SWDA. Together with the small islands of Tuckernuck and Muskeget, the island of Nantucket constitutes the Town of Nantucket and Nantucket County. Resources of economic and environmental importance located on Nantucket include:

- Public drinking water well and distribution systems;
- Cisco Beach, Surfside Beach, Pebble Beach, Low Beach, Sconset Beach, Madaket Beach, and Jetties Beach;
- Brant Point Shellfish Hatchery; and
- Nantucket National Wildlife Refuge and Coskata-Coatue Wildlife Refuge.

Environmental Sensitivity Index maps, available from the National Oceanic & Atmospheric Administration (NOAA), provide a summary of coastal resources that are at risk if an oil spill occurs in the area. Maps with coverage of Martha's Vineyard and Nantucket would be contained in Massachusetts and Rhode Island: Volume 3 Buzzards Bay. The maps are available in pdf format at: https://response.restoration.noaa.gov/maps-and-spatial-data/download-esi-maps-and-gis-data.html.

2.4.3 Implementation of Tactical Plan

The general procedures for implementation of a tactical plan are likely to include:

- Maximize protection of response personnel.
- Deploy containment resources, and, if appropriate, divert spill to a suitable collection point that is accessible and causes the least impact to surrounding areas.
- Boom off sensitive areas.
- Maximize on-water containment and recovery operations.
- Handle wastes to minimize secondary environmental impacts.

The Proponent will establish contractual agreements with an OSRO to conduct oil spill response operations. Facility personnel will use containment equipment available at the site to surround or divert the spill until the OSRO arrives on scene. If the spill is large enough to require a Unified Command and

Incident Management Team, the Incident Action Planning cycle will begin and will establish incident objectives, strategies, and tactics. The Unified Command would likely be made up of the USCG FOSC, the MassDEP State OSC, and the Park City Wind Incident Commander.

2.5 Response Strategies for Containment, Recovery, and Protection of Sensitive Sites

The WTGs and ESPs will be located in the OCS. Offshore export cables will move power from the ESPs to a landfall site in the Town of Barnstable on the south-central shore of Cape Cod. Each Phase will have a separate landfall site and onshore transmission system. Details regarding the Phase 1 landfall sites, Onshore Export Cable Routes, onshore substation site, and Grid Interconnection Routes[3] are presented in COP Volume I. Phase 1 is considering landfall sites at Craigville Public Beach or Covell's Beach in the Town of Barnstable. The specific location of the Phase 2 landfall sites, Onshore Export Cable Routes, onshore substation site, and Grid Interconnection Routes will be determined at a future date, though all onshore facilities will be located in the Town of Barnstable. If oil storage in the Onshore Development Area[4] exceeds 1,320 gallons in capacity in aggregate for containers or oil-filled equipment with a capacity of 55 gallons or greater, an SPCC Plan or an Integrated Contingency Plan will be developed to address spill response procedures. Thus, onshore discharges are not addressed in this OSRP.

Containment and recovery refer to techniques that can be employed to contain and recover aquatic spills. Responses on water should therefore emphasize stopping the spill, containing the oil near its source, and protecting sensitive areas before they are impacted. The objective of the initial phase of the containment procedure prevents the spread of the spill, especially on water, and confines it to as small an area as possible. The containment goals are to prevent liquid or vapors from reaching a possible ignition source (i.e., boat engines, electrical equipment) and any environmentally sensitive area (i.e., water, wetland, wildlife management area).

The primary methods to be used in containing a discharge would be sorbent boom or pads, if available, or containment boom, if the oil reaches water. It may be necessary to use several methods in one spill.

Sorbents can be used to remove minor on-water spills and spills on the WTGs and ESPs. Traditional polyethylene sorbents are best used for petroleum-based oils, such as the hydraulic oil in the WTG or the diesel oil in the ESP. Sorbent boom or pads made of natural fiber (e.g., coconut husk) can be more effective to cleanup spills of dielectric fluids/synthetic oils, such as the naphthenic or ester oils in the WTGs and/or ESPs. In addition, floating barriers or other mechanical means can be used to contain the oil. Once contained, skimmers can collect these oils in order to remove them from the environment. Drum and disk skimmers work best for removing spills of dielectric fluids/synthetic oils.

For larger spills, containment booming is used to protect sensitive areas and to position oil so it can be removed with skimmers or vacuum trucks (in the unlikely event oil reaches the shoreline). Due to entrainment, booming is not effective when the water moves faster than one knot, or the waves exceed

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[3] Grid Interconnection Routes are the onshore transmission routes that connect the onshore substations to the grid interconnection point. Onshore Export Cable Routes are the onshore routes within which the onshore export cables will be installed.

[4] Onshore Development Area is the onshore area where New England Wind's onshore facilities are physically located.

1.5 feet (ft) in height. Angling a boom will minimize entrainment. Using multiple parallel booms will also improve recovery in adverse conditions. A summary of booming techniques is provided in Table 2-4.

Table 2-4. Booming Techniques.

Type of Boom	Use of Boom
Containment Booming	Boom is deployed around free oil. Boom may be anchored or left to move with the oil.
Diversion Booming	Boom is deployed at an angle to the approaching oil. Oil is diverted to a less sensitive area. Anchor points may cause minor disturbances to the environment.
Exclusion Booming	Boom deployed to protect a sensitive area by preventing oil from entering that area

2.5.1 Atlantic Ocean

The SWDA is located in the OCS. Water depths in the SWDA generally range from approximately 43–62 m (141–203 ft). However, oils stored in the WTGs and ESPs have a specific gravity of less than 1.0 and would float on the surface of the water. Feasible protection methods therefore include skimming, booming, and improvised barriers. Sorbent boom should not be used in wide, open ocean environments, unless the oil is in close proximity to an offshore structure. As described above, large spills in open waters can be contained instead with floating barriers or other mechanical means and collected using skimming equipment.

2.5.2 Banks

The nearest land mass to the WTGs and ESPs is Martha's Vineyard, which is located approximately 32 km (20 mi) north of the SWDA. Therefore, it is not anticipated that a discharge of oil would impact the terrain alongside the bed of a river, creek, or stream. However, the following response discussion is made available for planning of such an event. Oil discharges that may reach the coastline are discussed in Section 2.5.5.

Vegetated Banks

Oil may penetrate the area and coat plants and ground surfaces. Oil can persist for months. A no-action alternative may be appropriate to minimize environmental impacts. Cleanup is usually unnecessary for light coatings, but heavier accumulations may require sediment surface removal to allow new growth. Low-pressure spraying and neutralization solutions may aid removal.

Sand Beaches

Heavy accumulations of wastes can cover an entire beach surface and subsurface. Oil can penetrate the sand from six to 24 inches deep. Organisms living along the beach may be smothered or dangerously contaminated. Fine sand beaches are generally easier to clean. Clean by removing oil above the swash zone after all oil has come ashore. Minimize sand removal to prevent erosion. Soil treatment may be possible as well.

Muddy Beaches

Mud habitats are characterized by a substrate composed predominantly of silt and clay sediments, although they may be mixed with varying amounts of sand or gravel. The sediments are mostly water saturated and have low bearing strength. In general, mud shorelines have a low gradient. These finegrained habitats often are associated with wetlands. Mud habitats are highly sensitive to oil spills and subsequent response activities. Response methods may be hampered by limited access, wide areas of shallow water, fringing vegetation and soft substrate. Natural recovery is typically the best response action for light crude. Vacuum trucks may be used to remove pooled oil on the surface if accessible. Avoid digging trenches to collect oil because that can introduce oil deeper into the sediment.

Riprap Structures

Oil contamination may penetrate deeply between the rocks. If left, oil can asphaltize and fauna and flora may be killed. If possible, remove all contaminated debris and use sorbents to remove oil in crevices. Best response may be to remove and replace heavily contaminated riprap to prevent chronic sheening and release.

Walls/Pier/Barriers and Docks

Mussels, shellfish, and algae are often found attached to these structures, which may be constructed of concrete, stone, wood, or metal. Contamination may percolate between joints and coat surfaces. Heavy accumulations will damage or kill the biota. High-pressure spraying may remove oil and prepare the substrate for recolonization of fauna/flora. Consider concentration of oil and continual release concentration to make a determination as to whether an action is required to remove contamination from these structures.

2.5.3 Wetlands

MassDEP's Priority Resource Map and the National Wetlands Inventory do not identify any wetland areas along the southern shoreline of Martha's Vineyard. Wetlands are located in the vicinity of Allen Point and Cobbs Point in Chilmark, and Swan Neck Point, King Point, and Butler Neck Point in Edgartown. It is anticipated that a release of oil would impact the shoreline prior to impacting the wetlands areas. However, the following response discussion is made available for planning of such an event.

Wetlands are characterized by water, unique soils, and vegetation adapted to wet conditions. Wetlands include a range of habitats such as marshes, bogs, and swamps. The surfaces of wetlands usually have a low gradient, and vegetated areas are typically at, or under, the water level. Wetlands are highly sensitive to oil spills. The biological diversity in these habitats is significant and they provide critical habitat for many types of animals and plants. Oil spills affect both the habitat and the organisms that directly and indirectly rely on the habitat. Wetlands support populations of fish, amphibians, reptiles, birds, and mammals; many species are reliant upon wetlands for reproduction and early life stages when they are most sensitive to oil. Moreover, migratory water birds depend heavily on wetlands as summer breeding locations, migration stopovers, and winter habitats.

For small to moderate spills and lighter oils, natural recovery avoids the damage often associated with cleanup activities. However, the threat of direct oiling of animals using the wetland often drives efforts to remove the oil. Sorbents may be used, but overuse generates excess waste materials. Flooding can be used selectively to remove localized heavy oiling, but it can be difficult to direct water and oil flow towards recovery devices. Pooled oil can be removed by vacuum truck, if accessible, and trampling of vegetation can be avoided. The removal of heavily oiled vegetation may reduce the contamination of wildlife. Time of year is an important consideration for any cleanup method used in a wetland area.

2.5.4 Small Lakes

Edgartown Great Pond, Tisbury Great Pond and Katama Bay are located along the southern portion of Martha's Vineyard and have access to the Atlantic Ocean. It is anticipated that a release of oil from the WTGs and ESPs could be contained prior to reaching the navigational channels for the ponds. However, should this occur, the following response discussion is made available for planning of such an event.

Lakes and ponds are standing bodies of water of variable size and water depth. Water levels can fluctuate over time. The bottom sediments close to shore can be soft and muddy, and the surrounding land can include wetlands and marshes. Floating vegetation can be common. Lakes provide valuable habitat for migrating and nesting birds and mammals and support important fisheries. Wind will control the distribution of oil slicks, holding the oil against a shore, or spreading it along the shore and into catchment areas. Wind shifts can completely change the location of oil slicks, contaminating previously clean areas. Thus, early protection of sensitive areas is important. Oil impacts on floating vegetation depend to a large degree on dose, with possible elimination of plants at high doses. The best possible response method is to deploy booms to prevent oil from entering the lakes. If oil does enter any lakes, containing the oil to a small area with booms is the next best response.

2.5.5 Offshore Environments

The SWDA is located approximately 32 km (20 mi) from the southwest corner of Martha's Vineyard. Therefore, it is anticipated that a discharge of oil from the WTGs and ESPs could be contained prior to reaching the coastline. However, should this occur, the following response information is included in this plan to assist in planning for such an incident.

Every effort will be made to clean up the spill from the WTG or ESP before it enters the water. Sorbents will be used to recover minor on-water spills. Traditional polyethylene sorbents are best used for petroleum-based oils, such as the hydraulic oil in the WTG or the diesel oil in the ESP. Boom made of natural fiber (e.g., coconut husk) can be more effective to cleanup spills of dielectric fluids/synthetic oils, such as the naphthenic or ester oils in the WTGs or ESPs. For larger spills, containment booming is used to protect sensitive areas and to position oil so it can be removed. Large Oil Spill Recovery Vessels (OSRVs) or other advancing skimming systems would be used to recover the oil before it reaches the shoreline.

Oil discharged offshore is generally distributed by the wind. In addition, wave action causes emulsification of the oil, decreasing the recoverable amount, and increasing the area of contamination. If the oil does reach the shoreline, Geographic Response Strategies from the ACP will be utilized to protect environmentally sensitive sites.

2.6 Waste Disposal and Oil Recovery

Oil spill cleanup from recovery operations will involve the further handling of recovered oil and oiled materials. These will be directed to a state-approved reclamation/disposal site. Normally, the waste generated from a recovery operation will be classified as a non-Resource Conservation & Recovery Act state regulated waste. Waste Code MA01 is appropriate for used or unused waste oil that is not otherwise Resource Conservation & Recovery Act hazardous waste. Waste Code MA97 is appropriate for Class A regulated recyclable material (including, but not limited to, specification used oil fuel) that is shipped using a hazardous waste manifest. Waste Code MA98 is appropriate for off-specification used oil fuel that is shipped using a hazardous waste manifest. In rare instances, where it is suspected that extraneous substances have been introduced into a spill, it is appropriate to test the recovered oil for hazardous waste characteristics (ignitability, reactivity, corrosivity, and toxicity).

The different types of wastes generated during response operations require different disposal methods. Waste will be separated by material type for temporary storage prior to transport to an approved recovery or treatment/storage/disposal facility.

Skimmer tanks allow for gravity separation of the oil from the water. The separated water is transferred through a hose and discharged forward of the recovery pump. This method is called “decanting”. This process is vital to the efficient mechanical recovery of spilled oil because it allows maximum use of limited storage capacity, thereby increasing recovery operations. Approval will be obtained from federal and state agencies before any decanting is used.

Recovered oil may be transferred to portable tanks. It is important to ensure temporary storage devices are of sufficient size to allow continued operations.

Oily debris collected requires specific handling. Contaminated materials will be placed in leak proof, sealable containers, such as drums or roll-off boxes, and transported to appropriate facilities for processing, recycling, or disposal.

Clean sand and shoreline materials can be separated from oiled materials and returned to the shoreline. Not only is this cost effective from an operations perspective, it also provides an efficient means of returning clean, excavated material back to the shoreline as a restorative measure.

2.7 Use of Dispersants

Although it is unlikely that dispersants will be required for a spill from New England Wind’s offshore facilities, the Proponent will consider the use of dispersants in any appropriate scenario as an effective means to quickly remove oil from the water’s surface and disperse it into the water column. If the Unified Command determines that dispersants could be an effective countermeasure, the use of dispersants will be requested from the RRT.

The Massachusetts/Rhode Island Dispersant Pre-Authorization Policy authorizes use of chemical dispersants outside of 2 nautical miles of the mainland or of designated islands, with a mean low water depth of less than 40 feet, or of any Special Consideration Areas. This area is considered the Pre-Authorized Zone. The area within 2 nautical miles of the mainland or of designated islands and areas with a mean low water depth of less than 40 feet is considered a Conditional Approval Zone where approval must be obtained by the RRT for the specific situation. These Special Consideration Areas include areas where baleen whales are present and feeding, Jeffreys Ledge between May 1st and September 30th, Stellwagen Bank between May 1st and November 15th, Great South Channel between May 1st and June 30th and October 1st and November 15th, and Cape Cod Bay between February 1st and May 15th. These areas can be seen in Figure 2-2, and the location of these areas in relation to the SDWA can be seen in Figure 2-3. The Unified Command will only consider chemical countermeasures included in the NCP Product Schedule.

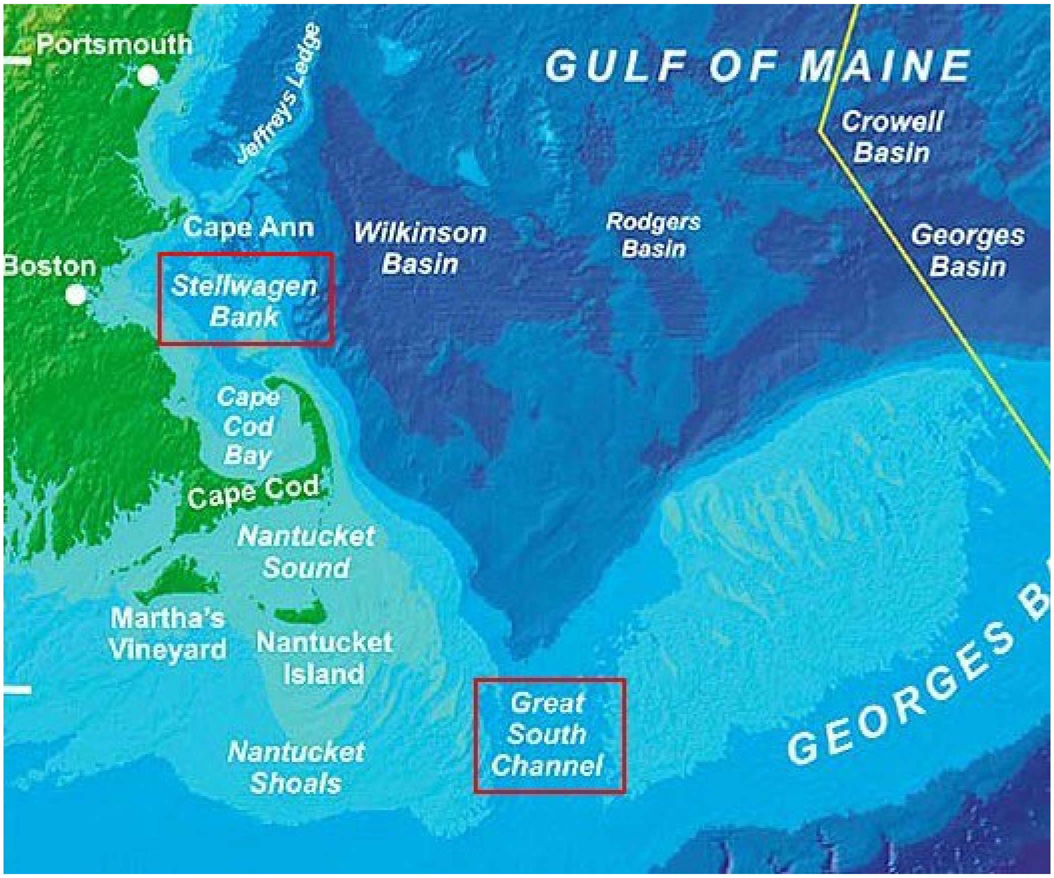


Figure 2-2. Locations of Special Consideration Areas under the Massachusetts/Rhode Island Dispersant Pre-authorization Policy. Image via Northeast Fisheries Science Center/NOAA. Retrieved from https://earthsky.org.

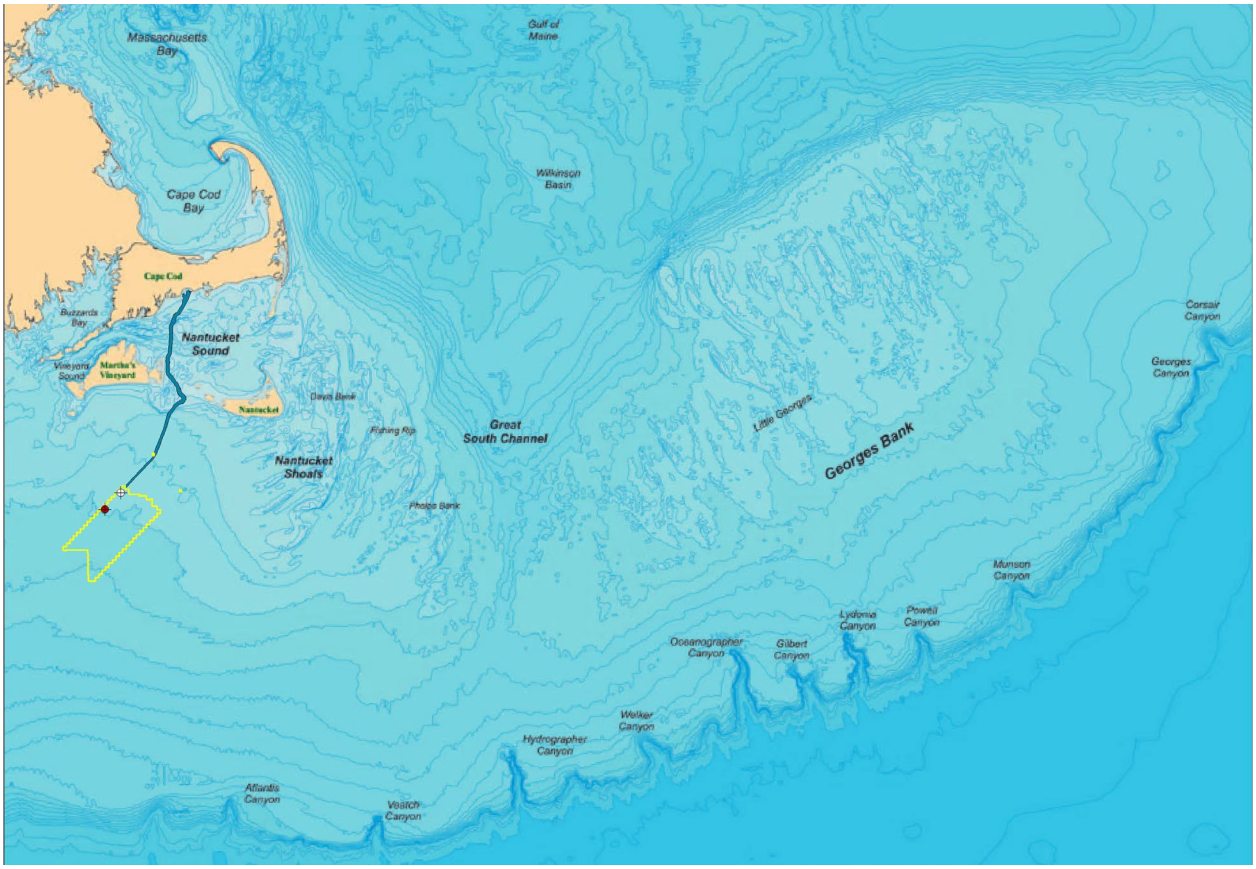


Figure 2-3. Shallow continental shelf surrounding the region of the proposed New England Wind facility (Source: PCCS, 2005). The spill markers represent the 804 MW ESP (red) and the 1200 MW ESP (white). The yellow box roughly shows the maximum size of the SWDA.

When an OSRO is contracted, the Proponent will update details in this section of the OSRP to include an inventory and location of the dispersants that could be used on the oils handled, stored, or transported; a summary of toxicity data for the dispersants; a description and location of the application equipment required and an estimate of time to begin application after approval is obtained; and the vessel and aerial application procedures.

2.8 Use of In-Situ Burning

Although it is very unlikely that in-situ burning will be required for a spill from the facility, the Proponent will consider the use of in-situ burning in any appropriate scenario as another response countermeasure that can be employed to remove oil from the water surface. A controlled burn reduces the oil on the water's surface by releasing the particles into the atmosphere. Spilled oil is contained within a fire boom and ignited using an ignition source. The spilled oil must be approximately 2-3 mm thick in order to burn.

According to the American Petroleum Institute, in-situ burning offers a practical method to remove large quantities of oil from the water very quickly. However, there are many limiting factors that should be considered before a burn is conducted. Physical limitations, such as wind speed, wave height, thickness of the oil, oil type, how weathered the oil is, and how emulsified the oil is, will limit the ability to conduct an in-situ burn operation. Environmental impacts that must be considered are human exposure to smoke, monitoring requirements, accessibility to the impacted site, and recovery of burned/unburned product and residue.

As with dispersant use, the use of in-situ burning can provide a means of oil removal when mechanical recovery cannot be effective or timely.

The Region 1 RRT developed a Memorandum of Understanding for pre-approval of in-situ burning in certain areas of Region 1. The SWDA is located in Zone A where open water in-situ burning is authorized. Zone "A" is defined as waters under the jurisdiction of RRT 1 that lie 6 nautical miles and seaward of the Territorial Sea Baseline (as defined in 30 CFR 2.05-10). Within Zone "A," the decision to use in-situ burning rests solely with the FOSC. No further concurrence or consultation on the part of the FOSC is required with EPA, NOAA, DOI, or the states. However, if threatened or endangered species are present in the burn area, then the trustee agency must be consulted prior to initiating burning operations.

The USCG will immediately notify EPA, NOAA, DOI, and the Commonwealth of Massachusetts of a decision to conduct burning within Zone A via each agency's respective RRT representative. In the case of a spill at the SWDA, the Unified Command would decide whether to use in-situ burning as a response countermeasure. Figure 2-4 shows the pre-authorization zones for in-situ burning in Region 1. The Special Consideration Areas for in-situ burning include the 20-foot water depth year-round area, the National Marine Fisheries Service areas in Jeffreys Ledge (April 1st-September 30th), Great South Channel (April 1st-June 30th, October 1st-November 15th), and Cape Cod Bay (February 1st-May 15th), and National Ocean Service year-round area for Stellwagen Bank National Marine Sanctuary.

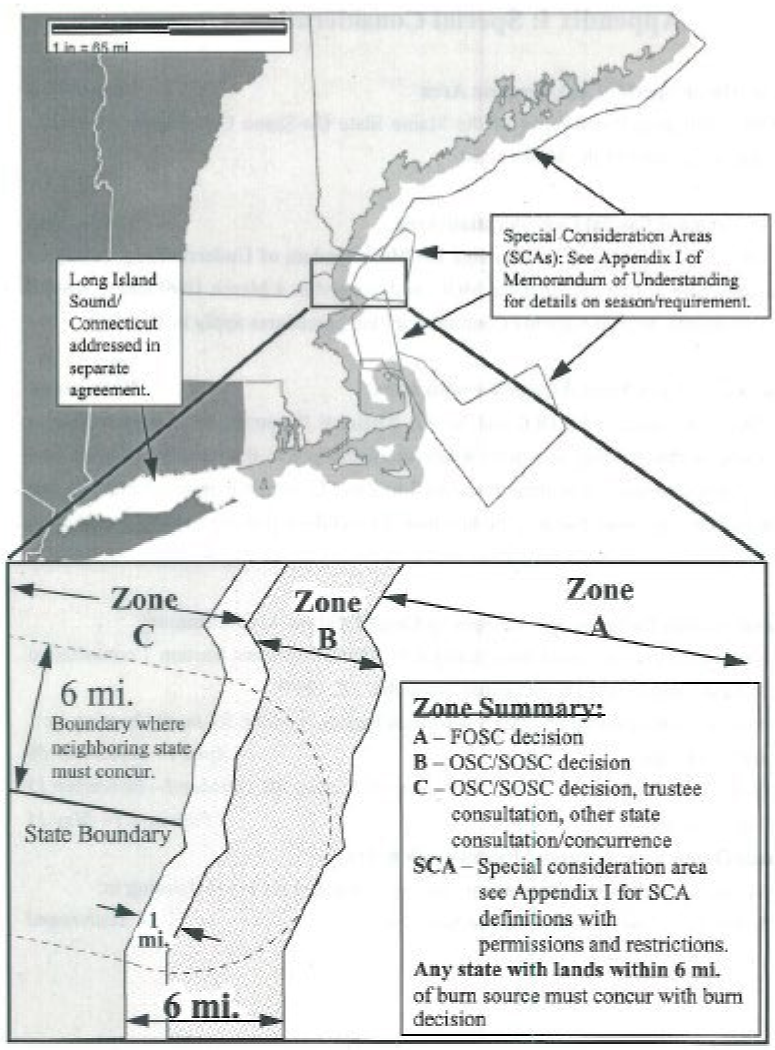


Figure 2-4. In Situ Burning Zone Boundaries from the Region 1 RCP. Source: https://nrt.org/site/site_profile.aspx?site_id=38

When an OSRO is contracted, the Proponent will update details in this section of the OSRP to include a description of in-situ burn equipment (including its availability, location, and owner), a description of the in-situ burning procedures (including ignition), and safety guidelines.

2.9 Potential Failure Scenarios

Specific mitigation actions and responses to be taken will depend on the nature of the situation. However, certain failure scenarios share common characteristics for mitigation. Mitigation procedures will be performed with consideration for health and safety as the top priority.

New England Wind is being developed and permitted using an Envelope Concept. The Envelope allows the Proponent to properly define and bracket the characteristics of New England Wind for the purposes of environmental review and permitting while maintaining a reasonable degree of flexibility with respect to selection and purchase of key New England Wind components. Potential failure scenarios will be developed as key New England Wind components are selected.

The physical-chemical properties of the oils used are important in spill response contingency planning. Any spill response at New England Wind's offshore facilities should be guided by the Material Safety Data Sheets (MSDSs) (see Annex 10). For example, dielectric insulating fluids or synthetic oils have environmental fate/transport and affinity for sorbent boom different from petroleum oils. Boom made of natural fiber (e.g., coconut husk) can be more effective than traditional polyethylene boom to cleanup spills of these fluids/oils. These fluids/synthetics are commonly light-colored, milky white, or frothy in appearance on the water surface in relatively protected marine environments. There may be no obvious rainbow sheen. In un-protected marine environments, these sheens might be very difficult to detect. In the open ocean where New England Wind's offshore facilities are located, the high-energy environment will readily disperse this oil into the water column. This tendency will be considered when selecting a response option to this type of spill. Drum or disk skimmers have been shown in lab tests to be most effective on these oils. In addition, due to the difficulty in visually locating these sheens and their tendency to disperse, a spill of dielectric insulating fluid or synthetic oil can continue for a period of time without detection and without being able to locate and secure the source. Although there are challenges in detecting these oils, the New England Wind offshore facilities will be closely monitored for any incidents, and the likelihood of any spills is very low. All equipment will be carefully maintained at all times to reduce the possibility of an incident.

2.10 Procedures for Mobilization of Resources

A major consideration during a spill is the organization and direction of the transportation of manpower, equipment, and materials used in response operations. The QI will work with local authorities (state police) to establish land routes to expedite the movement of personnel, equipment, materials, and supplies to the Staging Area and waste products from the Staging Area. The Staging Area is an ICS facility used as a forward operations location to mobilize response resources to the spill site. A Staging Area Manager will be responsible for managing the Staging Area and will utilize status boards to coordinate all equipment, personnel, and materials mobilized to the spill site. Equipment will first be mobilized from the OSRO warehouse to the Staging Area. The Staging Area Manager will direct response equipment to the appropriate Branch/Division/Group/Task Force/Strike Team.

Once Phase 1 of New England Wind is installed, tested, and commissioned, Phase 1 will enter an up to 30-year operating phase. Similarly, once Phase 2 is installed, tested, and commissioned, Phase 2 will enter an up to 30-year operating phase. The Proponent expects to use one or more facilities in support of New England Wind's O&M activities. The O&M facilities may include management and administrative team offices, a control room, office and training space for technicians and engineers, and/or warehouse space for parts and tools. The O&M facilities will also include pier space for crew transfer vessels (CTV) and/or other larger support vessels, such as service operation vessels (SOVs). Details regarding spill response materials, services, equipment, and response vessels have not been finalized at this time. The Proponent will retain a third-party OSRO that is licensed as a hazardous waste transporter and can provide emergency response services and cleanups of oil and/or other hazardous material (OHM) spills. MassDEP Southeast Regional Office (SERO) emergency response contractors located in close proximity to New England Wind include Frank Corporation (New Bedford), Global Remediation Services, Inc. (Sandwich), Clean Harbors, Incorporated (Braintree), and Cyn Environmental Services (Stoughton). In addition, U.S. Coast Guard-certified OSROs for the USCG District 1 can be found at https://cgrri.uscg.mil/UserReports/WebClassificationReport.aspx. Response times for mobilization of OSRO resources will be dependent on the location of the OSRO.

2.11 Sustained Actions

“Sustained” action is a term regularly used in oil spill response to capture the ongoing response once the initial emergency response phase is complete. This phase includes establishing an incident management organization, procuring response and support resources, implementing security measures at the ICS facilities, establishing oil waste decontamination and disposal procedures, and initiating public relations outreach.

The Unified Command will manage response operations 24-hours a day, seven days a week, until the operation is complete. Park City Wind’s IMT will cascade in to support response operations when necessary. Once the initial emergency stage of the spill situation transitions to the sustained action stage, the response management structure will also transition to prolonged mitigation and/or recovery action strategies.

The WTGs and ESPs are equipped with secondary containment, which reduces the potential need for a sustained action. Most incidents would be handled by a few individuals without implementing an extensive response management system and would not continue into this sustained action phase.

2.12 Termination and Follow-Up Actions

Cleanup will be conducted as thoroughly as possible, but will be terminated when, in the opinion of the FOSC and the QI/Park City Wind Incident Commander:

- There is no recoverable oil in the water;
- Further removal actions would cause more environmental harm than the remaining oil;
- Cleanup measures would be excessive in view of their insignificant contribution to minimizing a threat to the public health, welfare, or the environment; and
- Actions required to repair unavoidable damage resulting from removal activities have been completed.

Once the determination has been made that the response can be terminated, certain regulations may become effective once the “emergency” is declared over. Orderly demobilization of response resources will need to occur. Follow-up actions such as accident investigation, response critique, plan review, and written follow-up reports will be needed.

The Park City Wind IMT Planning Section will develop a Demobilization Plan to ensure that an orderly, safe, and cost-effective demobilization of personnel and equipment is accomplished.

General considerations for the Demobilization Plan include ensuring that comprehensive check-out procedures are developed, that a process for equipment return is included, and that all personnel return to their home location safely.

Resources will be demobilized in accordance with priorities and procedures set by the Unified Command/Incident Command. As the response transitions from the emergency response phase to a planned recovery effort, the demobilization of incident resources must be conducted in an efficient and safe manner and shall not interfere with ongoing incident operations.

The Unified Command/Park City Wind Incident Commander will approve the demobilization of critical resources identified by command staff prior to demobilization from the incident. Those resources will be identified daily in the daily operational period planning cycle. All releases from the incident will be initiated by the Planning Section’s Demobilization Unit after Unified Command/Incident Commander approval.

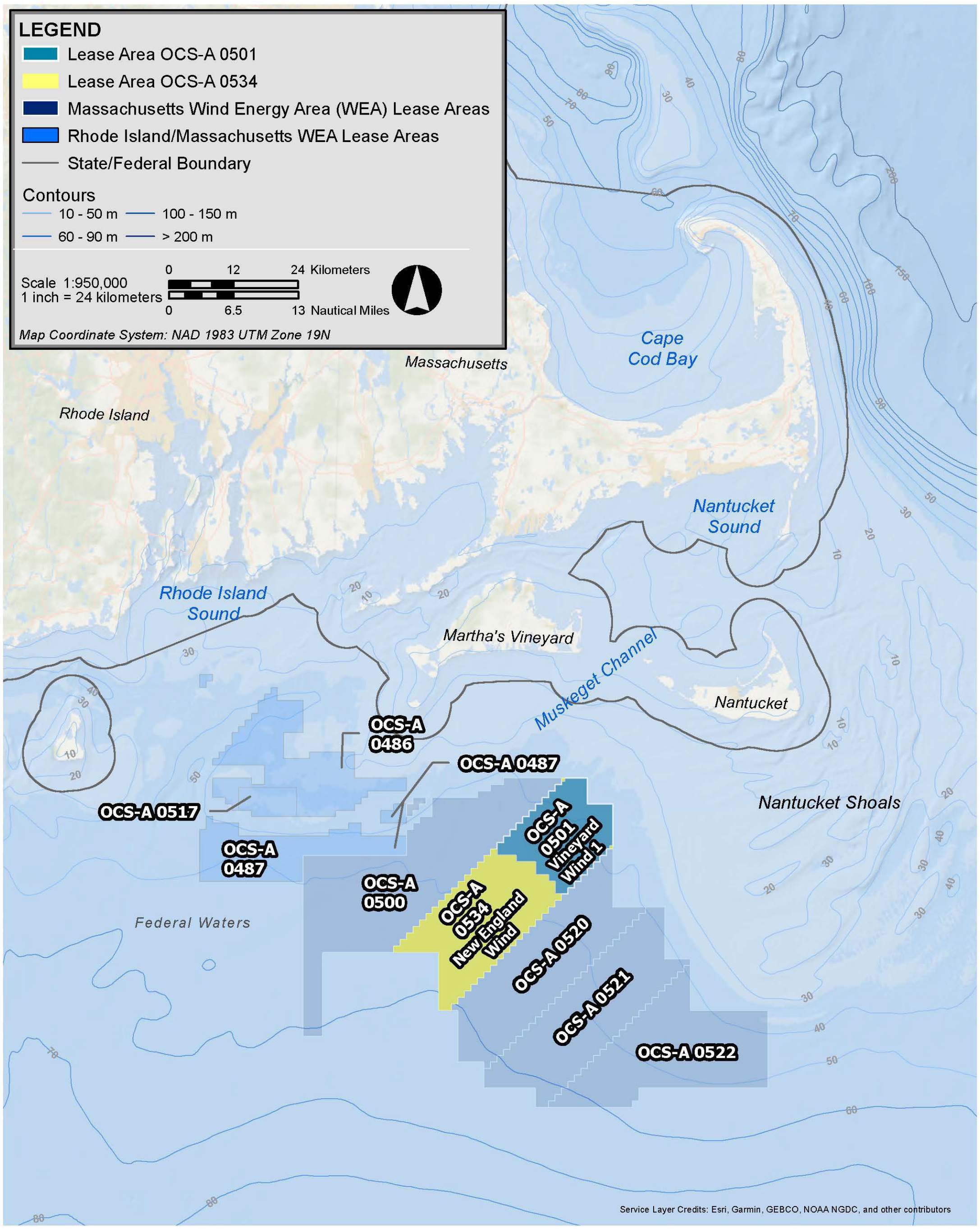
In accordance with 30 CFR 254.56(b), the Proponent will file a written follow-up report for any spill from the facility of 1 barrel or more to the Chief of OSPD within 15 days after the spillage is secured. All reports will include the cause, location, volume, and remedial action taken. Reports of spills of more than 50 barrels will include information on the sea state, meteorological conditions, and the size and appearance of the slick. The Proponent will provide additional information to the BSEE Regional Supervisor if it is determined that an analysis of the response is necessary.

2.13 References

Provincetown Center for Coastal Studies (PCCS). 2005. Toward an Ocean Vision for the Nantucket Shelf Region. Provincetown Center for Coastal Studies (PCCS), Provincetown, MA, 1-61.

Annex 1 – Facility Diagrams

Figure A1-1: Lease Area OCS-A 0534



New England Wind

Figure A1-1
Massachusetts Wind Energy Area

Figure A1-2: New England Wind Overview

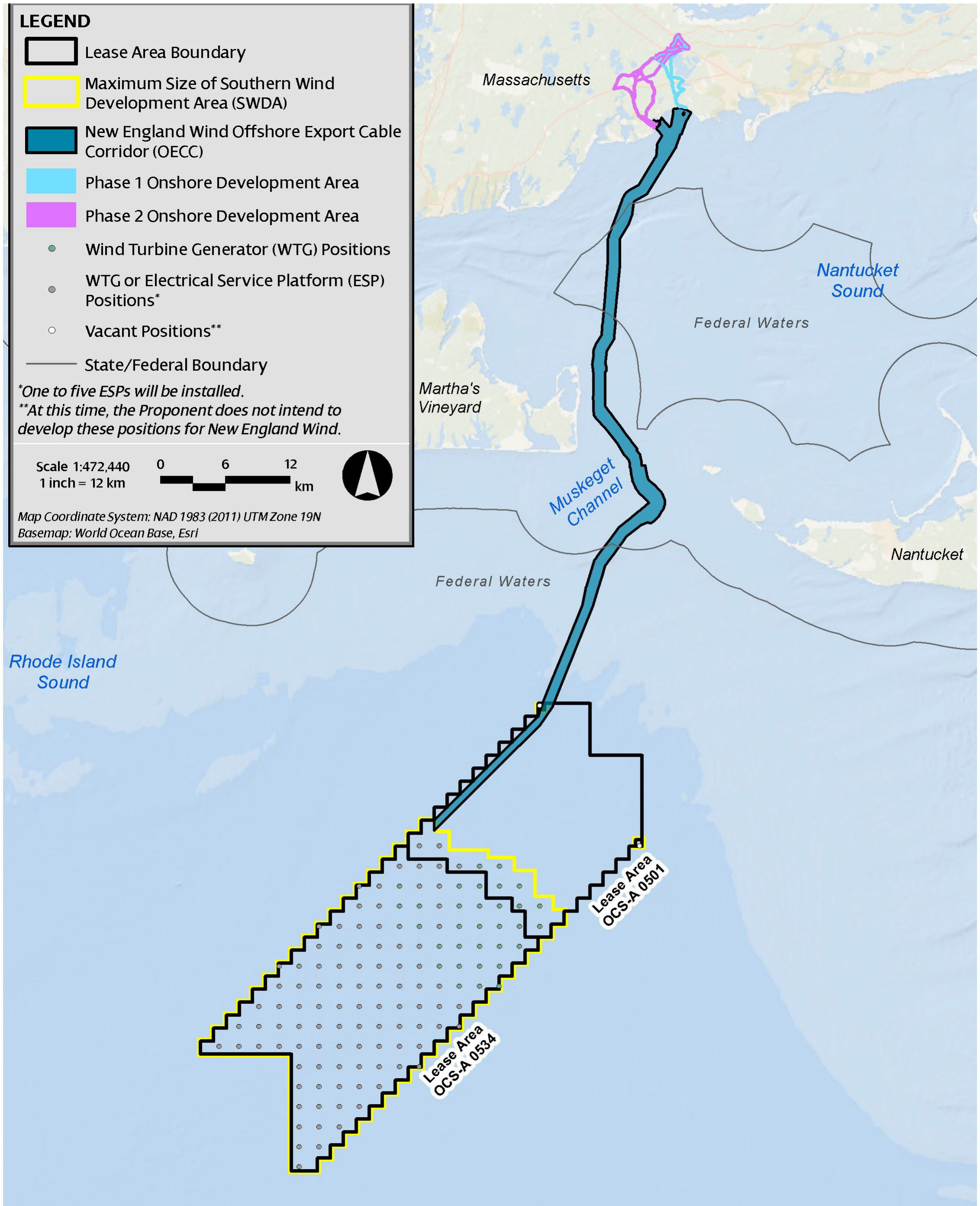


Figure A1-2
New England Wind Overview

Annex 2 – Notification Contact List

Table A2-1 Internal Notification List

New England Wind has not yet been approved. Details regarding QI personnel will be finalized prior to construction.

Name	Position	Cell	Email
Sy Oytan	Qualified Individual, Park City Wind	+1 (617) 937-9270	soytan@vineyardwind.com sy.oytan@avangrid.com
Iker Garcia Magrach	Alternate Qualified Individual, Park City Wind	+1 (617) 721-1843	igmagrach@vineyardwind.com iker.garcia@avangrid.com
Person C	Spill Response Coordinator	(XXX) XXX-XXXX	XXX@XXX.com
Person D	Alternate Spill Response Coordinator	(XXX) XXX-XXXX	XXX@XXX.com
Persons E-Z	Other Spill Management Team Members	(XXX) XXX-XXXX	XXX@XXX.com

Table A2-2 External Notification and Call List

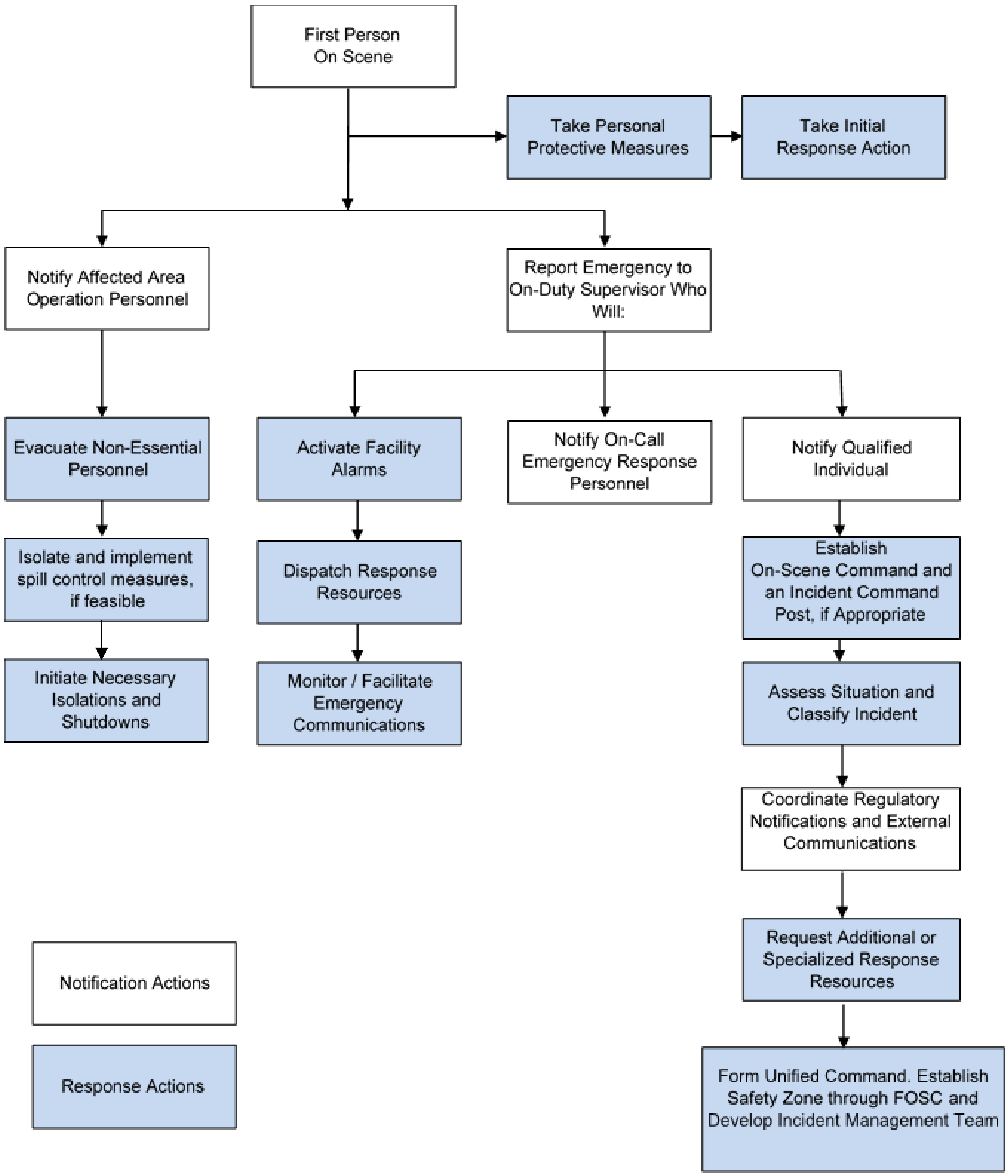
Agency	Location	Telephone
National Response Center	2703 Martin Luther King Jr. Avenue SE Washington, D.C. 20593	800-424-8802 (24 hr)
US Coast Guard Sector Southeastern New England	30 Little Harbor Road Woods Hole, MA 02543	508-457-3211 or 508-538-2300
BSEE Atlantic OCS Region	1201 Elmwood Park Boulevard New Orleans, LA 70123	504-736-0557
BOEM Atlantic OCS Region	1201 Elmwood Park Boulevard New Orleans, LA 70123	1-800-200-4853
EPA Region 1	5 Post Office Square, Suite 100 Boston, MA 02109	888-372-7341 or 617-918-1111
OSHA (fatality or 3 or more employees sent to hospital)	200 Constitution Avenue Washington, D.C. 20210	800-321-6742
Massachusetts Department of Environmental Protection	1 Winter Street Boston, MA 02108	888-304-1133
Massachusetts State Emergency Response Commission	Massachusetts Emergency Management Agency 400 Worcester Road Framingham, MA 01702	508-820-2010
Dukes County REPC (Threat to Martha's Vineyard)	32 Water Street Tisbury, MA 02568	508-696-4240
Wampanoag Tribe of Gay Head (Threat to tribal lands on MV)	20 Black Brook Road Aquinnah, MA 02535	508-645-9265
Mashpee Wampanoag Tribe	483 Great Neck Road South Mashpee, MA 02649	508-477-0208
Barnstable County REPC (Threat to Nantucket)	3195 Main Street Barnstable, MA 02630	508-375-6908
Nantucket Sound Keeper		(508) 775-9767
USCG Classified Oil Spill Removal Organizations (OSRO)		
Park City Wind has not selected an OSRO at this time. USCG Classified OSROs for USCG District 1 can be found at: https://cgrri.uscg.mil/UserReports/WebClassificationReport.aspx.		
Weather		
National Oceanic & Atmospheric Administration (NOAA) National Weather Service National Weather Service	445 Myles Standish Boulevard Taunton, MA 02870	508-822-0634 (forecasts) 508-828.2672 (general info) http://www.weather.gov/box/
NOAA Weather Radio Hyannis, MA	Camp Edwards Hyannis, MA	Call sign: KEX73 VHF: 162.550
NOAA National Data Buoy Center	http://www.ndbc.noaa.gov/maps/Northeast.shtml	
Martha's Vineyard Airport (MVY)	http://mvyairport.com/	
Aviation Resources		
Park City Wind has not selected aviation resources at this time. A list of Massachusetts charter operators is available at: http://www.aircharterguide.com/US_Operators/MA/Massachusetts		
Marine Resources		

Agency	Location	Telephone
Steamship Authority	1 Cowdry Road Woods Hole, MA 02543	508-548-5011
Hyline Ferry - Nantucket	34 Straight Wharf Nantucket, MA 02554	508-228-3949
Hyline Ferry – Martha's Vineyard	12 Circuit Ave Ext Oak Bluffs, MA 02557	508-693-0112
Island Queen Ferry	75 Falmouth Heights Rd Falmouth, MA 02540	508-548-4800
Regulatory Agencies for Wildlife		
US Fish and Wildlife Service North East Regional Office	300 Westgate Center Drive Hadley, MA 01035	413-253-8200
US Fish and Wildlife Service New England Field Office	70 Commercial Street Suite 300 Concord, NH 03301	603-223-2541
Massachusetts Environmental Police (fish kills)	251 Causeway Street Boston, MA 02114	800-632-8075
MassWildlife	1 Rabbit Hill Road Westborough, MA 01581	508-389-6300
MA Department of Fish and Game	251 Causeway Street Boston, MA 02114	617-626-1500
Other Wildlife Resources		
Mass Audubon	208 South Great Road Lincoln, MA 01773	781-259-9500 or 800-823-8266
Felix Neck Wildlife Sanctuary	100 Felix Neck Drive Edgartown, MA 02539	508-627-4850
Long Point Wildlife Refuge	Off Edgartown-West Tisbury Road Martha's Vineyard, MA 02575	508-639-3678
International Fund for Animal Welfare	290 Summer Street Yarmouth Port, MA 02675	508-743-9548
New England Aquarium	1 Central Warf Boston, MA 02110	617-973-5247
NOAA Greater Atlantic Fisheries Office	55 Great Republic Drive Gloucester, MA 01930	866-755-6622
National Audubon Society	New York, NY	212-979-3196
Licensed Wildlife Rehabilitation Providers		
The Commonwealth of Massachusetts maintains a list of licensed wildlife rehabilitators at: https://www.mass.gov/service-details/wildlife-rehabilitators-southeast-district		
Medical Facilities		
Martha's Vineyard Hospital	1 Hospital Road Oak Bluffs, MA 02557	508-693-0410
Vineyard Medical Care (Walk-in Clinic)	364 State Road Vineyard Haven, MA 02568	508-693-4400
Nantucket Cottage Hospital	57 Prospect St. Nantucket, MA 02554	508-825-8165
Ambulances		
Tri-Town Ambulance	West Tisbury, MA	508-693-4922
Oak Bluffs Ambulance Department	Oak Bluffs, MA	508-693-5380
Tisbury Ambulance	Vineyard Haven, MA	508-696-4112

Agency	Location	Telephone
Boston MedFlight (Air lift)	Bedford, MA	781-863-2213
Coast Guard Air Station Cape Cod (Medevac)	Buzzards Bay, MA	508-968-6673
Fire Aid (911)		
Edgartown Fire Department	Edgartown, MA	508-627-5167
Oak Bluffs Fire Department	Oak Bluffs, MA	508-693-0077
West Tisbury Fire Department	West Tisbury, MA	508-693-2749
Chilmark Fire Department	Chilmark, MA	508-645-2207
Vineyard Haven Fire Department	Vineyard Haven, MA	508-696-6726
Nantucket Fire Department	4 Fairgrounds Rd Nantucket, MA 02554	508-228-2324
Police Aid (911)		
Massachusetts State Police	Oak Bluffs, MA	508-693-0545
Dukes County Sherriff	Edgartown, MA	508-627-5328
Nantucket Police	4 Fairgrounds Rd Nantucket, MA 02554	508-228-7246
Massachusetts Environmental Police	Boston, MA	800-632-8075
Massachusetts Department of Public Safety	Boston, MA	617-727-3200
US Marshals Services	Boston, MA	617-748-2500
Federal Bureau of Investigation	Chelsea, MA	857-386-2000
Local Government and Agencies		
Wampanoag Tribe of Gay Head (Aquinnah)	Aquinnah, MA	508-645-9265
Dukes County Health Department	Vineyard Haven, MA	508-696-3844
Martha's Vineyard Chamber of Commerce	Vineyard Haven, MA	508-693-0085
Edgartown Town Hall	Edgartown, MA	508-627-6100
Oak Bluffs Town Hall	Oak Bluffs, MA	508-693-3554
Town of Tisbury	Vineyard Haven, MA	508-696-4200
West Tisbury Town Hall	West Tisbury, MA	508-696-4700
Chilmark Town Hall	Chilmark, MA	508-645-2100
Aquinnah Town Selectman	Aquinnah, MA	508-645-2310
Nantucket Island Chamber of Commerce	Zero Main St 2nd Floor Nantucket, MA 02554	508-228-1700
Other Industrial Facilities in Local Area		
Not Applicable		

Annex 3 – Response Management System

Figure A3-1 Initial Response Flowchart



Annex 4 – Incident and Other Documentation Forms

The QI will coordinate the documentation during the incident, and for post-incident review, in conjunction with federal, state, and local officials, as well as with others familiar with the incident. Forms to assist in documentation and presentation of consistent notification information are presented at the end of this Annex for use during an incident. These include:

- Initial Notification;
- Agency Call Back for Information;
- Chronological Log of Incident; and
- Incident Report.

As an alternative, or in addition to, the NIMS ICS Forms noted below may also be used. These can be accessed online at: https://www.fema.gov/media-library/assets/documents/103505.

Table A4-1 NIMS ICS Forms

ICS Form No.	Description
IAP	Cover Sheet Incident Action Plan
201	Incident Briefing
202	Incident Objectives
203	Organization Assignment List
204	Assignment List
204a	Assignment List Attachment
205	Incident Communications Plan
206	Medical Plan
207	Incident Organization Chart
208	Site Safety Plan
209	Incident Status Summary
210	Resource Status Change
211	Incident Check-In List
213	General Message
213-RR	Resource Request
214	Unit Log
215	Operational Planning Worksheet
215a	IAP Safety Analysis Form
218	Support Vehicle/Equipment Inventory
219	Resource Status Card (T-Cards)
220	Air Operations Summary
221	Demobilization Checkout
224	Crew Performance Rating
225	Incident Personnel Performance Rating
230	Daily Meeting Schedule
232	Resources at Risk Summary
232a	ACP Site Index
233	Incident Open Action Tracker
234	Work Analysis Matrix
235	Facility Needs Assessment

The post-incident investigation will begin after the source of the incident has been corrected, eliminated, or repaired, and the facility has been declared safe by the QI. The QI will take the following steps during a post-accident investigation:

- Obtain all data, information, and reports pertaining to the incident.
- Interview in person, or by telephone, each person knowledgeable of the incident.
- Review the response of operations personnel to see if procedures and training were adequate or if changes are warranted.
- Evaluate other potentially dangerous situations which could have occurred, and if the response of personnel and safety systems would have accommodated those situations had they occurred.
- Prepare recommendations as appropriate for changes to:
    - Design of facility;
    - Operating procedures;
    - Training;
    - Communications; and
    - Emergency response plans and procedures.
- The QI will prepare and issue a written report to all supervisors with any changes deemed appropriate.

The QI will prepare a post-incident report. This report will contain an account of the incident, including proof that Park City Wind met its legal notification requirements for any given incident (i.e. signed record of initial notifications and certified copies of written follow-up reports submitted after a response). Examples of routine equipment and maintenance checklists/logs are also provided. These include:

- Response Equipment Inspection Log;
- Secondary Containment Checklist and Inspection Form;
- Tank Inspection Form; and
- Maintenance Log.

Form A4-10 Initial Notification Data Sheet

Date:	Time:
INCIDENT DESCRIPTION	
Reporters Name:	Position:
Reporters Phone Number:	Address:
Company:	
Latitude:	Longitude:
Date of Incident:	Time of Incident:
Spill/Incident Location:	Source and/or Cause of spill/incident:
Material spilled and total volume:	Vessel Name and Number (if applicable):
Is the material spilled in water?	Is the source secured?
Weather conditions:	Precipitation?
Incident Description:	
Name of Incident Commander:	Where is the Incident Command Post (directions)?
RESPONSE ACTIONS	
Actions taken to correct, control or mitigate incident:	
Number of injuries:	Number of deaths:
Were there evacuations?	Number of evacuated:
Areas affected:	Damage estimate:
Any other information about impacted medium:	
CALLER NOTIFICATIONS	
National Response Center (NRC): 800-424-8802	MassDEP
NRC Incident Assigned Number:	Other Agencies Notified: □ USCG □ EPA □ BSEE □ BOEM □ OSHA □ USFWS □ NMFS
Other Information Not Recorded Elsewhere:	

Note: Do Not Delay Notifications Pending Collection of All Information. Notify NRC immediately.

Form A4-11 Agency Call Back Information

Incident Number: ____________

Document all information that agencies request.

Date:	**Time:**
Agency:	**Person Contacted:**
Reason for Call Back:	
Document all dialogue with agency below:	

Form A4-12 Chronological Log of Events

Incident No.___________

Document all events chronologically.

Date/Time	Record of Event

Form A4-13 Incident Report

Incident No. ___________

Reviewed by:	**Final Date:**
□ Attach Initial Notification Form for basic data, update as incident progresses.	
Incident Duration (dates and time):	Type and Location of Incident:
Categorical Level of Incident and what portions of response team were assembled? Identify all leader positions and names.	Does the incident create a potential compliance issue? If yes, describe.
Material discharged:	Final discharged volume:
Were there any abnormal operating conditions immediately before the emergency? If yes, describe.	Were there any equipment problems or changes immediately before the emergency? If yes, describe.
Description of media impacted:	Was all media cleaned up to satisfaction of regulatory agencies?
Type and volume of waste generated (attach waste tracking log if applicable):	How and where was waste disposed or recovered?
Were all spilled materials recovered? If not, describe what was not recovered and why.	
Provide description of cleanup methods utilized:	
Describe decontamination procedures and include pieces of equipment decontaminated:	
Has stock of emergency equipment been replenished to pre-incident conditions?	Date demobilization was completed:

Describe what worked and did not work during incident:
Recommendations for improvement:

Form A4-14 Response Equipment Inspection Log

Incident No. ___________

Inspector	Date	Equipment	Comments

New England Wind is being developed and permitted using an Envelope Concept. The Envelope allows Park City Wind to properly define and bracket the characteristics of New England Wind for the purposes of environmental review and permitting while maintaining a reasonable degree of flexibility with respect to selection and purchase of key New England Wind components. Specific details will be identified in the final version of the OSRP.

Form A4-15 Secondary Containment Checklist and Inspection Form

Incident No. ___________

Area(s) Inspected:	**Date/Time:**	**Inspected By:**
Inspection Item	**Acceptable (Y/N)**	**Comments/Corrective Action**
Level of precipitation in containment		
Presence of spilled or leaked material		
Operational status of drainage valves		
Debris		
Location/status of pipes, inlets, drainage		
Cracks		
Discoloration		
Corrosion		
Valve conditions		

New England Wind is being developed and permitted using an Envelope Concept. The Envelope allows Park City Wind to properly define and bracket the characteristics of New England Wind for the purposes of environmental review and permitting while maintaining a reasonable degree of flexibility with respect to selection and purchase of key New England Wind components. Specific details will be identified in the final version of the OSRP.

Form A4-16 Monthly Checklist and Inspection Form

Incident No. ___________

Tank(s) Inspected:	**Date/Time:**	**Inspected By:**
Inspection Item	**Acceptable (Y/N)**	**Comments/Corrective Action**
Emergency Generator (Day Tank and Lubrication Oils)		
Diesel Tank		
Platform Crane		
Power Transformers		
Reactors		
Auxiliary/Earthing Transformers		
Wind Turbine Generators		

Inspect for the following:

- **Support structure is in good condition (no corrosion or damage)**
- **External shell structure is in good condition (no corrosion or damage)**
- **Drip pans are in place (if applicable)**
- **Foundation is in good condition (stable and level)**
- **Liquid level gauge is in place and in good working condition (if applicable)**

Remarks:

Form A4-17 Response Equipment Maintenance Log

This may be maintained on computer log or paper but must be kept on-site. Include description of maintenance activities performed (i.e. repaired boat motor, gate valves lubricated, booms cleaned, etc.).

Date	Equipment	Maintenance Performed

Annex 5 – Drills and Exercises, Training, and Logs

Facility response training, ICS training, personnel response training, drills/exercises, and spill prevention meetings in this section comply with the requirements of 30 CFR 254.41. Per 30 CFR 254.41(d), training certificates and training attendance records must be maintained in a designated location for at least two years. The Proponent will maintain documentation of training in the New Bedford, Massachusetts office. Training records must be made available to any authorized BSEE representative upon request. The Emergency Response Critique forms used to document inspections, drills, and training are included in Table A5-1.

A5.1 Drills and Exercises

Per 30 CFR 254.42(a), the entire OSRP must be exercised at least once every three years. However, to satisfy this requirement, separate exercises may be conducted over a three-year period. Exercises will simulate conditions in the area of operations, including seasonal weather variations, to the extent practicable. In addition, exercises will cover a range of scenarios, such as spills of a short duration and limited volume and the worst case discharge scenario.

A schedule of exercises will be determined by management in accordance with 30 CFR 254.42(b). The Chief of OSPD may require a change in the frequency of required exercises. Actual training exercises will be coordinated with the OSRO. Response training programs will comply with the Preparedness for Response Exercise Program (PREP) and the USCG/EPA training guidelines for oil spill response. Table A5-1 includes a list of regular personnel training exercises. This annex includes Drill/Exercise Documentation Forms to be used to document drills and exercises. The Chief of OSPD and BOEM must be notified at least 30 days prior to the following exercises: annual incident management team tabletop exercise; annual deployment exercise of response equipment identified in the OSRP that is staged at onshore locations; and semi-annual deployment exercises of any response equipment which the BSEE Regional Supervisor requires the Proponent to maintain at the facility or on dedicated vessels. The annual Incident Management Team (IMT) tabletop exercise will include the actual notification to the National Response Center (NRC), BSEE Regional Supervisor, BOEM, and the OSRO to determine availability and response times. Each call that is made will begin with the statement “This is a drill.”

As detailed in this annex, several types of drills are conducted as part of the drill program as follows:

- Notification drills to test communications procedures will be conducted monthly.
- QI notification drills will be conducted at least quarterly to verify that the QI can be reached in an emergency situation to perform required duties.
- The Spill Management Team will participate in a table-top drill annually. A tabletop drill will also be included in other drills as often as possible.
- Unannounced annual notification drills will be performed. These drills will be conducted with BSEE OSPD, BOEM, and OSRO participation. These annual drills will simulate a response action and conveyance of key information between the QI, BOEM, and the BSEE OSPD.
- Every effort is made to cooperate in local drills requested by regulatory agencies and neighbors.
- OSROs under contract will be drilled at least annually.
- Full-scale exercises will be conducted every four years and will involve federal, state, and local government agencies, including BSEE, BOEM, and USCG

The annual notification drill will be an opportunity for the QI, BOEM, and BSEE OSPD to simulate an incident command post setting that is capable of supporting response efforts (e.g., deployment of personnel and equipment, tracking containment efforts, taking samples, shoreline cleanup, etc.) for a variety of spill scenarios. Prior to the drill, the size and scope of the drill will be defined and will be structured of various levels of complexity to test events ranging from implementation of specific components of the OSRP to full implementation of the plan.

Facility spill response drills are comprehensive and designed to improve response actions at the level of the first responder. A tabletop planning session is held prior to the drill, with a limited number of supervisory personnel informed of the drill.

Drills are conducted to enable personnel who will act as initial responders during an actual spill to become familiar with response equipment. During spill drills, the techniques of pulling and placing boom such as for diversion, deflection, and containment are practiced. Drills are also conducted to allow personnel to become familiar with climatic conditions, such as the interactions of wind, tide, and wave actions and their effect on oil movement. In spill drills, consideration is given to sensitive areas which may be affected and need protection.

As part of the drill process, a critique is held following the drill. All personnel who participate in the drill, including observers, also participate in the critique. The purpose of this is to review the drill for procedures which worked well and procedures which did not work well. Each individual has an opportunity to provide for input. Recommendations are submitted to management.

Annually, at least one of the exercises listed in Table A5-1 must be unannounced. Unannounced means the personnel participating in the exercise must not be advised in advance, of the exact date, time, and scenario of the exercise. The staff from New England Wind will also participate in unannounced exercises as directed by the lead federal agency. The objectives of the unannounced exercises will be to test notifications and equipment deployment for response to the average most probable discharge. After Park City Wind personnel successfully complete a Government-Initiated Unannounced Exercise (GIUE), they will not be required to participate in another one for at least 36 months from the date of the exercise.

New England Wind personnel will also participate in exercises of the ACP as directed by the USCG FOSC. As part of the National Preparedness for Response Exercise Program (PREP), the USCG Sector Southeastern New England FOSC will either direct a government-led PREP exercise where the Proponent could participate as the Responsible Party or lead the exercise design and facilitation effort for an industry-led PREP exercise. These exercises are typically full-scale exercises involving both an Incident Command Post element exercising the IMT and a field deployment element where spill response equipment is actually deployed. Area exercises test the ACP and are required on a quadrennial schedule. In either a government-led or industry-led PREP exercise, the Proponent would be a main player on the Exercise Design Team along with the USCG, MassDEP, and other federal, state, and local stakeholders.

An Exercise Drill Log will be developed and maintained by the Proponent's Training Department to record all drills and exercises completed at the facility. An example training log form is presented in this Annex. Records of these activities will be maintained for a period of three years, as per 30 CFR 254.42(e).

A5.2 Planned Training

Planned training sessions are held for staff and operations personnel on an annual basis to gain an understanding of the OSRP process. The intent of these sessions is to keep personnel informed of their obligation to respond to all emergencies, to prevent pollution incidents, to improve spill control and response techniques, and to gain a comprehensive understanding of the ICS and their responsibilities on the IMT. These briefings highlight and describe known spill events or failures, malfunctioning components, and recently developed precautionary measures to prevent spills.

Members of the Spill Response Operating Team who are responsible for operating response equipment will attend hands-on training classes at least annually. This training will include the deployment and operation of all response equipment. Supervisors of the team will receive this training and will also be trained annually on directing the deployment.

All field personnel and members of the spill response management team or IMT, including the Spill Response Coordinator and alternate Spill Response Coordinators, will receive annual training on their duties. This training will include:

- The proper procedures for the reporting of spills, including procedures for contacting the QI on a 24-hour basis.

- Locations, intended use, deployment strategies, and operational and logistical requirements of response equipment. They will also review procedures on how and where to place facility containment/recovery materials depending on where the spill occurs and various seasonal conditions. Personnel will be informed that detergents or other surfactants are prohibited from being used on an oil spill in the water and that dispersants may only be used with the approval of the RRT.

- Oil spill trajectory analysis and predicting spill movement.

- Other responsibilities of the IMT, including ICS procedures and roles.

The QI, Spill Response Coordinator, and alternate Spill Response Coordinators will receive specific training to ensure they are sufficiently trained to perform their duties.

Records of all training activities are maintained for at least two years following completion of training. The facility will maintain records for each individual as long as these individuals are assigned duties in this plan. Individuals will sign documentation when participating in training classes or exercises as provided in the example in Table A5-2 within this Annex.

Credit for any of the above drills and exercises may be taken by the Proponent if an actual incident occurs, and records of the incident will be maintained to show evidence of complying with any of the above drill or exercise requirements.

Table A5-1 Drills and Exercises

Exercise	Purpose/Scope	Objectives	Frequency	Participants
QI Notification Exercise	Ensure the QI can be contacted in a spill response emergency in order to carry out required duties.	• Contact QI by telephone, radio, fax, , or email. • Confirmation received from QI of notification.	Monthly	Qualified Individuals
Incident Management Team (IMT) Tabletop Exercise (TTX)	Ensure the IMT is familiar with the emergency response procedures and the Incident Command System.	• IMT is familiar with emergency response procedures. • Employs proper procedures during a simulated emergency response.	Annually	IMT, BSEE OSPD, BOEM
On-Site Equipment Deployment Exercise	Verify that required response equipment is operable and facility personnel are capable of deploying the equipment.	• Verify that designated equipment is available. • Deploy at least minimum required equipment during exercise. • Verify that personnel tasked with deployment have received required training.	Annually	Spill Response Operating Team, BSEE OSPD, BOEM, OSRO
OSRO Equipment Deployment Exercise	Same as above, but performed by OSRO	• Same as above	Annually	OSRO
Discharge Prevention Briefings	Conduct Discharge Prevention Briefings	• Personnel have adequate understanding of the OSRP. • Describe known discharges or failures. • Discuss any recently developed precautionary measures.	Annually (optional)	Oil-handling Personnel

Simulated Spill Drill[2]	Test the resources and response capabilities of the OSRO.	• Demonstrate OSRO's ability to deploy resources to include:
		  ○ On water containment and recovery
		  ○ Sensitive habitat protection
		• Storage
			Every three years	Oil-handling Personnel

Full-Scale Exercise (FSE)	Test the IMT's capability of establishing a Unified Command (UC) and developing an Incident Action Plan. In addition to the work within the Incident Command Post, field personnel will deploy equipment in the field using the same exercise scenario.	• Demonstrate IMT's ability to establish the ICS, transfer incident management to a UC formed with government personnel, and produce an Incident Action Plan • Demonstrate field personnel's capability to deploy oil spill response equipment to protect sensitive sites	Every four years	QI, Spill Response Coordinator, IMT, federal, state, and local government personnel including OSPD, field personnel

Notes:

1. In a three year period, at least one of these exercises must include a worst case discharge scenario.
2. In a three year period, all components of the response plan must be exercised.
3. Annually at least one of the first three exercises listed must be unannounced to participants.

A5.3 Training Documentation and Record Maintenance

Spill response personnel training records will be maintained at the Park City Wind office in New Bedford, MA. The address for this New Bedford office is 700 Pleasant Street, Suite 510, New Bedford, Massachusetts. An example training record is provided in Table A5-2. Records will be maintained at this location for two years and will include:

- Documentation of annual training associated with the OSRP provided to the QI, Alternate QI, Spill Response Coordinator, alternate Spill Response Coordinator, IMT members, and other facility personnel;
- Records of personnel training in accordance with OSHA 29 CFR §1910.120 regulations;
- Records of training provided for response contractor personnel will be maintained at the respective contractor's office and will be verified by facility personnel on-site; and
- Logs of volunteer workers (if applicable) and activities performed.

Table A5-2 Spill Response Drill Form Notification Exercise

PARK CITY WIND LLC
SPILL RESPONSE DRILL/EXERCISE DOCUMENTATION FORM

NOTIFICATION EXERCISE

1. Date performed: ______________________________
2. Exercise or actual response: ______________________________
3. Facility initiating exercise: ______________________________
4. Name of person notified: ______________________________

   Is this person identified in your response plan as qualified individual or designee? ______________________________
5. Time initiated: ______________________________

   Time in which qualified individual or designee responded: ______________________________
6. Method used to contact:

   ____Telephone

   ____Radio

   ____Other ______________________________
7. Description of notification procedure:

   ____

   ____

   ____
8. Evaluation of Drill:

   ____

   ____

   ____
9. Changes to be implemented (if any):

   ____

   ____

   ____

Certifying Signature ______________________________

Table A5-3 Incident Management Team Tabletop Exercise

PARK CITY WIND LLC
SPILL RESPONSE DRILL/EXERCISE DOCUMENTATION FORM

INCIDENT MANAGEMENT TEAM TABLETOP EXERCISE

1. Date performed:____
2. Exercise or actual response:____________________________________
   If an exercise, announced or unannounced:__________________________
3. Location of tabletop:____
4. Time started:____
   Time completed:____
5. Response plan scenario used (check one):
   ____Average most probable discharge ____Worst case discharge
   ____Maximum most probable discharge ____Size of (simulated) spill-bbls/gals
6. Describe how the following objectives were exercised:

a) Spill management team's knowledge of oil-spill response plan:

____
____
____

b) Proper notifications:

____
____
____

c) Communications system:

____
____
____

d) Spill management team's ability to access contracted oil spill removal organizations:

____
____
____

e) Spill management team's ability to coordinate spill response with Federal On-Scene Coordinator, State On-Scene Coordinator, and other applicable agencies:

____
____
____

f) Spill management team's ability to access sensitive site and resource information in the Area Contingency Plan:

____
____
____

INCIDENT MANAGEMENT TEAM TABLETOP EXERCISE (Continued)

7. Evaluation of Exercise:

____
____
____
____
____
____

8. Lessons Learned:

____
____
____
____
____
____

9. Changes to be implemented (if any):

____
____
____
____
____
____

Certifying Signature:______________________________________

Table A5-4 Spill Response Drill Form Equipment Deployment Exercise

PARK CITY WIND LLC
SPILL RESPONSE DRILL/EXERCISE DOCUMENTATION FORM

EQUIPMENT DEPLOYMENT EXERCISE

1. Date performed:____
2. Exercise or actual response:______________________________________

   If an exercise, announced or unannounced:______________________________
3. Deployment location(s):

   ____
   ____
   ____
4. Time started:____

   ________Time OSRO called (if applicable)

   ________Time on-scene

   ________Time boom deployed

   ________Time recovery equipment arrives on-scene

   ________Time completed
5. Equipment deployed was:

   ________Facility-owned

   ________OSRO-owned; if so, which OSRO:______________________________

   ________Both
6. List type and amount of all equipment (e.g., boom and skimmers) deployed and number of support personnel employed:

   ____
   ____
   ____
   ____
   ____
7. Describe goals of the equipment deployment and list any Area Contingency Plan strategies tested. Attach a sketch of equipment deployments and booming strategies:

   ____
   ____
   ____
   ____
   ____
8. For deployment of facility-owned equipment, was the amount of equipment deployed at least the amount necessary to respond to your facility's average most probable spill?

   ____
   ____
   ____

EQUIPMENT DEPLOYMENT EXERCISE (Continued)

9. Was the equipment deployed in its intended operating environment?

____
____
____

10. For deployment of OSRO-owned equipment, was a representative sample (at least 1000 feet of each boom type and at least one of each skimmer type) deployed?

____
____
____

11. Was the equipment deployed in its intended operating environment?

____
____
____

12. Are all facility personnel that are responsible for response operations involved in a comprehensive training program, and all pollution response equipment involved in a comprehensive maintenance program?

____
____
____

13. Date of last equipment inspection:______________________________

14. Was the equipment deployed by personnel responsible for its deployment in the event of an actual spill?______________________________

15. Was all deployed equipment operational? If not, why not?

____
____
____

16. Evaluation of Exercise:

____
____
____

17. Lessons Learned:

____
____
____

18. Changes to be implemented (if any):

____
____
____
____
____
____

Certifying Signature:____

Table A5-5 Park City Wind Training Log

PARK CITY WIND LLC
TRAINING LOG

EMPLOYEE TRAINING

Employee Name	Date	Hours of Training	Training Topic

Annex 6 – Regulatory Compliance and Cross-Reference Matrix

Table A6-1 Oil Spill Response Plans for Outer Continental Shelf Facilities

Oil Spill Response Plans for Outer Continental Shelf Facilities 30 CFR 254, Subpart B		Plan Reference
254.21(b)(1)	Table of Contents	Table of Contents
254.21(b)(2)	Emergency response action plan	Annex 3
254.21(b)(3)(i)	Equipment response inventory	Annex 9
254.21(b)(3)(ii)	Contractual agreements	Annex 8
254.21(b)(3)(iii)	Worst case discharge scenario	Annex 7
254.21(b)(3)(iv)	Dispersant use plan	OSRP Section 2.7
254.21(b)(3)(vi)	In situ burning plan	OSRP Section 2.8
254.21(b)(3)(vi)	Training and drills	Annex 5
254.22(a)	Facility location and type	OSRP Section 1.3
254.22(b)	Table of Contents	Table of Contents
254.22(c)	Record of changes	OSRP Page v
254.22(d)	Cross reference table	Annex 6
254.23(a)	Designation of QI	OSRP: Section 2.2, Table 2-2, Section 2.3
254.23(b)	Designation of spill management team	OSRP Section 2.2.2
254.23(c)	Spill response operating team	OSRP Section 2.2.2
254.23(d)	Spill response operation center	OSRP Section 2.2.2
254.23(e)	Oil stored, handled, or transported	Annex 7
254.23(f)	Procedures for early detection of a spill	OSRP Section 2.1 and 2.4.1
254.23(g)(1)	Spill notification procedures	OSRP Section 2.2 Annex 2
254.23(g)(2)	Methods to detect/predict spill movement	OSRP Section 2.1 and 2.4.1
254.23(g)(3)	Methods to prioritize areas of importance	OSRP Section 2.5
254.23(g)(4)	Methods to protect areas of importance	OSRP Section 2.5
254.23(g)(5)	Containment and recovery equipment deployment	OSRP Section 2.5
254.23(g)(6)	Storage of recovered oil	OSRP Section 2.6
254.23(g)(7)	Procedures to remove oil and oil debris from shallow waters	OSRP Section 2.4
254.23(g)(8)	Procedure to store, transfer, and dispose of recovered oil and oil-contaminated materials	OSRP Section 2.6
254.23(g)(9)	Methods to implement dispersant use plan and in situ burning plan	OSRP Section 2.7 and 2.8
254.24(a)	Inventory of spill response resources	Annex 9
254.24(b)	Procedures for inspecting and maintaining spill response equipment	Annex 9

Oil Spill Response Plans for Outer Continental Shelf Facilities 30 CFR 254, Subpart B		Plan Reference
254.25	Contractual agreements	Annex 8
254.26(a)	Volume of worst case discharge	Annex 7
254.26(b)	Trajectory analysis	Annex 11
254.26(c)	List of special economic and environmentally important resources	OSRP Section 2.4.2
254.26(d)(1)	Response equipment	Annex 9
254.26(d)(2)	Personnel, materials, and support vessels	OSRP Section 2.10
254.26(d)(3)	Oil storage, transfer, and disposal equipment	Annex 9
254.26(d)(4)	Estimation of time to mobilize	OSRP Section 2.10
254.26(e)	Suitability of response	OSRP Section 2.9
254.27	Dispersant use plan	OSRP Section 2.7
254.28	In situ burning plan	OSRP Section 2.8
254.29(a)	Training	Annex 5
254.29(b)	Drills	Annex 5
254.30	Revision of OSRP	OSRP Page v

Annex 7 – Worst-Case Discharge – Planning Calculations for Discharge Volumes, Response Equipment, and Detailed Spill Response Plan

Per 30 CFR 254.26, the volume of the worst-case discharge scenario must be determined using the criteria in 30 CFR 254.47. The criteria in 30 CFR 254.47 applies to oil production platform facilities and pipeline facilities. Per BSEE/BOEM guidance titled, "Oil Spill Response Plan (OSRP) for Offshore Wind Facilities Discussion Handout" dated August 21, 2019, the worst-case discharge for a renewable energy facility is defined as the release of all oil from a component located at an offshore facility, such as a WTG or an ESP.

A7.1 Facility Information

Park City Wind proposes to construct, operate, and decommission offshore renewable wind energy facilities its BOEM Lease Area OCS-A 0534 along with associated offshore and onshore cabling, onshore substations, and O&M facilities ("New England Wind"). New England Wind will be developed in two Phases with a maximum of 130 WTG and ESP positions. Each Phase of New England Wind will be developed using a Project Design Envelope.

The SWDA is just over 32 kilometers (km) (20 miles [mi]) from the southwest corner of Martha's Vineyard and approximately 38 km (24 mi) from Nantucket. The WTGs and ESPs in the SWDA will be oriented in an east-west, north-south grid pattern with one nautical mile (NM) (1.85 km) spacing between WTG/ESP positions. Phase 1 of New England Wind, which includes Park City Wind, will deliver power to one or more Northeastern states and/or to other offtake users, including but not limited to 804 MW of power to the ISO New England electric grid to meet the Proponent's obligations under long-term contracts with Connecticut electric distribution companies. The Phase 1 Envelope allows for 41 to 62 WTGs and one or two ESPs. Depending upon the capacity of the WTGs, Phase 1 will occupy 150–231 km^2 (37,066–57,081 acres) of the SWDA. The Phase 1 Envelope includes two WTG foundation types: monopiles and piled jackets. Strings of WTGs will connect with the ESP(s) via a submarine inter-array cable transmission system. The ESP(s) will include step-up transformers that increase the voltage of power generated by the WTGs prior to transmission and other electrical equipment. The worst case oil discharge associated with Phase 1 is conservatively assessed as a catastrophic release of all oil contents from the topple of an 804 MW ESP located closest to shore within the Phase 1 portion of the SWDA.

Phase 2, which includes Commonwealth Wind, will be developed immediately southwest of Phase 1 and will occupy the remainder of the SWDA. The footprint and total number of WTG and ESP positions in Phase 2 depend upon the final footprint of Phase 1. Phase 2 is expected to contain 64 to 88 WTG/ESP positions (up to three positions will be occupied by ESPs) within an area ranging from 222-303 km^2(54,857-74,873 acres). The largest ESP expected to be included in Phase 2 is a 1,200 MW ESP. The worst case oil discharge associated with Phase 2 is conservatively assessed as a catastrophic release of all oil contents from the topple of a 1,200 MW ESP located closest to shore within the Phase 2 portion of the SWDA.

The oil sources in the WTGs include the generator oil and transformer oil, which total approximately 3,162 gallons for the largest WTG included in both the Phase 1 and Phase 2 Envelope. Oil sources in the ESPs include power transformers, reactors, auxiliary/earthing transformers, diesel tanks, an emergency generator day tank, an emergency generator, and naphthenic oil for a platform crane. Oil sources presented in this document are associated with the single largest ESPs, which are either 804 MW ESPs or 1,200 MW ESPs. The oil sources associated with one 804 MW ESP and one 1,200 MW ESP total approximately 124,097 gallons (2,955 bbl) and 185,978 gallons (4,428 bbl), respectively.

Table A7-1 WTG Oil Storage

Oil Source	Volume (Liters)	Approximate Gallons
Generator (hydraulic oil)	570	151
Transformer	11,400	3,012
TOTAL		**3,162**

Table A7-2 ESP Oil Storage for 804 MW ESP

Oil Source	Volume (Liters)	Gallons
Emergency Generator – Diesel Day Tank	3,802	1,004
Emergency Generator – Naphthenic Oil	53	14
Diesel Tank	16,896	4,463
Platform Crane – Naphthenic Oil	1,267	335
Power Transformers (two units) - Naphthenic Oil	291,456	76,994
Reactors (two units) - Naphthenic Oil	147,840	39,055
Auxiliary/Earthing Transformer – Biodegradable ester	8,448	2,232
TOTAL		**124,097**

Table A7-3 ESP Oil Storage for 1,200 MW ESP

Oil Source	Volume (Liters)	Gallons
Emergency Generator – Diesel Day Tank	5,702	1,506
Emergency Generator – Naphthenic Oil	79	21
Diesel Tank	25,344	6,695
Platform Crane – Naphthenic Oil	1,267	335
Power Transformers (two units) – Naphthenic Oil	437,184	115,491
Reactors (two units) – Naphthenic Oil	221,760	58,582
Auxiliary/Earthing Transformer – Biodegradable ester	12,672	3,348
TOTAL		**185,978**

A7.2 Oil Volume and Spill Containment

If all the oils associated with the ESPs were released, the worst-case discharge scenario would be 124,097 gallons for the Phase 1 804 MW ESP and 185,978 gallons each for the Phase 2 1,200 MW ESP. However, control measures (e.g., containment structures) would be in place to contain a release of oil. Where possible, biodegradable oils will be used. In addition, monitoring equipment will be used to detect a release of oil. Monitoring equipment being considered include closed circuit televisions, supervisory control and data acquisition, alarm systems (e.g., tank level, containment liquids, etc.), and oil detection equipment for the sump tank. The equipment will be monitored remotely from a "control room". Specific details will be identified in the final version of the OSRP.

Based on the current conceptual ESP design and subject to ongoing refinements, the ESP platform is expected to be equipped with a drain system consisting of containment structures, piping, an oil/water separator (OWS), and a sump tank. The containment structures are sized according to the largest container and are connected via a piping system, draining liquids under gravity to an OWS and a sump tank. The sump tank must be dimensioned for the largest amount of oil, deluge water, and firewater coming from an oil-filled equipment during the greatest incident plus spare capacity (15% recommended). The sump tank may be emptied by a service vessel for proper disposal of the oily substances onshore.

The ESPs will likely include an OWS, subject to the final ESP design. Rainwater and oily substances are separated in the OWS before water is led overboard. Water being led overboard is monitored for oil contamination. As per maritime regulations, the oil content in the water processed from the OWS must be less than 15 parts per million of oil. The 15 ppm alarm shall activate to indicate when this level cannot be maintained, and initiate automatic stop of overboard discharge of oily mixtures where applicable. The overboard line will be closed, and the drained liquids are fed to the sump tank and stored, in the event of a discharge.

In general, all equipment that contains an environmentally harmful substance is placed above drip trays. The area of the platform where the transformers are placed is expected to be a plated area with drains, acting as drip trays. Drip trays that have the potential to collect rainwater are connected via the OWS to the sump tank. Other drip trays (e.g., indoor) which collect only harmful substances may be connected directly to the sump tank.

Any temporary piping connections transporting oily substances (e.g., between diesel storage container and emergency generator) will be made using off-shore certified dry-break connectors and placed above a drip tray. A simple oil spillage kit, allowing to mitigate small, local spillage during maintenance, will be part of the delivery.

The Phase 1 and Phase 2 WTGs contain up to approximately 3,162 gallons of oil per WTG. The WTGs are designed to have a fiberglass secondary containment system, which would be sized according to the largest container.

A7.3 Oil Spill Trajectory

Based on 30 CFR 254.26, an appropriate oil spill trajectory analysis was conducted. This analysis identified the onshore and offshore areas that a discharge could potentially affect. The oil spill modeling study assessed the trajectory and weathering of oil following a catastrophic release of all oil contents from the topple of the largest volume ESP located the closest to shore within each of the two Phases in the SWDA (during a time period that oil could reasonably be expected to persist in the environment). This scenario would be the worst-case discharge, involving a relatively small and finite release of oil (on the order of 3,000–4,500 bbl in comparison to a larger multi-million bbl catastrophic release such as the Deepwater Horizon oil spill). It is important to note that the modeling conducted includes the conservative assumption that no oil spill response or mitigation would occur. In fact, the Proponent would employ containment and recovery methods, including response equipment employed on water that would be used to prevent the spread of the spill, contain the oil to as small an area as possible, and protect sensitive areas before they are impacted. A full description of the oil spill modeling and results are provided in Annex 11 of this OSRP.

A7.4 Resources of Special Economic or Environmental Importance

According to the RRT 1 RCP, MassDEP is the designated representative of Region I RRT for the Commonwealth of Massachusetts. In addition, MassDEP is the Trustee for Natural Resources under the Oil Pollution Act of 1990 (Public Law 101-380). MassDEP has established a Priority Resource Map, which includes data such as sole source aquifers, wellhead protection areas, protected open space areas, areas of critical environmental concern, and estimated habitats of rare wildlife. The mapping does not include the SWDA since it is in the OCS.

At its closest point, the SWDA is located just over 31 km (19 mi) from the southwest corner of Martha's Vineyard and approximately 38 km (23 mi) from Nantucket, Massachusetts. The island of Martha's Vineyard is an EPA designated sole source aquifer. The central and eastern portions of Martha's Vineyard have been identified as potentially productive aquifers. An area that has been designated as a National Heritage and Endangered Species Program Estimated Habitat of Rare Wildlife is located south of Martha's Vineyard in the Atlantic Ocean. This area extends approximately one mile offshore in the western and central portions of Martha's Vineyard to approximately 4.5 miles offshore in the eastern portion of Martha's Vineyard. Open spaces on Martha's Vineyard include Manuel F. Correllus State Forest in the central portion of the island and several beaches located along the perimeter of the island.

ESI maps, available from the National Oceanic & Atmospheric Administration, provide a summary of coastal resources that are at risk if an oil spill occurs in the area. Maps with coverage of Martha's Vineyard are contained in *Massachusetts and Rhode Island: Volume 3 Buzzards Bay*. The maps are available in pdf format at: https://response.restoration.noaa.gov/maps-and-spatial-data/download-esi-maps-and-gis-data.html.

The oil spill modeling results (provided in Annex 11 of this OSRP) conservatively assume that no oil spill response or mitigation would occur. This is a very conservative assumption as the ESP will be designed with containment and New England Wind would employ containment and recovery methods to contain and recover aquatic spills. Under these very conservative assumptions, the modeling results indicate there is a 1–40% probability that oil above a threshold of concern for ecological impacts would reach the shorelines of Martha's Vineyard and Nantucket within one to two days of the release during all seasons. There is a lower probability (less than 20%) of oil above the threshold reaching the shorelines of Rhode Island and Massachusetts, less than three days following the release. There is the relatively small (less than 10%) potential for shoreline contamination to occur above the threshold on parts of Long Island and Connecticut; however, the elapsed time for this to occur is much longer (greater than 7 days) in most cases and would likely be largely mitigated with response measures. When comparing the oil spill modeling results with the ESI data for Massachusetts and Rhode Island, the southern shores of Martha's Vineyard and Nantucket, which would likely be the first shorelines to be impacted by a spill (prior to response equipment being deployed), are primarily dominated by tidal flats. The shorelines of Rhode Island and Massachusetts on which there would be a lower probability of oiling above the threshold for ecological effects are predominately comprised of sand and gravel beaches and riprap. Some of the specific areas of environmental concern along the southern shores of Martha's Vineyard and Nantucket that would be taken into special consideration in the event of an oil spill include the Long Point Wildlife Refuge, Katama Plains Nature Preserve, Head of Plains Wildlife Management Area, Smooth Hummock Coastal Preserve, and Miacoment Heath Wildlife Management Area.

A7.5 Response

New England Wind has not yet been approved. Details regarding spill response materials, services, equipment, and response vessels have not been finalized at this time.

The WTGs and ESPs have been designed to utilize secondary containment systems to prevent a discharge of oil to the environment. Containment will be provided considering the size of the largest container. The secondary containment for the ESPs is connected to a sump tank. In addition, an oil/water separator will likely be in use. It is unlikely that a release of oil would not be contained by the containment systems.

Oils used by New England Wind have a specific gravity of less than 1.0. Therefore, any discharges of oil to water would float on the surface of the water, and on-water mechanical recovery techniques could be used to recover the released oil.

The Proponent will retain a third-party OSRO to assist in the unlikely event of a release of oil to the environment. In addition, the Proponent will maintain pier space for crew transfer vessels (CTVs) and/or other support vessels. CTVs are purpose built to support offshore wind energy projects and are set up to safely and quickly transport personnel, parts and equipment. In addition to vessels, the Proponent will maintain spill response equipment such as a spill overpack drum, containment bladders, absorbent booms, pigs, socks, and other sorbent materials. In addition, the Proponent will have on-hand personal protective equipment (PPE) such as goggles or safety glasses, face shields, gloves, and disposable chemical and oil resistant suits (e.g., Tyvek suits).

MassDEP maintains a list of companies licensed as hazardous waste transporters who provide emergency response services and cleanups OHM spills. MassDEP SERO emergency response contractors located near the SWDA include Frank Corporation (New Bedford), Global Remediation Services, Inc. (Sandwich), Clean Harbors, Incorporated (Braintree), and Cyn Environmental Services (Stoughton). These companies maintain boats and other equipment to respond to releases of oil on the in a marine environment. USCG Classified OSROs for USCG District 1 can be found at: https://cgrri.uscg.mil/UserReports/WebClassificationReport.aspx. Once an OSRO is contracted, additional details will be provided regarding spill response resources and the time needed for procurement. In addition, a discussion of response to worst case scenario in adverse weather conditions will be addressed. Per 33 CFR 115.1020, factors to consider when evaluating adverse weather include, but are not limited to, significant wave height, ice, temperature, weather-related visibility, and currents.

Sections 2.4 and 2.5 address the overall response to a possible oil spill at the SWDA. The use of dispersants is covered in Section 2.7 and the use of in-situ burning is covered in Section 2.8. Please refer to those sections for more complete details on oil spill response measures.

Annex 8 – Agreement with Oil Spill Removal Organization

Park City Wind has not yet been approved. Details regarding contractual agreements will be finalized prior to construction.

Per 30 CFR 254.25, this contractual agreement appendix must furnish proof of any contracts or membership agreements with OSROs, cooperatives, spill-response service providers, or spill management team members who are not Park City Wind employees that are cited in the OSRP. Documentation should include copies of the contracts, or membership agreements, or certification that contracts or membership agreements are in effect. The contract or membership agreement must include provisions for ensuring the availability of the personnel and/or equipment on a 24-hour-per-day basis.

The Proponent will retain a third-party OSRO. MassDEP SERO emergency response contractors located near the SWDA include Frank Corporation (New Bedford), Global Remediation Services, Inc., (Sandwich), Clean Harbors, Incorporated (Braintree), and Cyn Oil Corporation (Stoughton).

Annex 9 – Equipment Inventory

Details regarding spill response materials, services, equipment, and response vessels for New England Wind will be confirmed at a later date.

Appendix 9 of the RRT 1 RCP contains the USCG/EPA Response Jurisdiction Boundary. This document demarcates the boundary between inland and coastal zones for the purpose of pre-designation of on-scene coordinators for pollution response. Martha's Vineyard, Nantucket, and all other islands lying off the coast of Massachusetts are the responsibility of the USCG for providing the predesignated FOSC. USCG will be responsible for general agency and incident specific responsibilities under the NCP and ACP.

A9.1 Maintenance Facilities

The Proponent expects to use one or more facilities in support of New England Wind's O&M activities. The O&M facilities may include management and administrative team offices, a control room, office and training space for technicians and engineers, and/or warehouse space for parts and tools. The O&M facilities will also include pier space for crew transfer vessels (CTV) and/or other larger support vessels, such as service operation vessels (SOVs). I

For Phase 1 O&M, the Proponent will likely establish a long-term SOV O&M base at Barnum Landing in Bridgeport, Connecticut. The SOV O&M base would be the primary homeport for the SOV and would likely be used for crew exchange, bunkering, spare part storage, and load-out of spares to the SOV and/or other vessels. Related support infrastructure, warehousing, and a control room may also be located near the SOV O&M base. In addition to the SOV O&M base, the Proponent may base some Phase 1 O&M activities on Martha's Vineyard; current plans anticipate that crew transfer vessels or the SOV's daughter craft would operate out of Vineyard Haven during O&M. For Phase 2 O&M, the Proponent will likely use the same O&M facilities that are used for other Park City Wind projects.

It is anticipated that the Proponent will maintain spill response equipment such as a spill overpack drum, containment bladders, absorbent booms, pigs, socks, and other sorbent materials. In addition, the Proponent will have on-hand PPE such as goggles or safety glasses, face shields, gloves, and disposable chemical and oil resistant suits (e.g., Tyvek suits).

A9.2 Electrical Service Platform

The ESPs will include step-up transformers and other electrical gear.

The Proponent will maintain spill response equipment at the ESPs. Brooms, shovels, sorbents, pigs, socks, and a spill overpack drum will be maintained at the ESP for response to minor leaks and spills. In addition, the Proponent will have on-hand PPE such as goggles or safety glasses, face shields, gloves, and disposable chemical and oil resistant suits (e.g., Tyvek suits).

A9.3 Oil Spill Removal Organization

The Proponent will retain a third-party OSRO. MassDEP maintains a list of companies licensed as hazardous waste transporters who provide emergency response services and cleanups of OHM spills. The list is updated annually by MassDEP and is organized by MassDEP Regions. The SERO is affiliated with Martha's Vineyard and New Bedford. The list of contractors for the SERO Region is available at: http://www.mass.gov/eea/docs/dep/cleanup/serohwtr.pdf. MassDEP SERO emergency response contractors located near the SWDA include Frank Corporation (New Bedford), Global Remediation Services, Inc. (Sandwich), Clean Harbors, Incorporated (Braintree), and Cyn Oil Corporation (Stoughton).

The selected spill contractor will be responsible for the inspection and maintenance of their equipment. The equipment should be inspected on at least a monthly basis.

A9.4 Response Equipment

Response equipment on the ESPs and WTGs will be inspected at least quarterly and maintained to ensure optimal performance. Records of inspections of response equipment must be maintained for at least two years and made available to authorized BSEE representatives upon request. Inspections of contractor equipment is addressed in A9.8.

The program of maintenance and testing of emergency response equipment involves four activities: Operability Check, Inventory, Inspection, and Maintenance. The Emergency Response Team (ERT) Coordinator or designee is required to sign the inspection form and will be responsible for any follow-up actions that may be required as a result of the inspection, inventory or test of emergency response equipment. For any items that cannot be replaced or repaired during the inspection, test or inventory, the inspector will indicate need of further action on the inspection form. It will then become the responsibility of the ERT Coordinator to take further actions(s) as required.

A9.5 Operability Check (Semi-annual)

This activity is intended to periodically ensure the operability of certain items of equipment in New England Wind's emergency equipment inventory so that it is in a constant state of readiness for deployment. The designated inspector will check the operability of equipment including safety monitoring equipment and outboard motors. Any equipment that is electronic, electrical, or mechanical will be tested under actual load or use conditions.

During the operability check, the inspector will also perform routine maintenance on the equipment, as needed, such as battery replacements, oil and filter changes, and cleaning of boom. The inspector will indicate on the inspection form any problems encountered with the equipment and corrective measures taken or needed.

A9.6 Inventory (Monthly)

The inspector will verify the availability and condition of the variety of supplies, materials, and tools that are maintained in storage. The inspector will work from a list of items that are required to be maintained at all times. Any discrepancies in the list, or item replacement needs, will be noted on the inventory form. Inspection for condition of emergency resources will be checked semi-annually.

A9.7 Inspections

The semi-annual inspection of the sorbent booms will involve complete removal of booms from storage and the laying-out of the booms in an area that would not cause damage to the fabric of the booms. The inspector will examine each length of boom closely, making note of any fabric damages or wear, broken or frayed cable, missing weights and damaged connectors. The inspector will also verify the quantity of boom that is in storage to ensure there is sufficient supply. Any damages will be repaired, if possible. If the length of boom cannot be economically repaired, the inspector will request replacement.

A9.8 Contractor Equipment

The ERT will ensure that the contractor has a maintenance program established for its equipment. A copy of the program would be requested and kept on file.

Annex 10 – Material Safety Data Sheets

Safety Data Sheets for oils located at New England Wind's offshore facilities to be included.

Annex 11 – New England Wind Offshore Wind Oil Spill Modeling Study

ANNEX 11 – NEW ENGLAND WIND OFFSHORE WIND OIL SPILL MODELING STUDY

Oil Spill Risk Assessment

Oil Spill Risk Assessment

New England Wind 19-P-203530
Draft 4

May 10, 2022

www.rpsgroup.com

Document Status

Version	Purpose of document	Authored by	Reviewed by	Approved by	Review dates
Draft	Worst Case Discharge Oil Spill Modeling, New England Wind	See below	SB	JR	4/27/2020
Draft 2	Worst Case Discharge Oil Spill Modeling, New England Wind	See below	JR	JR	6/5/2020
Draft 3	Worst Case Discharge Oil Spill Modeling, New England Wind	See below	JR	JR	8/12/2021
Draft 4	Worst Case Discharge Oil Spill Modeling, New England Wind	See below	JR	JR	11/12/2021
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EXECUTIVE SUMMARY

New England Wind is the proposal to develop offshore renewable wind energy facilities in Bureau of Ocean Energy Management (BOEM) Lease Area OCS-A 0534 along with associated offshore and onshore cabling, onshore substations, and operations and maintenance (O&M) facilities. New England Wind will be developed in two Phases with a maximum of 130 wind turbine generator (WTG) and electrical service platform (ESP) positions. Four or five offshore export cables will transmit electricity generated by the WTGs to onshore transmission systems in the Town of Barnstable, Massachusetts, unless technical, logistical, grid interconnection, or other unforeseen issues arise. Each Phase of New England Wind will be developed and permitted using a Project Design Envelope (the Envelope).[1] Park City Wind LLC, a wholly owned subsidiary of Avangrid Renewables, LLC, is the Proponent and will be responsible for the construction, operation, and decommissioning of New England Wind.

New England Wind's offshore renewable wind energy facilities are located immediately southwest of Vineyard Wind 1, which is located in Lease Area OCS-A 0501. New England Wind will occupy all of Lease Area OCS-A 0534 and potentially a portion of Lease Area OCS-A 0501 in the event that Vineyard Wind 1 does not develop "spare" or extra positions included in Lease Area OCS-A 0501 and Vineyard Wind 1 assigns those positions to Lease Area OCS-A 0534. For the purposes of the COP, the Southern Wind Development Area (SWDA) is defined as all of Lease Area OCS-A 0534 and the southwest portion of Lease Area OCS-A 0501.

The SWDA may be approximately 411–453 square kilometers (km^2) (101,590– 111,939 acres) in size depending upon the final footprint of Vineyard Wind 1. At this time, the Proponent does not intend to develop the two positions in the separate aliquots located along the northeastern boundary of Lease Area OCS-A 0501 as part of New England Wind. The SWDA (excluding the two separate aliquots that are closer to shore) is just over 32 kilometers (km) (20 miles [mi]) from the southwest corner of Martha's Vineyard and approximately 38 km (24 mi) from Nantucket.[2] The WTGs and ESPs in the SWDA will be oriented in an east-west, north-south grid pattern with one nautical mile (NM) (1.85 km) spacing between positions. Phase 1, also known as Park City Wind, will be developed immediately southwest of Vineyard Wind 1. The Phase 1 Envelope allows for 41 to 62 WTGs and one or two ESPs. Depending upon the capacity of the WTGs, Phase 1 will occupy 150–231 km^2 (37,066–57,081 acres) of the SWDA. The Phase 1 Envelope includes two WTG foundation types: monopiles and piled jackets. Strings of WTGs will connect with the ESP(s) via a submarine inter-array cable transmission system. The ESP(s) will include step-up transformers that increase the voltage of power generated by the WTGs prior to transmission and other electrical equipment. The worst case oil discharge associated with Phase 1 is conservatively assessed as a catastrophic release of all oil contents from the topple of an 804 MW ESP located closest to shore within the Phase 1 portion of the SWDA.

Phase 2 is also known as Commonwealth Wind. When constructed, Phase 2 will be immediately southwest of Phase 1 and will occupy the remainder of the SWDA. Phase 2 may include one or more projects, depending on market conditions. The footprint and total number of WTG and ESP positions in Phase 2

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[1] https://www.boem.gov/sites/default/files/environmental-stewardship/Environmental-Studies/Renewable-Energy/Phased-Approaches-to-Offshore-Wind-Developments-and-Use-of-Project-Design-Envelope.pdf

[2] Within the SWDA, the closest WTG is approximately 34 km (21 mi) from Martha's Vineyard and 40 km (25 mi) from Nantucket.

depends upon the final footprint of Phase 1. Phase 2 is expected to contain 64 to 88 WTG/ESP positions (up to three positions will be occupied by ESPs) within an area ranging from 222-303 km^2 (54,857-74,873 acres). Phase 2 includes up to two ESPs and the largest ESP expected to be included in Phase 2 is a 1,200 MW[3] ESP. The worst case oil discharge associated with Phase 2 is conservatively assessed as a catastrophic release of all oil contents from the topple of a 1,200 MW ESP located closest to shore within the Phase 2 portion of the SWDA.

Pursuant to 30 CFR 585.627(c), as part of the requirement to submit an Oil Spill Response Plan (OSRP) in accordance with 30 CFR 254.1, the OSRP should include:

> "An appropriate trajectory analysis specific to the area in which the facility is located. The analysis must identify onshore and offshore areas that a discharge potentially could affect. The trajectory analysis chosen must reflect the maximum distance from the facility that oil could move in a time period that it reasonably could be expected to persist in the environment."

Therefore, as an Annex to the New England Wind OSRP (See COP Appendix I-F), an oil spill modeling study was performed to assess the trajectory and weathering of oil following a catastrophic release of all oil contents from the toppling of the largest volume ESP located closest to shore within each of the two Phases in the SWDA. These would be the worst case discharge scenarios and involve a relatively small and finite release of oil (on the order of 3,000–4,500 barrels [bbl]), which is considerably smaller than potential worst case releases from offshore oil and gas platforms (which could be on the order of multi-million bbl). Based on the results of a previous BOEM study (Bejarano et al. 2013) assessing potential catastrophic oil spills from offshore wind structures, the probability of occurrence of this type of catastrophic release, such as the toppling of an ESP, is very low (on the order of 1 in ≥ 1,000 years). As described in COP Volume I, the ESPs are designed to site-specific conditions in accordance with international and U.S. standards and the designs will be reviewed by a third-party Certified Verification Agent that certifies the design conforms to all applicable standards.

In addition to the low probability of such an event, the oil spill scenarios modeled in this study assume that no oil spill response or mitigation would occur. This is also a very conservative assumption as the ESPs will be designed with containment measures and the Proponent would employ containment and recovery methods to contain and recover onshore and aquatic petroleum spills. As discussed in further detail in Section 2.3.4 of the OSRP (See COP Appendix I-A), response equipment employed on water would be used to prevent the spread of the spill, contain the oil to as small an area as possible, and protect sensitive areas before they are impacted.

The oil spill model, OILMAP/SIMAP, was used to conduct this assessment. Model inputs included winds, currents, chemical composition and properties of oils of interest, and specifications of the release (amount, location, etc.). Environmental conditions (i.e., wind and current forcing, water temperature, and salinity) play a critical role in the assessment of the trajectory and weathering of oil in a marine spill. Therefore, a data analysis of these conditions as input to the model was also performed. The environmental analysis is only presented for the 1,200 MW ESP location because of the proximity of the three release locations and because the environmental conditions are similar for the three locations. The data analysis also helped to

[3] The term 1200 MW ESP is used to refer to an ESP containing the oil quantities defined herein; results could also be applicable to a larger capacity ESP (1300-1500 MW) provided that ESP did not exceed the maximum oil quantities listed herein.

identify the site-specific seasons in which the modeling scenarios should be performed. As a result of this analysis, a total of eight stochastic modeling scenarios (one per season for three spill sites) were assessed.

Based on the environmental datasets analyzed as input for the oil spill modeling, the following conclusions can be drawn:

- Winds in the region are moderate, generally blowing from the northwest (winter) or southwest sector (summer) with monthly average wind speeds ranging from 6 to 10 meters per second (m/s). The strongest winds are found in December and January, and the weakest winds are in August.
- Average currents at the spill site flow up to approximately 19 centimeters per second (cm/s), with a predominant east/east-southeastward and west/west-southwestward direction.
- Wind drift is the primary agent of surface transport throughout the year in the region of the SWDA.

Based on the results of the stochastic spill trajectory analysis assessing potential spills of all oil contents from one ESP located closest to shore in each Phase, the following conclusions can be made:

- The sea surface area exposed to oil exceeding the 10 g/m^2 threshold is predicted to be contained within a radius up to 54 km (34 mi) of the 804 MW Phase 1 ESP spill location and up to 80.5 km (50 mi) of the 1,200 MW Phase 2 ESP spill location in all four seasons. The stochastic footprint of exposed surface waters was smallest for the winter simulation, likely due to increased winds and surface waves that enhanced vertical entrainment into the water column.
- In all seasons for each of the sites, there is a 1–40% probability of oil above a minimum thickness of 100 microns (μm) (100 grams per square meter [g/m^2] on average over the grid cell) reaching the shorelines of Martha's Vineyard and Nantucket within a minimum of one to three days from release. There is a lower probability (less than 20%) of oil above the threshold reaching the shorelines of Rhode Island and Massachusetts more than two days following the release. There is the relatively small (less than 10%) potential for shoreline contamination to occur above 100 g/m^2 on parts of Long Island and Connecticut; however, the elapsed time for this to occur is much longer (greater than 10 days) in most cases and would likely be largely mitigated with response measures.

As noted, the stochastic spill trajectory analysis conservatively assesses a catastrophic release of all oil contents from a Phase 1 or Phase 2 ESP located closest to shore in the SWDA and does not consider mitigation measures. In the unlikely event of a worst case discharge, the Proponent plans to employ response equipment on water to prevent the spread of the spill, contain the oil to as small an area as possible, and protect sensitive areas before they are impacted. Therefore, any potential impacts from an oil release are likely to be less than predicted by the conservative worst case discharge scenario.

Contents

Tables

Figures

1 INTRODUCTION

1.1 Project Background

New England Wind is the proposal to develop offshore renewable wind energy facilities in BOEM Lease Area OCS-A 0534 along with associated offshore and onshore cabling, onshore substations, and O&M facilities. New England Wind will be developed in two Phases with a maximum of 130 WTG and ESP positions. Four or five offshore export cables will transmit electricity generated by the WTGs to onshore transmission systems in the Town of Barnstable, Massachusetts, unless technical, logistical, grid interconnection, or other unforeseen issues arise. Each Phase of New England Wind will be developed and permitted using a Project Design Envelope (the Envelope). Park City Wind LLC, a wholly owned subsidiary of Avangrid Renewables, LLC, is the Proponent and will be responsible for the construction, operation, and decommissioning of New England Wind.

New England Wind's offshore renewable wind energy facilities are located immediately southwest of Vineyard Wind 1, which is located in Lease Area OCS-A 0501. New England Wind will occupy all of Lease Area OCS-A 0534 and potentially a portion of Lease Area OCS-A 0501 in the event that Vineyard Wind 1 does not develop "spare" or extra positions included in Lease Area OCS-A 0501 and Vineyard Wind 1 assigns those positions to Lease Area OCS-A 0534. For the purposes of the COP, the Southern Wind Development Area (SWDA) is defined as all of Lease Area OCS-A 0534 and the southwest portion of Lease Area OCS-A 0501.

The SWDA may be approximately 411–453 square kilometers (km^2) (101,590– 111,939 acres) in size depending upon the final footprint of Vineyard Wind 1. At this time, the Proponent does not intend to develop the two positions in the separate aliquots located along the northeastern boundary of Lease Area OCS-A 0501 as part of New England Wind. The SWDA (excluding the separate aliquots that are closer to shore) is just over 32 kilometers (km) (20 miles [mi]) from the southwest corner of Martha's Vineyard and approximately 38 km (24 mi) from Nantucket. The WTGs and ESPs in the SWDA will be oriented in an east-west, north-south grid pattern with one nautical mile (NM) (1.85 km) spacing between positions.

Phase 1, also known as Park City Wind, will be developed immediately southwest of the Vineyard Wind 1 project. Phase 1 will occupy 150 to 231 km^2 (37,066 to 57,081 acres) of the SWDA. Phase 1 includes one or two ESPs and the largest ESP expected to be included in Phase 1 is an 804 MW ESP. Phase 2, also known as Commonwealth Wind, will be developed immediately southwest of Phase 1 and will occupy the remainder of the SWDA. The footprint and total number of WTG and ESP positions in Phase 2 depends upon the final footprint of Phase 1. Phase 2 is expected to contain 64 to 88 WTG/ESP positions (up to three positions will be occupied by ESPs) within an area ranging from 222-271 km^2 (54,857-74,873 acres). Phase 2 includes up to two ESPs and the largest ESP expected to be included in Phase 2 is a 1,200 MW ESP.

Pursuant to 30 CFR 585.627(c), as part of the requirement to submit an OSRP in accordance with 30 CFR 254.1 with an appropriate trajectory analysis, this Annex documents the oil spill modeling study performed in support of the COP for New England Wind.

As described in the New England Wind OSRP (See COP Appendix I-F), New England Wind components containing oil include the WTGs placed on a foundation support structure and ESPs. The largest proposed ESP in Phase 1 is an 804 MW ESP while Phase 2 will include a maximum volume of oil if one 1,200 MW ESP[4]

[4] The term 1200 MW ESP is used to refer to an ESP containing the oil quantities defined herein; results could also be applicable to a larger capacity ESP (1300-1500 MW) provided that ESP did not exceed the maximum oil quantities listed herein

is used. The oil sources in the WTGs include the generator oil and transformer oil, which total approximately 3,162 gallons for the largest WTG included in both the Phase 1 and Phase 2 Envelope. Oil sources in the ESPs include power transformers, reactors, auxiliary/earthing transformers, diesel tanks, an emergency generator day tank, an emergency generator, and naphthenic oil for a platform crane. Oil sources presented in this document are associated with the single largest ESPs, which are either an 804 MW ESP (for Phase 1) or 1,200 MW ESP (for Phase 2). The oil sources associated with one 804 MW ESP total approximately 124,097 gallons (2,955 barrels [bbl]). The oil sources associated with one 1,200 MW ESP total approximately 185,978 gallons (4,428 bbl). Therefore, this oil spill modeling study assesses the trajectory and weathering of a catastrophic release of all oil contents from two different locations in four seasons (eight total scenarios), including the topple of an 804 MW ESP located closest to shore within the Phase 1 portion of the SWDA and the topple of a 1,200 MW ESP located closest to shore within the Phase 2 portion of the SWDA. Table 1 and Figure 1 display the location of the spill sites and local geographic points of reference.

Based on the results of a previous BOEM study (Bejarano et al. 2013) assessing potential catastrophic oil spills from offshore wind structures, the probability of occurrence of this type of catastrophic release, such as the topple of an ESP, is extremely small. As described in COP Volume I, the ESPs are designed to site-specific conditions in accordance with international and United States (US) standards and the designs will be reviewed by a third-party Certified Verification Agent that certifies the design conforms to all applicable standards. In addition to the low probability of such an event, the oil spill scenarios modeled in this study assume that no oil spill response or mitigation would occur. This is also a very conservative assumption as the ESP will be designed with containment measures, and the Proponent would employ containment and recovery methods to contain and recover onshore and aquatic petroleum spills. As discussed in further detail in Section 2.3.4 of the OSRP (See COP Appendix I-A), response equipment employed on water would be used to prevent the spread of the spill, contain the oil to as small an area as possible, and protect sensitive areas before they are impacted.

Table 1. Release location used in oil spill modeling

Site	Description	Latitude N (decimal degrees)	Longitude W (decimal degrees)
804 megawatt (MW) electrical service platform (ESP)	ESP location in northwest (NW) corner of New England Wind Phase 1	41.018215	70.615439
1,200 MW ESP	ESP location in NW corner of New England Wind Phase 2	40.967242	70.680221

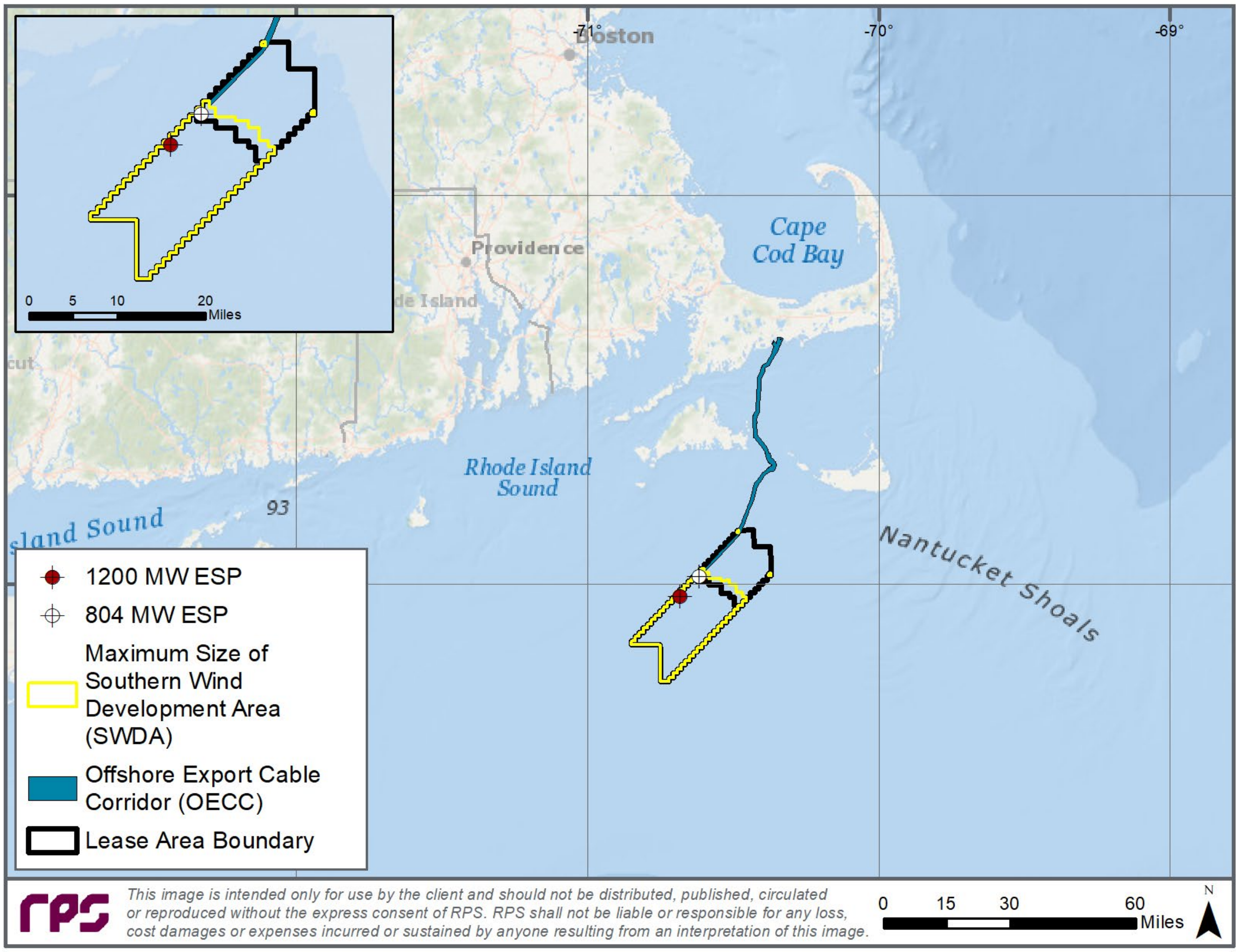


Figure 1. Oil spill model domain defined for this study, south of Martha's Vineyard

1.2 Objectives, Tasks and Study Output

The goals of spill modeling include projecting the probable behavior of accidentally spilled oil using a state-of-the-art three-dimensional (3-D) transport model and producing modeled trajectory and fate output such as visual representations (e.g., probability of oiling and minimum travel time maps) for various scenarios. RPS's proprietary oil spill modeling framework, OILMAP/SIMAP, was used for the simulations performed in this study. Model inputs included winds, currents, chemical composition, and properties of oils of interest, and specifications of the release (amount, location, etc.). The model was run in stochastic mode, as described further in Section 3, providing two types of information: (1) the footprint of sea surface and shoreline areas exposed to oil above a certain threshold of concern and the associated probability of oil contamination, and (2) the shortest time required for oil to reach any point within the areas predicted to be oiled.

Environmental conditions (i.e., wind and current forcing, water temperature, and salinity) play a critical role in the assessment of the trajectory and weathering of oil in a marine spill. Therefore, a data analysis of these conditions as input to the model was performed. The data analysis also helped to identify the site-specific seasons in which the modeling scenarios should be performed. As a result of this analysis, a total of eight stochastic modeling scenarios (one per season for three spill locations) were assessed.

This report describes the models, modeling approach, model inputs, and outputs used in this study. A description of environmental data sources is provided in Section 2. The oil spill modeling approach and scenario specifications are provided in Section 3. Section 4 provides a summary of the stochastic modeling results and conclusions. References are provided in Section 5.

2 ENVIRONMENTAL CONDITIONS AND DATA ANALYSIS

In order to understand the behavior of a marine oil spill, it is necessary to evaluate the predominant environmental conditions in the area. Winds and currents are the key forcing agents that control the transport and weathering of oil. To reproduce the natural variability of the environment, the OILMAP/SIMAP model requires wind and current datasets that vary both spatially and temporally. Optimally, the minimum time window for stochastic simulations is five to 10 years; therefore, long-term records of wind and current data were obtained from the outputs of global numerical atmospheric and circulation models. The following section describes the key environmental conditions that dominate in the region of interest and more specifically in the model domain (Figure 1) for which the environmental datasets have been subset. As the three sites are near each other and because results are similar for both locations, only figures for the 1,200 MW ESP are presented and discussed in this section.

2.1 General Dynamics and Climatology

The sites of interest are located near Martha’s Vineyard, Massachusetts on a shallow continental shelf. This shallow continental shelf is formed by the Nantucket Sound, Vineyard Sound, Nantucket Shoals, Great South Channel, Georges Bank, and the continental shelf south and west of Martha’s Vineyard (Figure 2) (PCCS 2005). Based on the types of spills and the predominant environmental conditions in the region, the modeling domain was defined to encompass the region located south of Martha’s Vineyard (Figure 1).

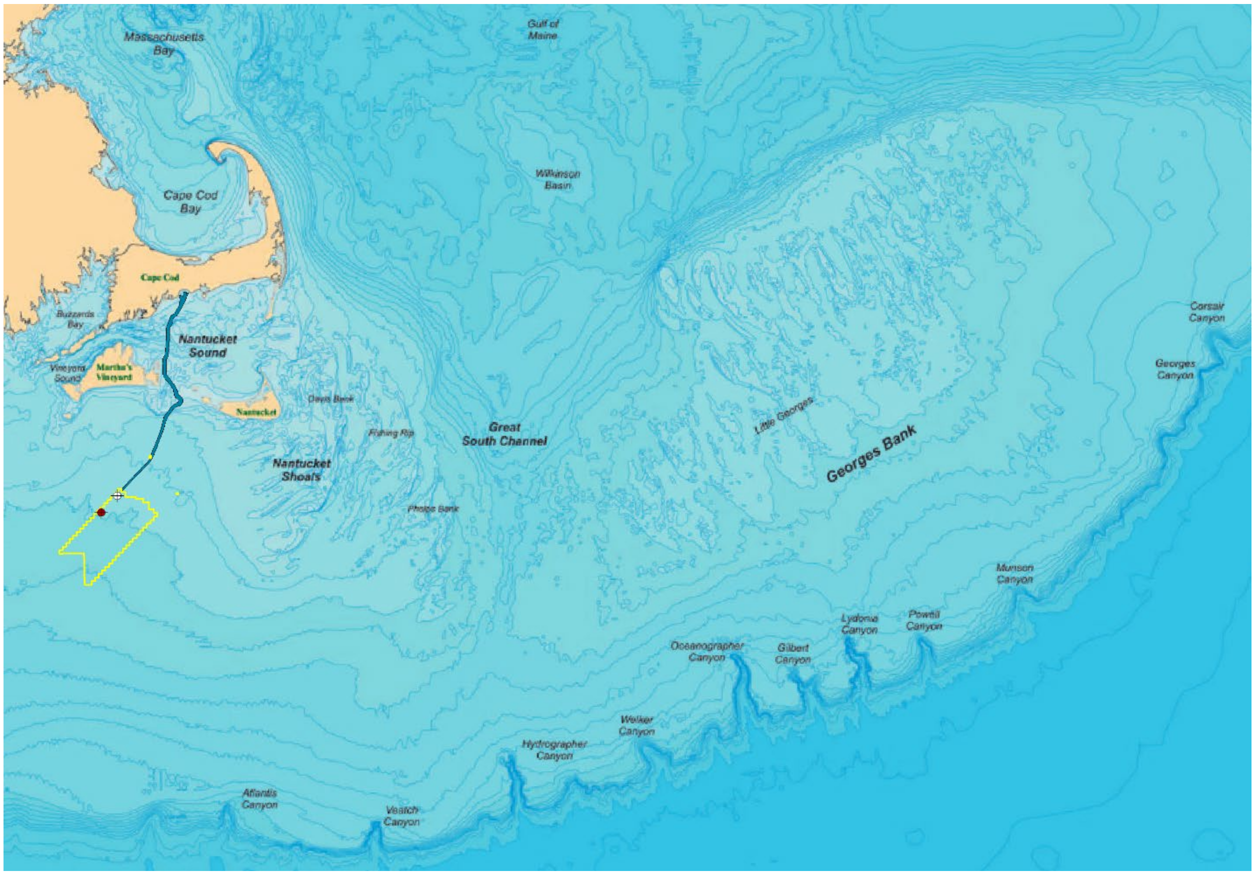


Figure 2. Shallow continental shelf surrounding the study area and sites of interest (adapted from PCCS, 2005). The spill markers represent the 804 MW ESP (red) and the 1200 MW ESP (white). The yellow box roughly shows the maximum size of the SWDA.

The shallow continental shelf is a major biogeographic transition zone between northern and southern plant and animal species due to mixing of colder waters from the north and warmer waters from the south (PCCS 2005). North of this continental shelf lies Cape Cod and the Gulf of Maine which are dominated by the Labrador Current (PCCS 2005). The Labrador Current is a cold, southern flowing current from the Canadian Arctic that brings severe cooling to the area during the winter. The shallow continental shelf is also warmed by warm core rings off the northward flowing Gulf Stream (PCCS 2005).

This area has been heavily investigated in terms of the dynamics of depth-dependent across-shelf circulation caused by wind and wave forcing. Fewings et al. (2008) and Lentz et al. (2008) found significant across-shelf circulation driven by across-shelf winds, as well as evidence of a circulation resulting from waves in the inner shelf. The seasonal (both summer and winter) mean circulations found in the moored observations of Lentz et al. (2008) and Fewings et al. (2008) were generally attributed to the effects of pressure gradients (Fewings and Lentz 2010; Lentz 2008) or surface gravity waves (Lentz et al. 2008). North and east of the sites of interest in Vineyard Sound, Nantucket Sound, and Nantucket Shoals, the tidal range is relatively small (PCCS 2005). Despite the low tidal range, the circulation in this region is dominated by strong reversing semi-diurnal tidal currents. During the ebb tide, the current in Vineyard Sound and Nantucket Sound flows westward, whereas the flood tide is eastward (PCCS 2005). Through Muskeget Channel, between Nantucket and Martha's Vineyard, the ebb tidal current flows south into the Nantucket Shoals region and reverses during flood tides (PCCS 2005). Modeling studies by He and Wilkin (2006) and Wilkin (2006) indicated that these large tidal velocities in the gap between the islands of Martha's Vineyard and Nantucket play a critical role in the formation of upwelling centers near Martha's Vineyard despite uniform winds.

Data obtained from the World Ocean Atlas climatology dataset (Locarnini et al. 2018; Zweng et al. 2018) for the location of the 1,200 MW ESP show the monthly sea surface temperature typically varies from 4°C to 20°C (Figure 3). Warmest temperatures are from July through September. The sea surface salinity at this site is on average roughly 32 parts per thousand (ppt), with the lowest sea surface salinity occurring in June and July (Figure 3).

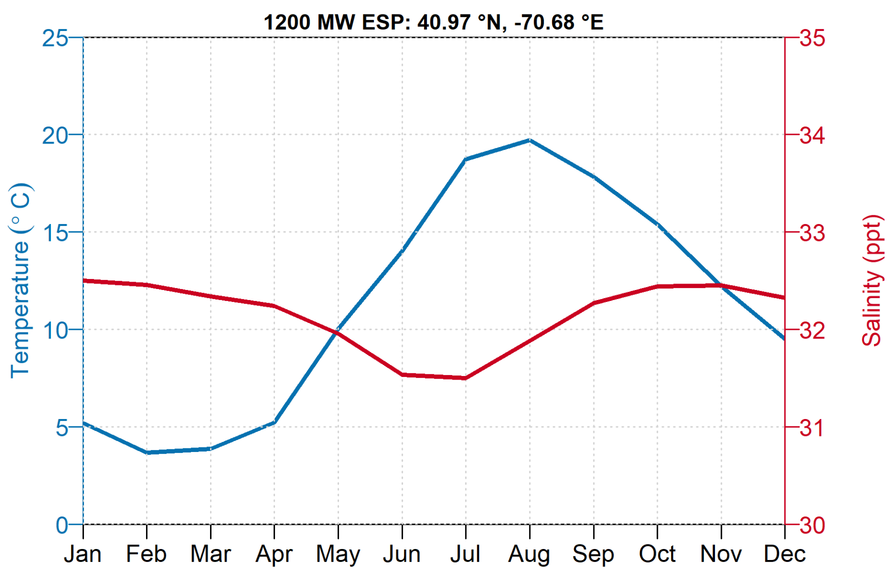


Figure 3. Monthly sea surface temperature (°C) in blue and sea surface salinity (ppt) in red near the 1,200 MW ESP (Locarnini et al. 2018; Zweng et al. 2018).

From a modeling perspective, the year was split into four representative periods corresponding to the meteorological seasons (winter, spring, summer, and fall) (Table 2).

Table 2. Summary of season breakdown used for the oil spill modeling

Season	Representative Months	Season Description
Winter	December–February	Stronger wind speed, predominately from the NW
Spring	March–May	Transition of wind direction from NW to southwest (SW) with relatively weaker wind speed than winter
Summer	June–August	Weaker wind speed, predominantly from the SW
Fall	September–November	Transition of wind direction from SW to NW with relatively stronger wind speed than summer

2.2 Wind Dataset – NCEP CFSR

For this study, wind data were obtained from the US National Centers for Environmental Prediction (NCEP) Climate Forecast System Reanalysis (CFSR) for a 10-year period (2001 to 2010) (Table 3). The CFSR was designed and executed as a global, high-resolution, coupled atmosphere-ocean-land surface-sea ice system to provide the best estimate of the state of these coupled domains (Saha et al. 2010). This atmospheric model has a horizontal resolution of 38 km, with 64 vertical levels extending from the surface to the height at which air pressure reaches 0.26 hectopascal (hPa). CFSR winds were also one of the main driving forces used in the HYCOM Reanalysis, the global hydrodynamic currents dataset used in this study.

Table 3. The specifics of the wind dataset used for the modeling

Name of Dataset	CFSR
Coverage	-75 °E to -69°E 39 °N to 42 °N
Owner/Provider	NCEP (US)
Horizontal Grid Size	0.5°x0.5°
Hindcast Period	2001–2010
Time Step	six hourly

The following figures provide qualitative and statistical description of the CFSR winds in this region in order to understand their variability, both spatially and temporally:

- Windrose map (Figure 4): Spatial distribution of CFSR annual windroses (in m/s and mph) off the southern coast of New England in the direction from which the wind is blowing;
- Annual windrose (Figure 5): Annual CFSR windrose (in m/s) near the spill site in the direction from which the wind is blowing;
- Wind speed statistics (Figure 6): Monthly average and 95th percentile CFSR wind speed (in m/s) statistics near the spill site;
- Monthly windroses (Figure 7): Monthly CFSR windroses (in m/s) near the spill site, in the direction from which the wind is blowing; and
- Seasonal windroses (Figure 8): Monthly CFSR windroses (in m/s) near the spill site, in the direction from which the wind is blowing.

Based on this analysis of the CFSR global wind dataset for a 10-year period (2001–2010), the following conclusions can be drawn:

- Wind direction is predominately from the northwest, west, and southwest throughout the domain with decreased wind speeds over land.
- Near the 1,200 MW ESP, the wind blows from all directions, but predominantly blows from the southwest and northwest.
- Monthly average wind speed ranges from 6–10 m/s (13–22 mph) and the 95th percentile wind speed ranges from 10–17 m/s (22–38 mph) near the 1,200 MW ESP. Lowest speeds occur during summer (June–August) with the weakest winds occurring in August.

- During winter (December–February), wind is predominantly northwesterly with higher speed, while throughout the summer (June–August), wind is largely southwesterly with lower speed. Spring (March–May) and fall (September–November) are transitional seasons. In spring, the predominant wind direction changes from northwest to southwest and average wind speed decreases. Fall marks the period when the wind speed increases compared to summer.

All figures display wind data in the meteorological convention (roses indicate the direction which winds are blowing *from*). Due to the proximity of the sites where results are similar for both locations, figures are only shown for the 1,200 MW ESP.

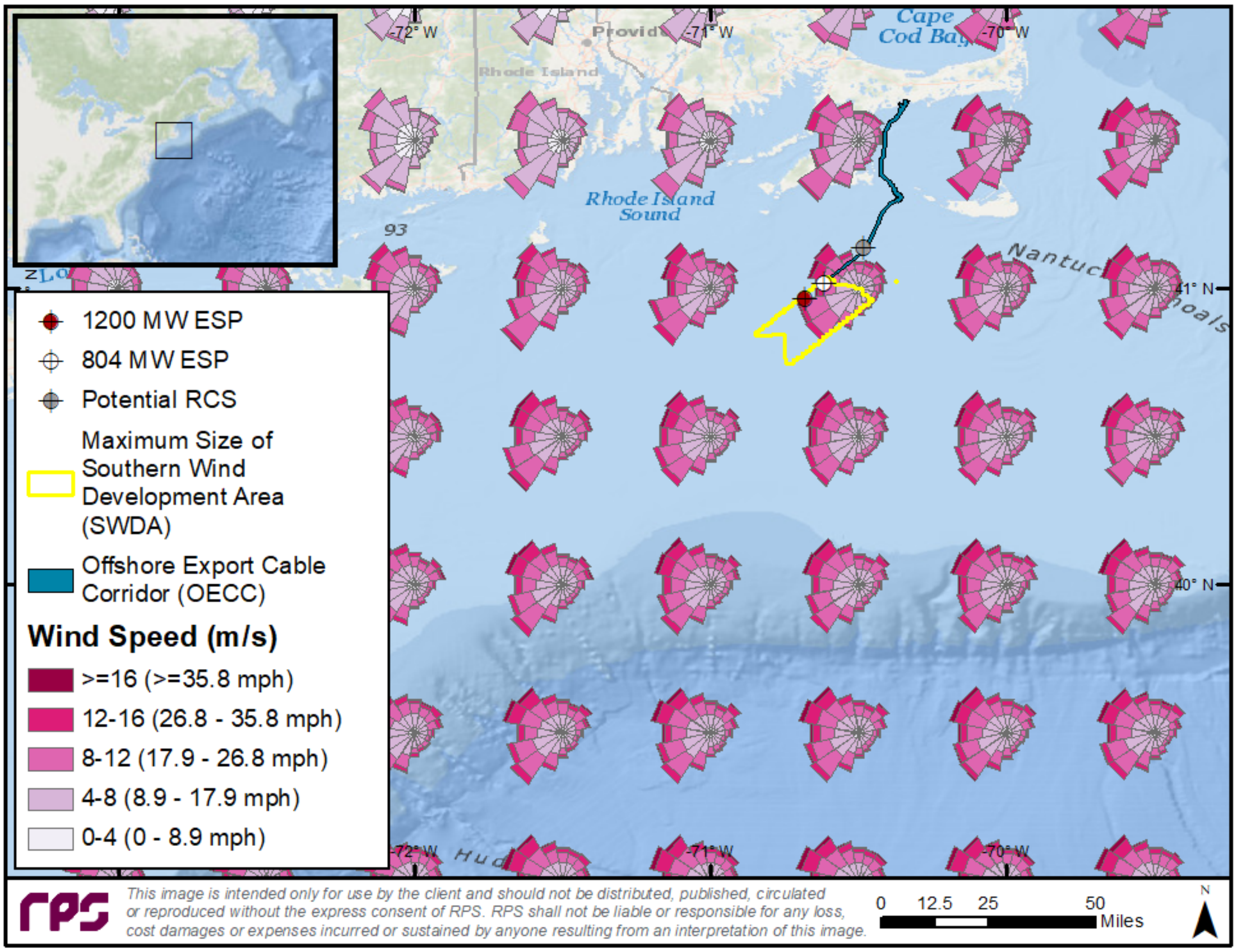


Figure 4. Spatial distribution of Climate Forecast System Reanalysis (CFSR) annual wind speed and direction off the coast of New England (in m/s). The red and white markers indicate the spill locations.

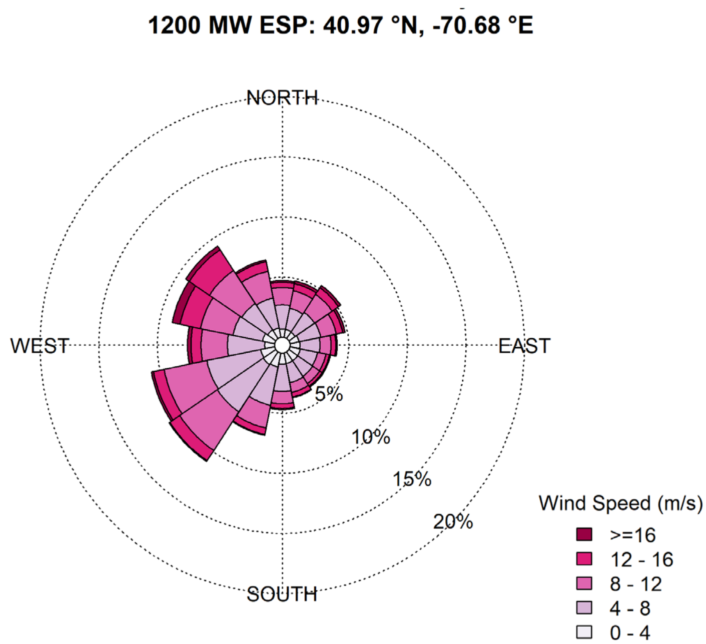


Figure 5. Annual CFSR windrose near the 1,200 MW ESP. Wind speeds in m/s, using meteorological convention (i.e., direction wind is coming from).

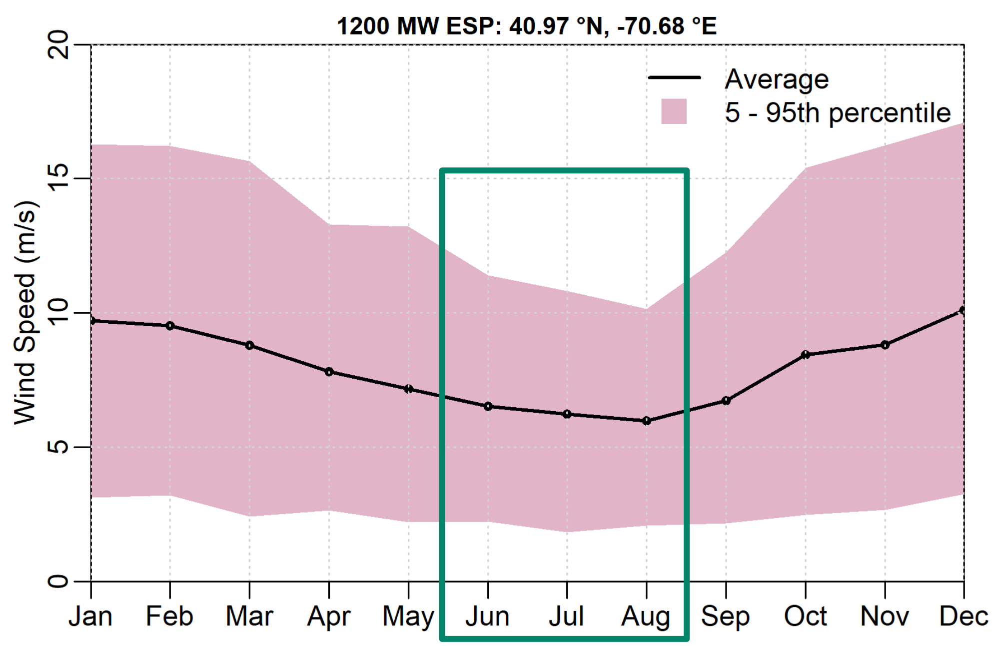


Figure 6. Monthly average (black) and 5th to 95th percentile (pink polygon) CFSR wind speed statistics near the 1,200 MW ESP. Wind speed is reported in m/s. The green box highlights summer.

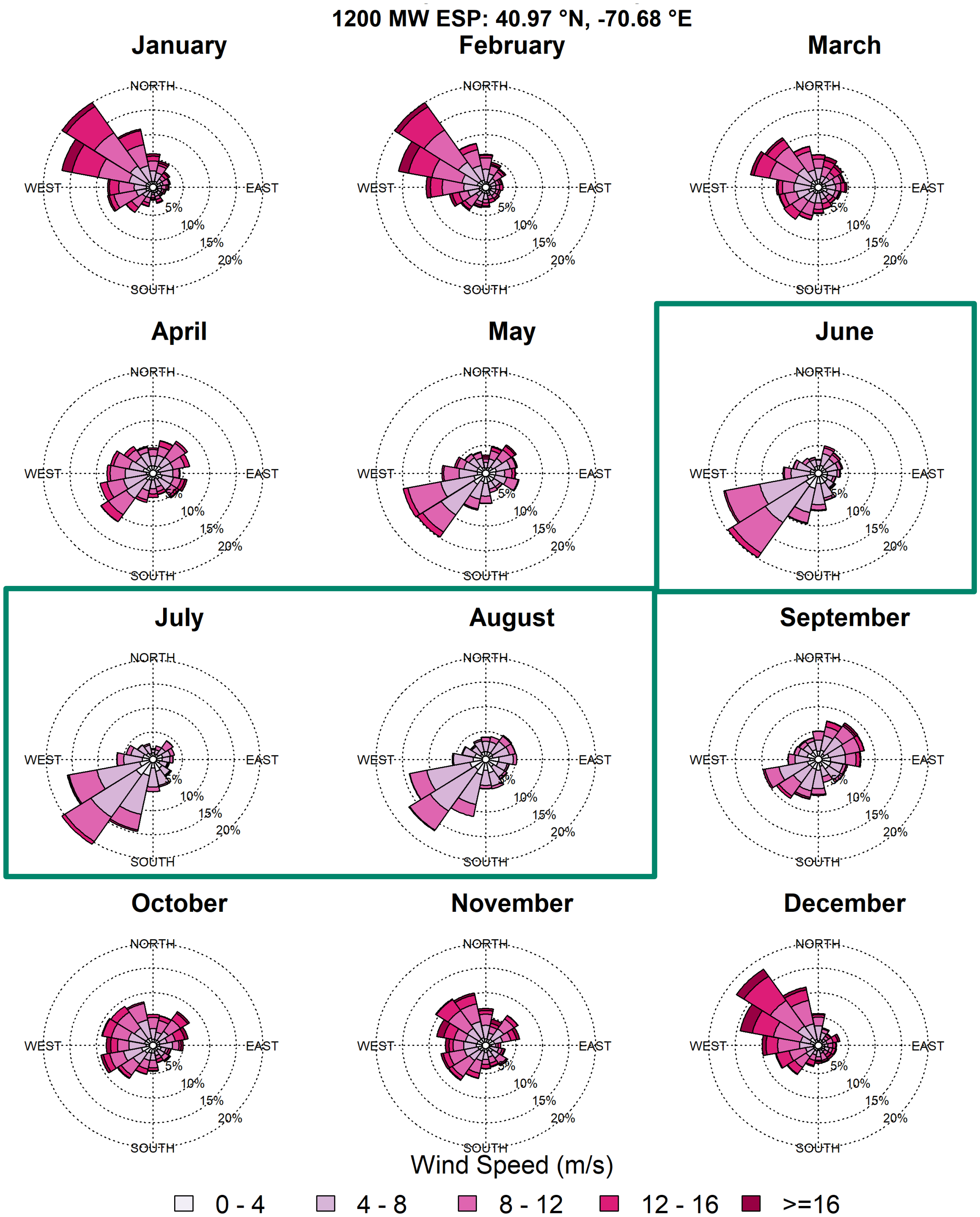


Figure 7. Monthly CFSR wind roses near the 1,200 MW ESP. Wind speeds in m/s, using meteorological convention (i.e., direction wind is coming from). The green box highlights summer.

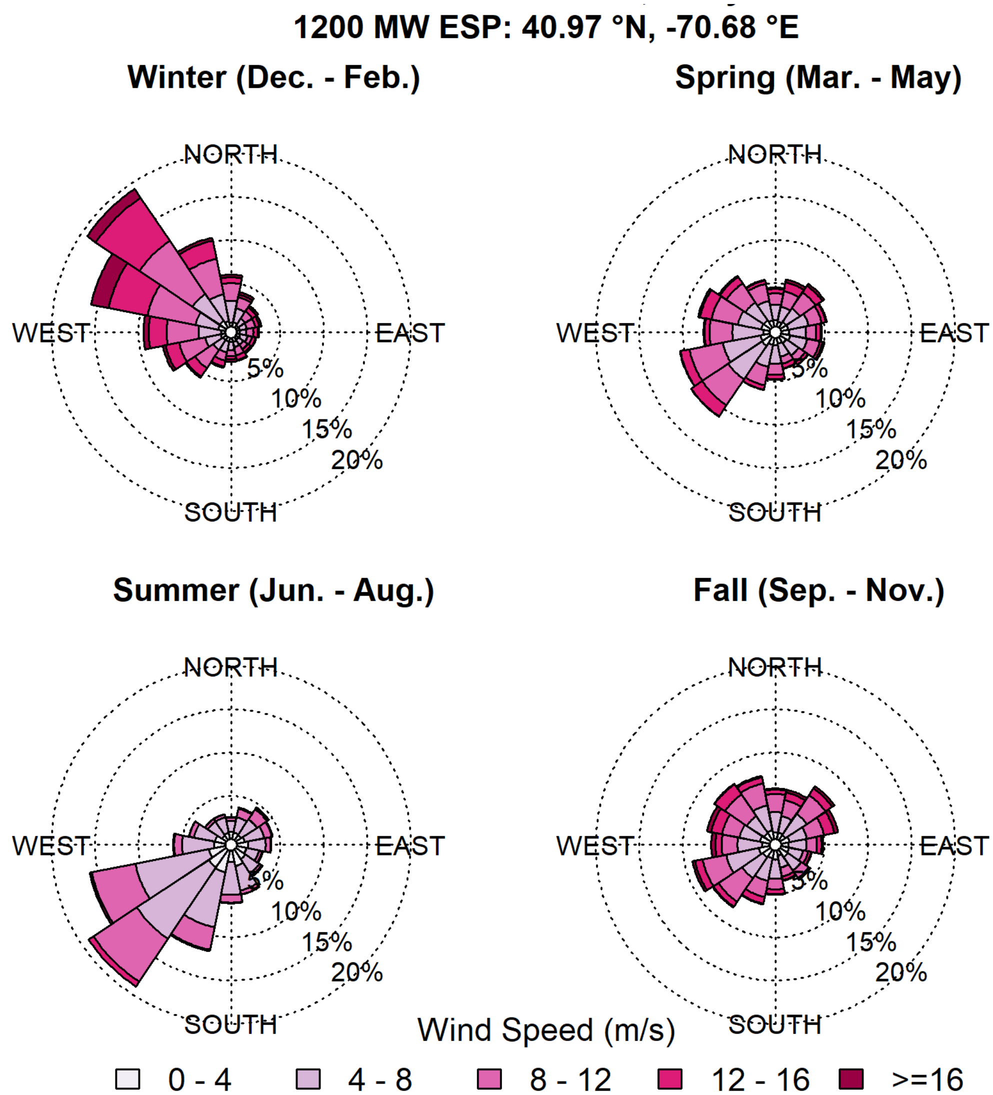


Figure 8. Seasonal CFSR wind roses near the 1,200 MW ESP. Wind speeds in m/s, using meteorological convention (i.e., direction wind is coming from).

2.3 Hydrodynamic Data Used in Oil Spill Model

To capture the complex nature of the regional and coastal circulation for the area of study, two different current datasets have been combined in this modeling study: a regional hindcast dataset that captures the general mesoscale circulation (HYCOM) and a higher resolution dataset developed by RPS for this project to capture the tidal circulation important in the coastal areas (HYDROMAP) (Table 4). These models are explained in more detail in the next sections.

Table 4. Specifics of the current datasets used for the modeling

	Global	Regional Tidal
Coverage	-74.5 °E to -69°E 39 °N to 42.7 °N	-74.5 °E to -69°E 39 °N to 42.7 °N
Name of Dataset	HYCOM (GLBu0.08/expt_19.1)	HYDROMAP
Owner/Provider	Naval Research Laboratory (US)	RPS
Bathymetry	GEBCO	GEBCO
Wind Forcing	CFSR (US)	No
Tides	No	Yes
Horizontal Grid Size	~9 km	Up to 0.125 km
Hindcast Period	2001–2010	Periodic tidal constituents' phase and amplitude
Output Frequency	Daily	30-minute processing

2.3.1 Global Current Dataset – HYCOM Reanalysis

Current data were obtained from the HYCOM + NCODA (Navy Coupled Ocean Data Assimilation) (Table 4) Global 1/12° Reanalysis (Halliwell 2004). This dataset (Table 4) captures the oceanic large-scale circulation in the study area. Details of the data assimilation procedure are described in Cummings and Smedstad (2013) and Cummings (2005).

The reanalysis was carried out at the Naval Oceanographic Office Major Shared Resource Center. Forcing data for the model comes from the NCEP CFSR (Saha et al. 2010). The hindcast is comprised of 3-D temperature, salinity, sea surface height, zonal velocity, and meridional velocity fields. Ocean dynamics, including geostrophic and wind driven currents, are reproduced by the model. Data are provided as daily snapshots. The most recent reanalysis experiment (GLBu0.08/expt_19.1) includes data between August 1, 1995 and December 31, 2012. For this study, a 10-year period of daily model output was collected (2001 to 2010). However, as this version of HYCOM does not include tidal information, a separate model (HYDROMAP Tidal Model) was used to supplement HYCOM and generate tidal currents.

2.3.2 HYDROMAP Tidal Circulation Model

HYDROMAP, a hydrodynamic model (Table 4) developed by RPS, was used to reproduce the local circulation due to tides for this study. HYDROMAP is a globally re-locatable hydrodynamic model (Isaji et al. 2001a; 2001b) capable of simulating complex circulation patterns due to tidal forcing, wind stress, and freshwater flows. HYDROMAP employs a novel step-wise-continuous-variable-rectangular gridding strategy with up to six levels of resolution. The term "step-wise-continuous" implies that the boundaries between successively smaller and larger grids are managed in a consistent integer step. HYDROMAP has been applied in numerous sediment dispersion and transport studies in the US and worldwide.

HYDROMAP can be used to make constant cyclical or time varying current fields. The constant and cyclical current fields are generated for each component of the circulation separately, whereas the time-varying current fields represent the integration of all components simultaneously for a specific timeframe. Once generated, the HYDROMAP model predicted tidal currents were then combined with the HYCOM circulation to present a complete hydrodynamic dataset for the area.

The regional hydrodynamic model application using HYDROMAP that encompassed the New England Wind Offshore Development Area (i.e., Southern Wind Development Area and Offshore Export Cable Corridors) was developed for use in the sediment transport modeling of the cable installation activities. That model application (grid and tidal forcing) was used to generate cyclical tidal model output for the oil spill modeling.

The tidal component of the currents for off the coast of New England were generated utilizing superposition of each of the individual contributions from the various frequencies of astronomical forcing (constituents) that contribute to tidal variations. For this study, seven astronomical constituents were considered. These seven constituents (M2, N2, S2, K2, K1, O1, and P1) account for the majority of tidal energy in the region and are sufficient to reproduce the main tidal circulation patterns. Near the sites, tidal currents are weak to moderate with variable magnitude throughout the day (Figure 9). The tidal constituents result in variable current speeds due to the timing of individual constituents.

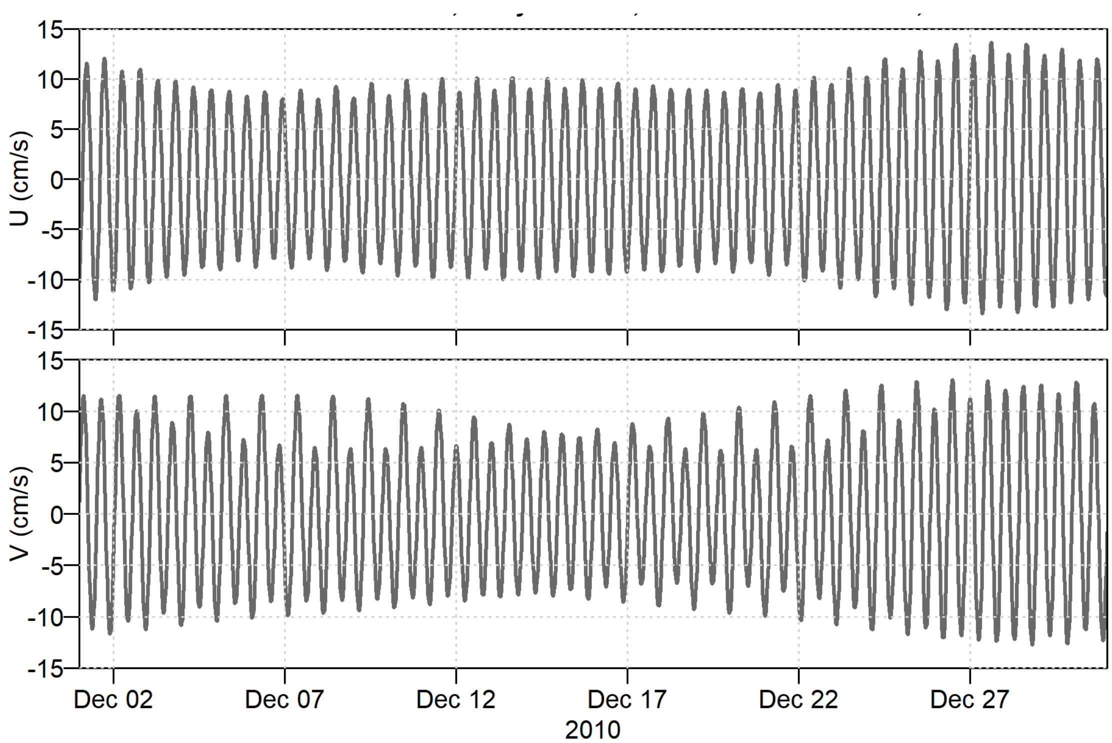


Figure 9. Example of timeseries of U and V component of tidal current (from HYDROMAP) near the 1,200 MW ESP.

2.3.3 Current Analysis – HYDROMAP + HYCOM

Daily HYCOM files were augmented by adding a HYDROMAP tidal hydrodynamics file (explained in Section 2.3.2) at a temporal resolution of 30 minutes. For this study, a 10-year period of daily HYCOM model output was collected (2001 to 2010) and combined with the tidal model predicted datasets.

The following figures describe the variability of current speed and direction near the potential spill sites based on the hydrodynamic datasets:

- Annual current intensity and direction maps (Figure 10): Spatial distribution of HYCOM averaged surface current speeds (in cm/s) and current directions for the area of interest;
- Annual current rose (Figure 11): Annual HYCOM+HYDROMAP current rose (in cm/s) near the spill site, and the direction towards which current is flowing;
- Monthly current speed statistics (Figure 12): Monthly average and 5th to 95th percentile HYCOM+HYDROMAP current speed (in cm/s) near the spill site;
- Monthly current roses (Figure 13): Monthly HYCOM HYDROMAP current roses (in cm/s) near the spill site, and the direction towards which current is flowing; and
- Seasonal current roses (Figure 14): Seasonal HYCOM+HYDROMAP current roses (in cm/s) near the spill site, and the direction towards which current is flowing.

Based on the analysis of these regional data, the following conclusions can be drawn:

- Annually averaged surface currents at the spill site are moderate and largely east/east-southeastward with some towards a west/west-southwestward direction.
- Monthly average current speed ranges from about 17 cm/s to 21 cm/s near the 1,200 MW ESP and the 95th percentile current speed ranges from 32 cm/s to 47 cm/s.
- Currents are largely consistent in direction and speed throughout the year. Current direction is mostly in the east/east-southeastward and west/west-southwestward directions, however, during the summer the current direction is predominately east/east-southeastward.

All figures display current data in the oceanographic convention (roses indicate the direction which currents are flowing *toward*). Due to the proximity of the sites, figures are only shown for the 1,200 MW ESP.

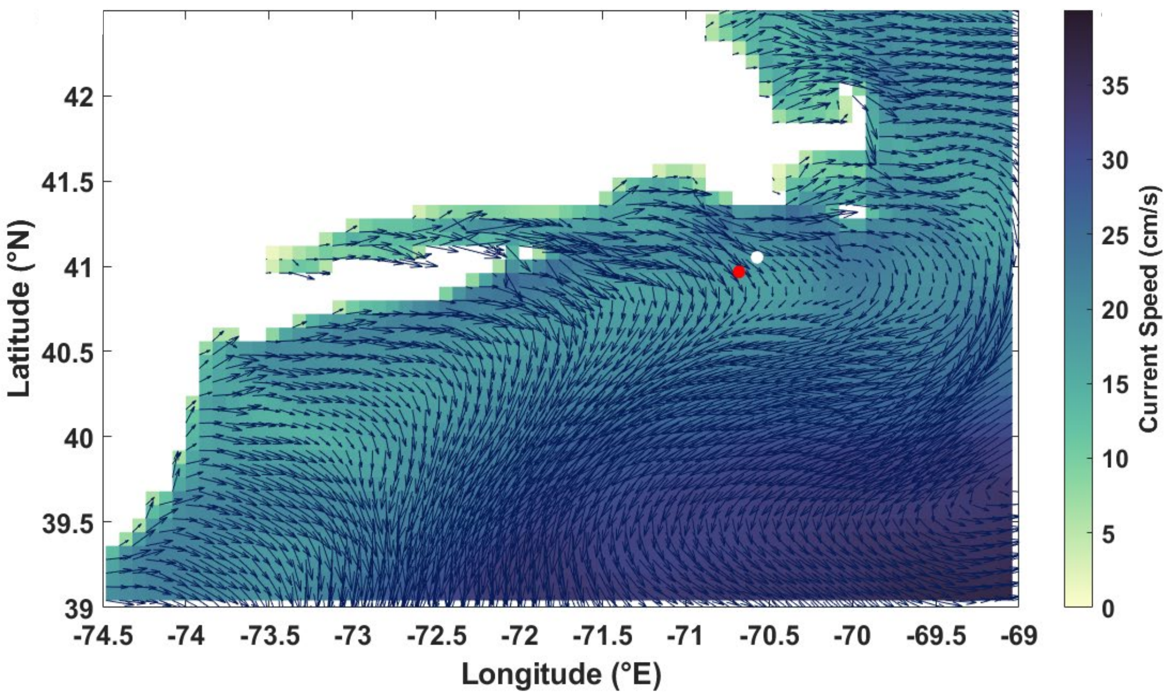


Figure 10. Spatial distribution of HYCOM averaged surface current directions (current speeds in cm/s). The red "x" indicates the 1,200 MW ESP site, whereas the white "x" is the 804 MW ESP site.

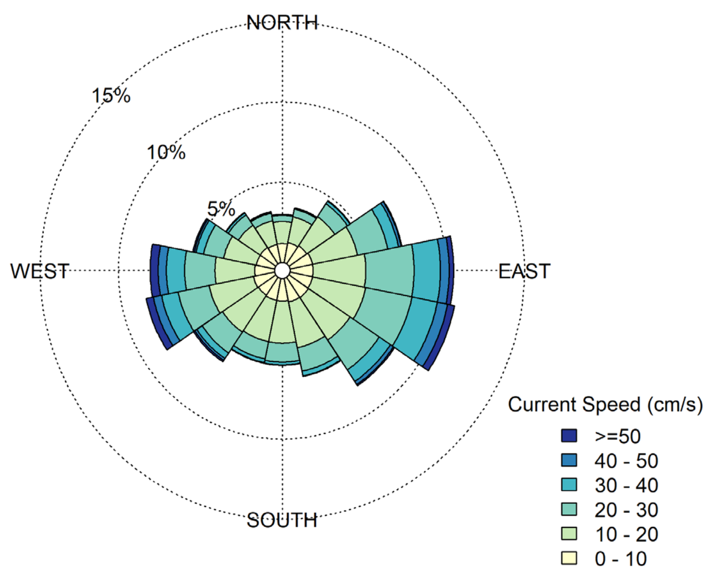


Figure 11. Annual HYCOM+HYDROMAP surface current rose near spill site following oceanographic convention (direction currents are heading towards). Current speeds are in cm/s.

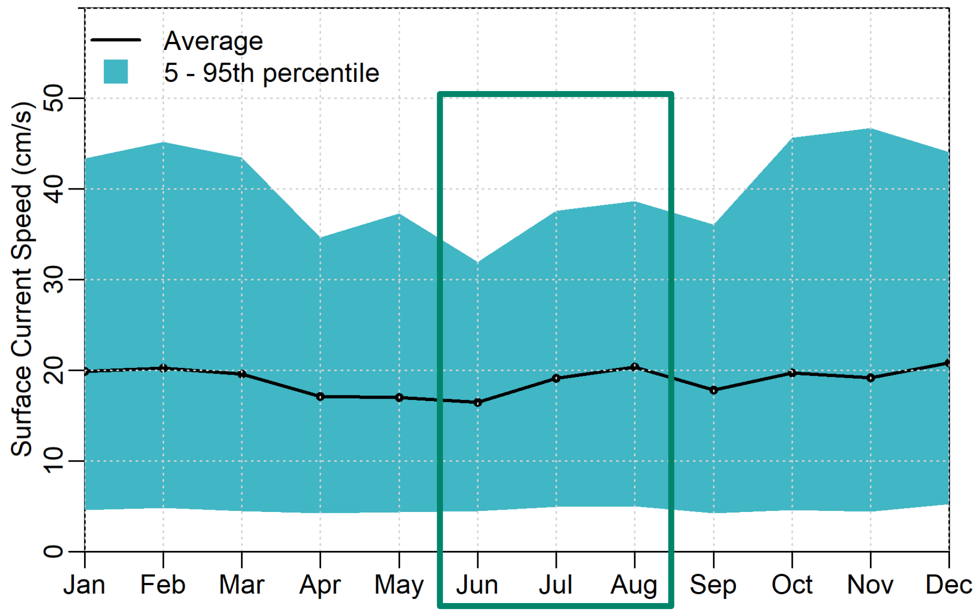


Figure 12. Monthly average (black line) and 5th to 95th percentile (blue polygon) HYCOM+HYDROMAP current speed (cm/s) statistics near the spill site. The green box highlights summer.

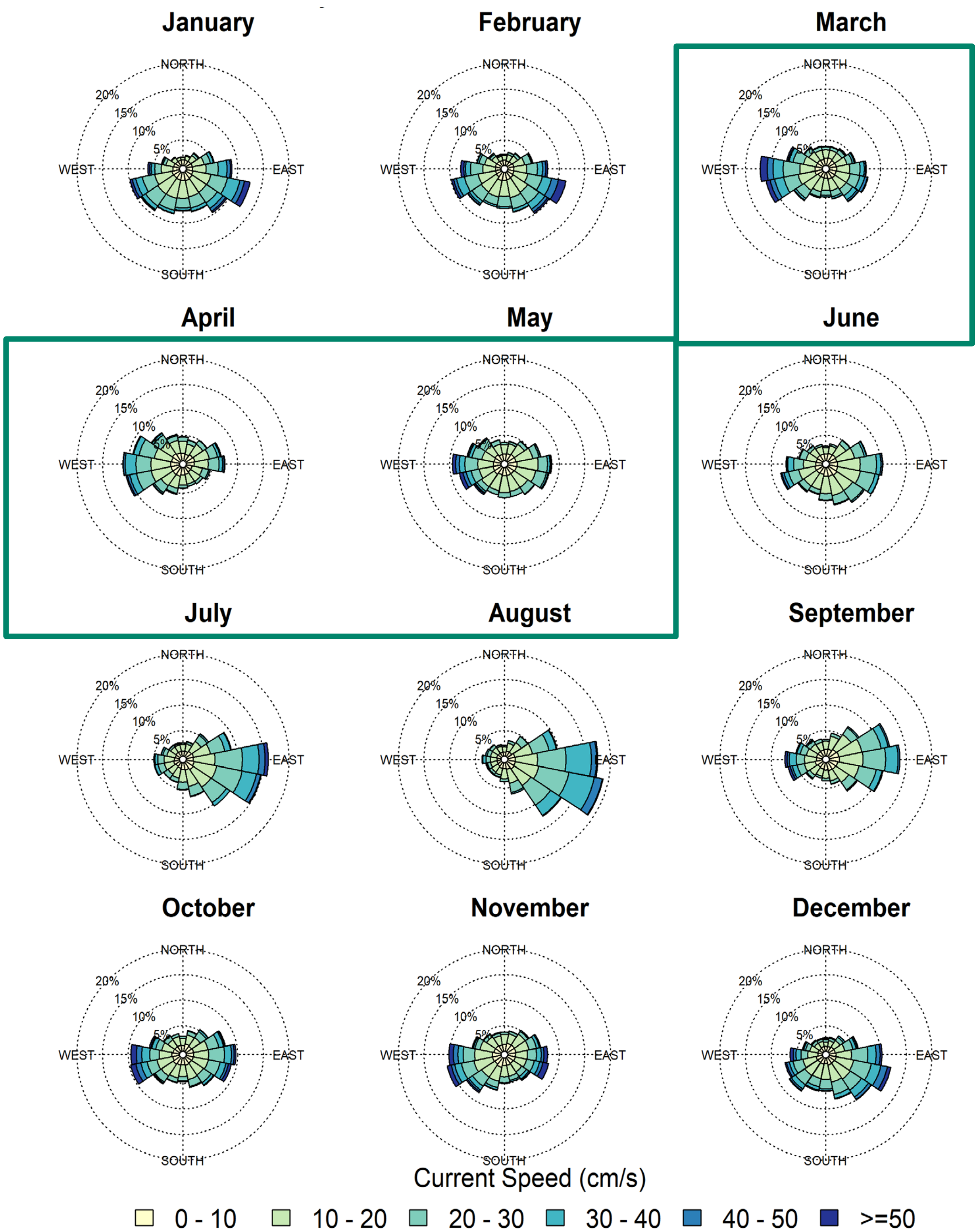


Figure 13. Monthly HYCOM+HYDROMAP current roses near the 1,200 MW ESP. Current speeds in cm/s, using oceanographic convention (direction currents are heading towards). The green box highlights summer.

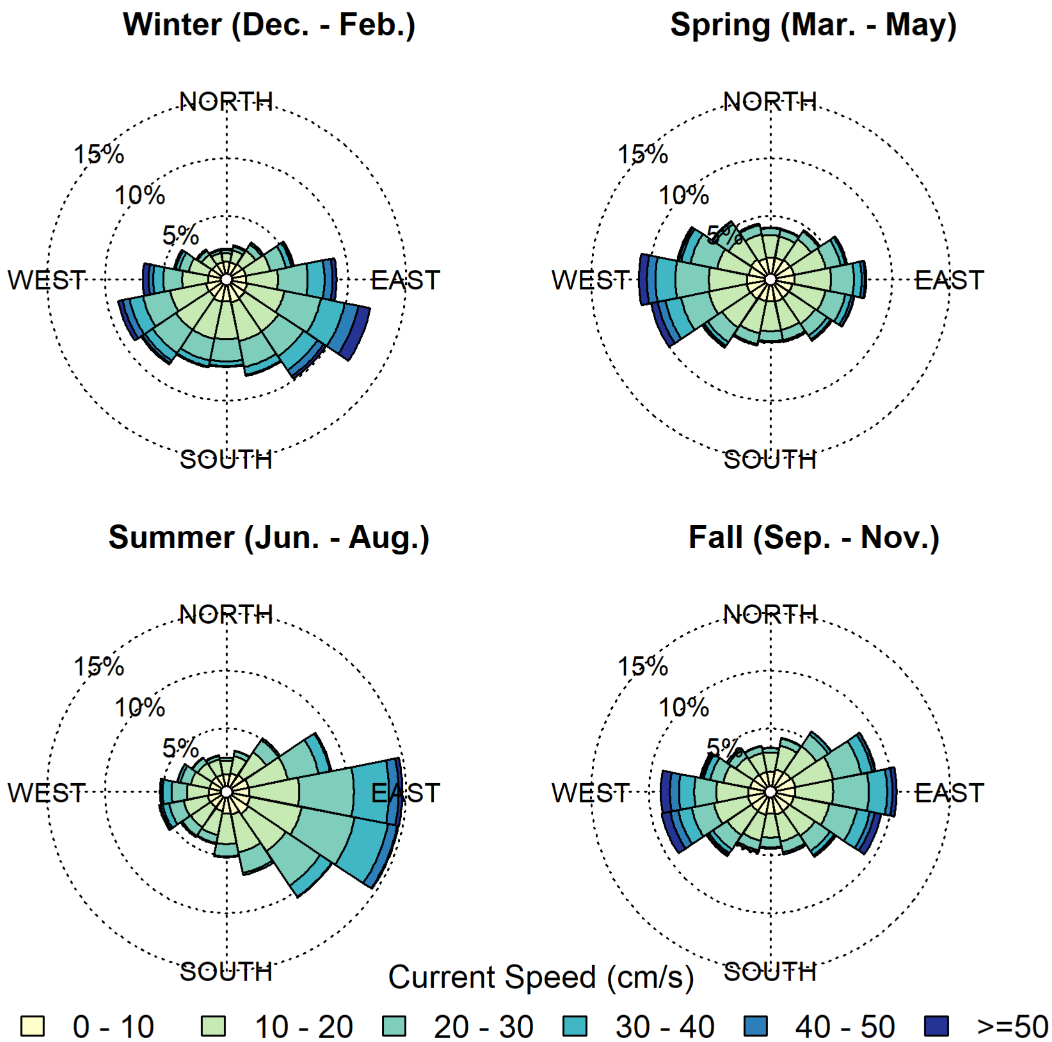


Figure 14. Seasonal HYCOM+HYDROMAP current roses near the 1,200 MW ESP. Current speeds in cm/s, using oceanographic convention (direction currents are heading towards).

2.4 Surface Transport

To compare the potential for surface wind-driven transport versus current-driven transport, an assessment of the wind drift speed versus current speed was performed close to the spill site as shown in Figure 15. For this study, the wind drift was estimated as 3.5% of the wind speed. Based on this analysis, wind drift is the primary agent of surface transport at the site. However, during the month of August, wind intensity decreases to a point where winds and currents are almost equally influential on defining the surface drift.

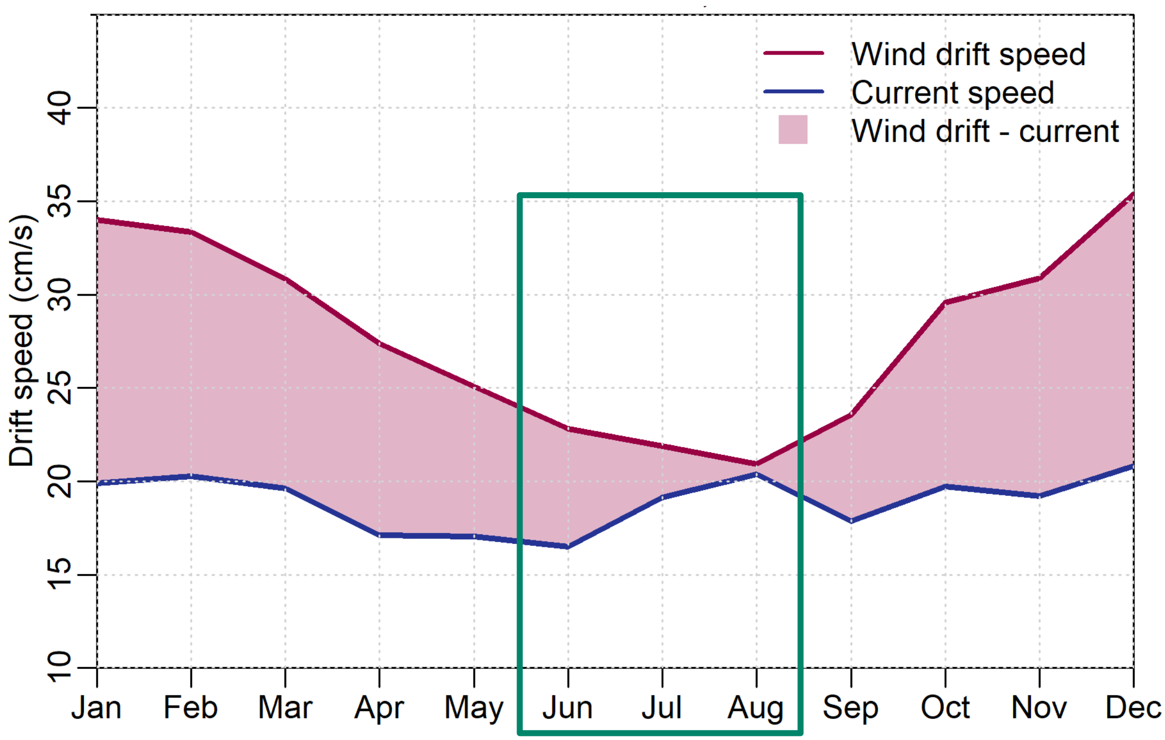


Figure 15. Surface drift forcing comparison statistics near the 1200 MW ESP spill site: monthly-averaged CSFR wind drift compared with HYCOM+HYDROMAP current speed. Wind drift is calculated as 3.5% of the wind speed. Periods with predominant wind transport are shaded pink. The green box highlights summer.

3 OIL SPILL MODELING SETUP

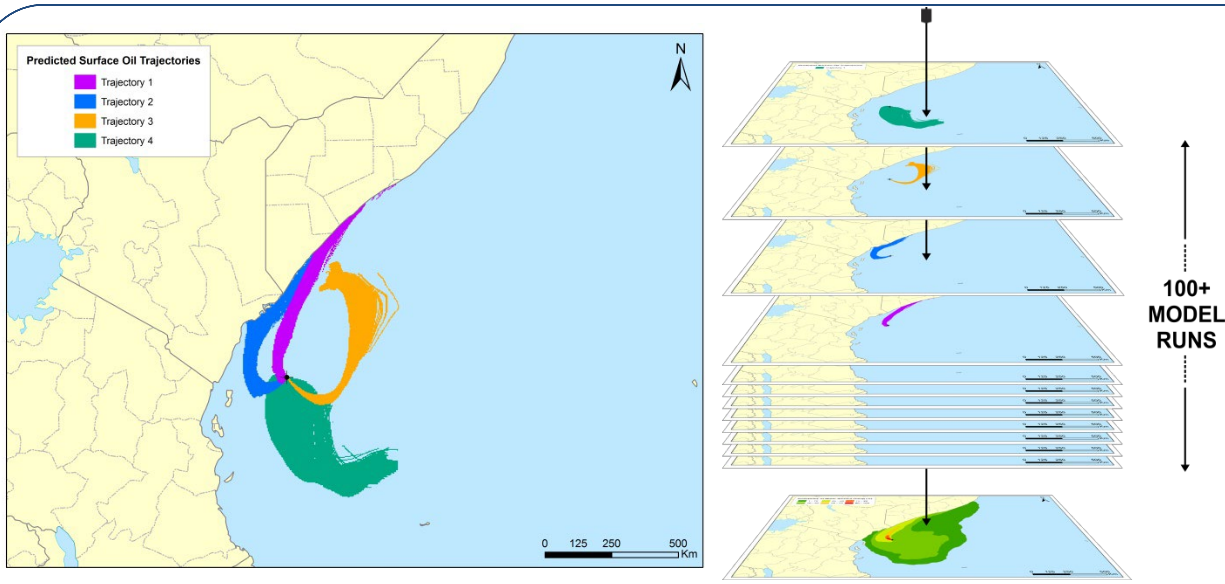
3.1 Modeling Methodology

RPS's proprietary oil spill modeling framework OILMAP/SIMAP was used for all simulations performed in this study. The model quantifies the transport and fate of different components of hydrocarbon mixtures through different compartments of the marine environment over time. The modeling system uses a 3-D Lagrangian model where each component of the spilled oil (floating, dispersed, shoreline, etc.) is represented by an ensemble of independent mathematical particles or "spillets". Each spillet comprises a subset of the total mass of hydrocarbons spilled and is transported by both currents and surface wind drift. Additional information on the modeling system is contained in Appendix A.

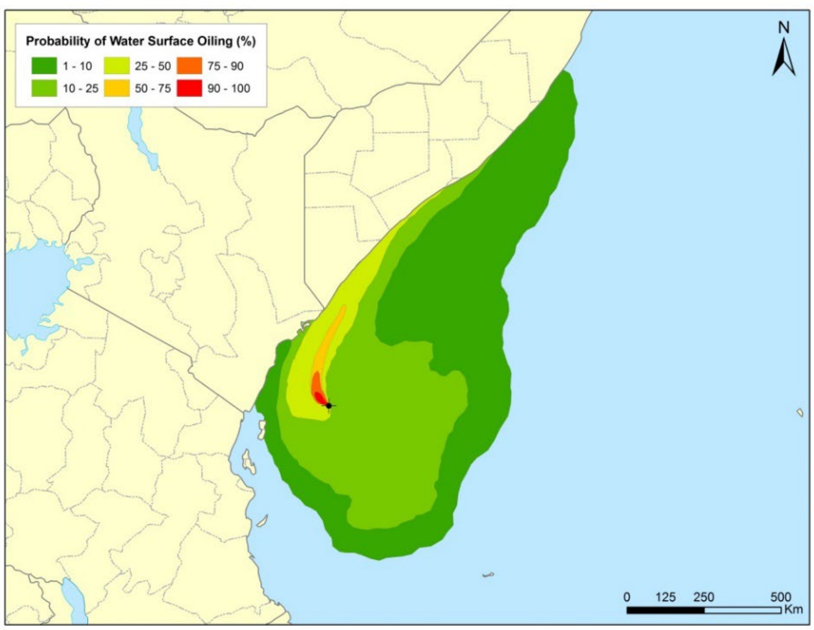
Stochastic Simulations

Stochastic simulations provide insight into the probable behavior of potential oil spills in response to temporally- and spatially-varying meteorological and oceanographic conditions in the study area. The stochastic model computes surface trajectories for an ensemble of hundreds of individual cases for each spill scenario, thus sampling the variability in regional and seasonal wind and current forcing by starting the simulation at different dates within the timeframe of interest.

The stochastic analysis provides two types of information: (1) the footprint of sea surface and shoreline areas exposed to oil above a certain threshold of concern and the associated probability of oil contamination, and (2) the shortest time required for oil to reach any point within the areas predicted to be oiled. The areas and probabilities of oiling are generated by a statistical analysis of all the individual stochastic runs (Figure 16). It is important to note that a single run will encounter only a relatively small portion of this footprint. In addition, the simulations provide shoreline oiling data expressed in terms of minimum and average times for oil to reach shore, and the percentage of simulations in which oil is predicted to reach shore. Results from this modeling step are presented in Section 4.



Examples of four individual spill trajectories predicted by OILMAP/SIMAP for a particular spill scenario. The frequency of contact with given locations is used to calculate the probability of impacts during a spill. Essentially, all 100+ model runs are overlain (shown as the stacked runs on the right) and the number of times that a trajectory reaches a given location is used to calculate the probability for that location.



Probability of surface oil exceeding a given threshold for the example scenario. This figure overlays 100+ individual model runs to calculate the percentage of runs that caused oiling above the threshold in a given area. This figure does not depict the areal extent of a single model run/spill.

Figure 16. Diagram of RPS stochastic modeling approach; an ensemble of individual trajectories creates the stochastic probability footprint.

3.2 Thresholds of Concern and Weathering

The stochastic approach applied in the spill risk assessment provided an evaluation of the likelihood of exposure to oil above ecological thresholds of concern, expressed as mass per unit area and concentration. The thresholds listed in Table 5 were used in the stochastic analysis, and followed a similar methodology as used in BOEM's previous study assessing potential catastrophic oil spills from offshore wind structures (Bejarano et al. 2013).

Table 5. Oil thickness thresholds applied in the spill risk assessment for sea surface and shoreline probability determinations

Threshold Type	Average Concentration Threshold	Rationale	Visual Appearance	References
Oil on Sea Surface	10 $g/m^2 \approx$ 10 µm (0.01 mm) on average over the grid cell	**Ecological:** Observed lethal effects to birds on water at this threshold. Sublethal impacts to marine mammals, sea turtles, and floating Sargassum mats.	Fresh oil at this thickness corresponds to a slick being a dark brown or metallic sheen.	French et al. 1996; French McCay 2009;French McCay et al. 2011; French McCay et al. 2012; French McCay 2016
Shoreline Oil	100 $g/m^2 \approx$ 100 µm (0.1 mm) on average over the grid cell	**Ecological:** This is a screening threshold for potential ecological effects on shoreline flora and fauna, based upon a synthesis of the literature showing that shoreline life has been affected by this degree of oiling. Sublethal effects on epifaunal intertidal invertebrates on hard substrates and on sediments have been observed where oiling exceeds this threshold. Assumed lethal effects threshold for birds on the shoreline.	May appear as black opaque oil.	French et al. 1996; French McCay 2009; French McCay et al. 2011; French McCay et al. 2012**;** French McCay 2016

3.3 Oil Spill Scenarios

The Proponent has identified the closest potential location to shore for an ESP in Phase 1 and in Phase 2. The Phase 1 location will include one 804 MW ESP, and the Phase 2 location will include one 1,200 MW ESP. Release scenarios for the stochastic simulations assumed a spill from an instantaneous, catastrophic loss of the complete contents of both the ESP locations (Table 6). Two thousand particles were used in OILMAP/SIMAP to simulate the surface release of oil as a near instantaneous release tracked over the course of 20 days. The stochastic model was run for the three different scenarios using 478 simulations covering the span of 10 years (2001 to 2010). These results were then reanalyzed over four seasons, each consisting of over 100 simulations (Table 7). As described in Section 2, a combination of HYCOM Reanalysis and HYDROMAP modeled tidal circulation was used as current inputs to the model, while CFSR was used as wind inputs.

Table 6. Release locations used in oil spill modeling.

Site	Description	Latitude N (decimal degrees)	Longitude W (decimal degrees)
804 MW ESP	ESP location in NW corner of New England Wind Phase 1	41.052178	70.572195
1,200 MW ESP	ESP location in NW corner of New England Wind Phase 2	40.967242	70.680221

Table 7. Oil spill scenarios defined for the oil spill modeling.

ID	Site	Oil Type	Season	Total Volume Released
1	804 MW ESP	Oil Mixture (Napthenic/Mineral + Biodegradable + Diesel)	Spring: (March–May)	2,955 bbl (124,097 gal)
2			Summer: (June–August)	
3			Fall: (September-November)	
4			Winter: (December–February)	
5	1,200 MW ESP	Oil Mixture (Napthenic/Mineral + Biodegradable + Diesel)	Spring: (March-May)	4,428 bbl (185,978 gal)
6			Summer: (June–August)	
7			Fall: (September–November)	
8			Winter: (December–February)	

3.4 Oil Characteristics

Three main oil types were chosen as representative oils to be used within Phase 1 and Phase 2 after communication between the Proponent and RPS. The three oils in order of prevalence in the final mixture are: (1) Naphthenic oil produced by Nynas known as “Nytro 10X”; (2) diesel fuel, using the properties of “Diesel 2002” as presented on Environment Canada’s oil property database; and (3) biodegradable, ester-based oil produced by Midel known as “Midel 7131”.

Using these components, two theoretical “combination oils” were generated by creating two mass-weighted averages of the three-constituents calculated by utilizing the volumes specified by the Proponent (one for the 804 MW Phase 1 scenario and one for the 1,200 MW Phase 2). The naphthenic, diesel, and biodegradable oils represent approximately 94%, 4%, and 2% of the final mixtures, respectively, in both the 804 MW Phase 1 and 1,200 MW Phase 2 with compositional differences of less than 1%. Thus, the properties of the final combined oil most closely resemble the naphthenic oil which dominates the mixture. The compositional breakdown of scenarios is presented in Table 8 and the bulk properties of all component and mixtures of hydrocarbons are presented in Table 9.

Table 8. Composition of Oil Mixtures for the 804 MW and 1,200 MW Sites. Properties from Environment Canada oil properties database, NYNAS Nytro 4000x SDS, and Midel 7131 SDS.

	Bulk Property	Naphthenic (Nytro 10x)	Diesel	Biodegradable (Midel 7131)	Total
804 MW	Volume (L)	440,616	20,697	8,448	469,761
	Volume (bbl)	2,771	130	53	2,954
	Total mass (kg)	387,742	17,199	8,209	413,151
	Mass fraction	94%	4%	2%	100%
1,200 MW	Volume (L)	660,290	31,046	12,672	704,008
	Volume (bbl)	4,153	195	79	4,428
	Total mass (kg)	581,055	25,799	12,314	619,169
	Mass fraction	94%	4%	2%	100%

Table 9. Bulk properties for each of the component hydrocarbons and mixtures for the 804 MW, 1,200 MW scenarios. Oil properties from Environment Canada oil properties database, NYNAS Nytro 4000x SDS, and Midel 7131 SDS.

	Component Hydrocarbons			Oil Mixtures		
Bulk Property	Naphthenic (Nytro 10x)	Diesel	Biodegradable (Midel 7131)	804 MW	1,200 MW	Potential RCS
Density at 25°C (g/cm^3)	0.8679	0.970	0.9682	0.874	0.874	0.874
Viscosity at 15°C centipoise (cP)	26.0	2.8	117.0	26.8	26.8	26.8
% mass with boiling point 0-180°C	0.0%	16.4%	0.0%	0.7%	0.7%	0.7%
% mass with boiling point 180-165°C	17.1%	49.0%	0.0%	18.1%	18.1%	18.1%
% mass with boiling point 265-380°C	66.4%	31.9%	1.0%	63.7%	63.7%	63.7%
% mass with boiling point >380°C	16.5%	2.7%	99.0%	17.6%	17.6%	17.6%
Surface Tension in millinewtons per meter (mN/m)	45	28	50	44	44	44

4 STOCHASTIC MODELING RESULTS

OILMAP/SIMAP's stochastic model computed the probable surface and shoreline trajectories of surface releases of oil mixtures from two ESPs for four seasons. Over 100 simulations define each seasonal spill scenario. Stochastic trajectory results were summed to calculate probabilities of surface oiling and minimum travel time for each spill scenario including oil contamination of the water surface and shoreline.

The stochastic results for all spill scenarios are summarized in Table 10. The average time to reach the shoreline and the average mass of oil washed ashore were calculated based on all the individual trajectories that led to oil reaching shore with more than 0.1% of the initial spilled volume. The percentage of simulations reaching shore was based on the number of trajectories out of the total number of individual simulations run for the stochastic modeling in which at least 0.1% of the spilled volume was predicted to reach shore. Thickness thresholds for shoreline contamination were not used in the below calculations, and as such results present conservative probabilities and timing. It is also important to note that the time to reach shore is based on the minimum time for any shoreline contamination to occur and does not indicate the thickness of shoreline contamination occurring at that time.

Table 10. Oil spill stochastic results—predicted shoreline impacts for each scenario.

ID	Spill Site	Oil Type	Season	Total Volume Released	Sims. Reaching Shore (%) [1]	Time to Reach Shore (days)		Contamination to shoreline (% of total release)	
						Min.	Avg.	Max.	Avg.
1	804 MW	Oil Mixture	Spring: (Mar.-May)	2,955 bbl	65.5%	1.16	6.06	26.6%	5.8%
2	804 MW	Oil Mixture	Summer: (June-Aug.)	2,955 bbl	63.9%	1.77	5.94	40.24%	6.0%
3	804 MW	Oil Mixture	Fall: (Sept.-Nov.)	2,955 bbl	47.9%	1.20	6.47	44.1%	4.8%
4	804 MW	Oil Mixture	Winter: (Dec.-Feb.)	2,955 bbl	16.8%	0.84	5.40	10.3%	3.2%
5	1,200 MW	Oil Mixture	Spring: (Mar.-May)	4,428 bbl	49.2%	1.29	6.49	16.2%	5.8%
6	1,200 MW	Oil Mixture	Summer: (June-Aug.)	4,428 bbl	47.5%	1.96	6.26	52.4%	6.4%
7	1,200 MW	Oil Mixture	Fall: (Sept.-Nov.)	4,428 bbl	31.7%	1.49	7.44	42.5%	6.2%
8	1,200 MW	Oil Mixture	Winter: (Dec.-Feb.)	4,428 bbl	7.6%	1.01	5.37	9.5%	3.8%

Notes:

1. The percentage of simulations reaching shore is based on the number of trajectories out of the ensemble of stochastic individual simulations. Since these calculations are based on total mass reaching shore, thickness thresholds were not incorporated.

Results from the stochastic modeling are provided in maps depicting the probability and timing of oil contamination on the surface and shoreline in excess of the threshold oil thicknesses described in Section 3.2 (0.01 millimeters [mm] for surface oil and 0.1 mm for shoreline oil). Figure 18 to Figure 25, Figure 30 to Figure 37, and Figure 30 to Figure 37 present surface oiling for the 804 MW and 1,200 MW spill scenarios, respectively. Figure 26 to Figure 29, Figure 38 to Figure 41, and Figure 38 to Figure 41 present shoreline oiling for the 804 MW and1,200 MW spill scenarios, respectively. Each figure contains two maps, and in two different zoom layouts (for surface oil contamination), portraying the following information:

1. **Probability of Oil Contact Figures**: The probability of oiling maps for each scenario defines the area and the associated probability in which sea surface and shoreline oiling above the defined thresholds (Table 5) would be expected should a worst case discharge scenario occur. The colored area in the stochastic maps indicates areas that *may* receive oil contamination in the event of that particular spill scenario. The 'hotter' the color (e.g., reds), the more likely an area would be affected; the cooler the colors (e.g., greens), the less likely an area would be affected. The probability of oil contamination was based on a statistical analysis of the resulting ensemble of individual trajectories for each spill scenario. These figures do not imply that the entire contoured area would be covered with oil in the event of a spill, nor do they provide any information on the quantity of oil that would be found in a given area.

2. **Minimum Travel Time Figures**: The footprint of the minimum travel time corresponds to the oil contamination probability maps for oil above the threshold of concern. These figures illustrate the shortest time required for oil to reach any point within the footprint at a thickness or concentration exceeding the defined threshold for surface and shoreline oil contamination. These results are based on the ensemble of all individual trajectories.

It is important to note that the probability of a spill trajectory passing through a certain water surface area and the probability of a spill trajectory hitting a shoreline segment near that water surface area are different. For example, in the schematic shown in Figure 17, there are four trajectories total, which do not overlap near the shore. Thus, the surface oiling probability at a surface water grid cell near the shore (yellow cell) is 25%, since only one out of four trajectories crosses that grid cell. However, the probability of shoreline oiling within the green bracketed segment near the yellow surface water cell is 75%, since three out of four trajectories intercept that particular shoreline segment. In the locations in which two of the four trajectories do overlap within a surface water grid cell, the probability of oiling is 50% (purple cell). In addition, oil contamination to the shoreline has a cumulative effect over an individual run, since oil that hits the shoreline is stranded there, and more oil can accumulate. In contrast, oil contamination on the surface only shows the maximum concentration at each grid cell for any given time (i.e., oil can move through a cell in cumulative excess of the threshold but still not exceed the threshold at any given time).

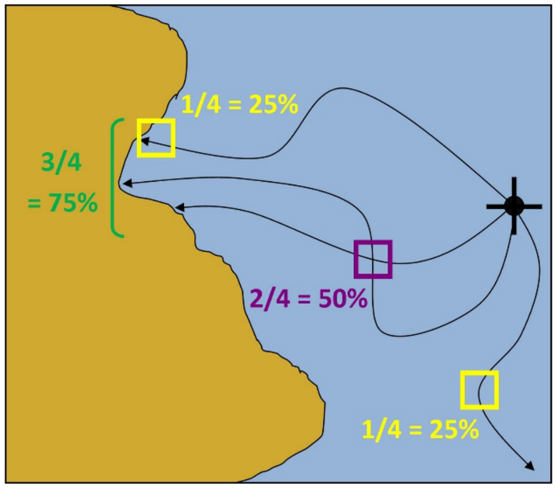


Figure 17. Example illustration of the difference between surface and shoreline oiling probabilities. Surface probabilities in yellow and purple, shoreline probabilities in green.

4.1 804 MW Phase 1 Site

4.1.1 Oil Contamination to Water Surface

Figure 18 to Figure 25 provide the results of surface oil contamination for the spill scenarios over each season. In all four seasons, the sea surface area exposed to oil exceeding the 10 g/m^2 threshold is contained within a radius up to 54 km (34 mi) of the 804 MW Phase 1 spill location, with the largest stochastic contour comprised of a 1–10% probability. The surface oiling probability footprint extended furthest to the northwest and west, towards the edge of Rhode Island Sound, and northeast, towards Nantucket Sound, where surface oil was predicted to occur within a minimum of one to three days of the release. Three of the seasons (spring, summer and fall) (Figure 18 to Figure 23, respectively) demonstrate similar water surface oil exposure footprints, while the winter scenario depicts a relatively smaller footprint centralized around the spill site. It is important to note again that these scenarios are very conservative and do not include the use of oil spill response equipment, which the Proponent would implement in the case of a spill.

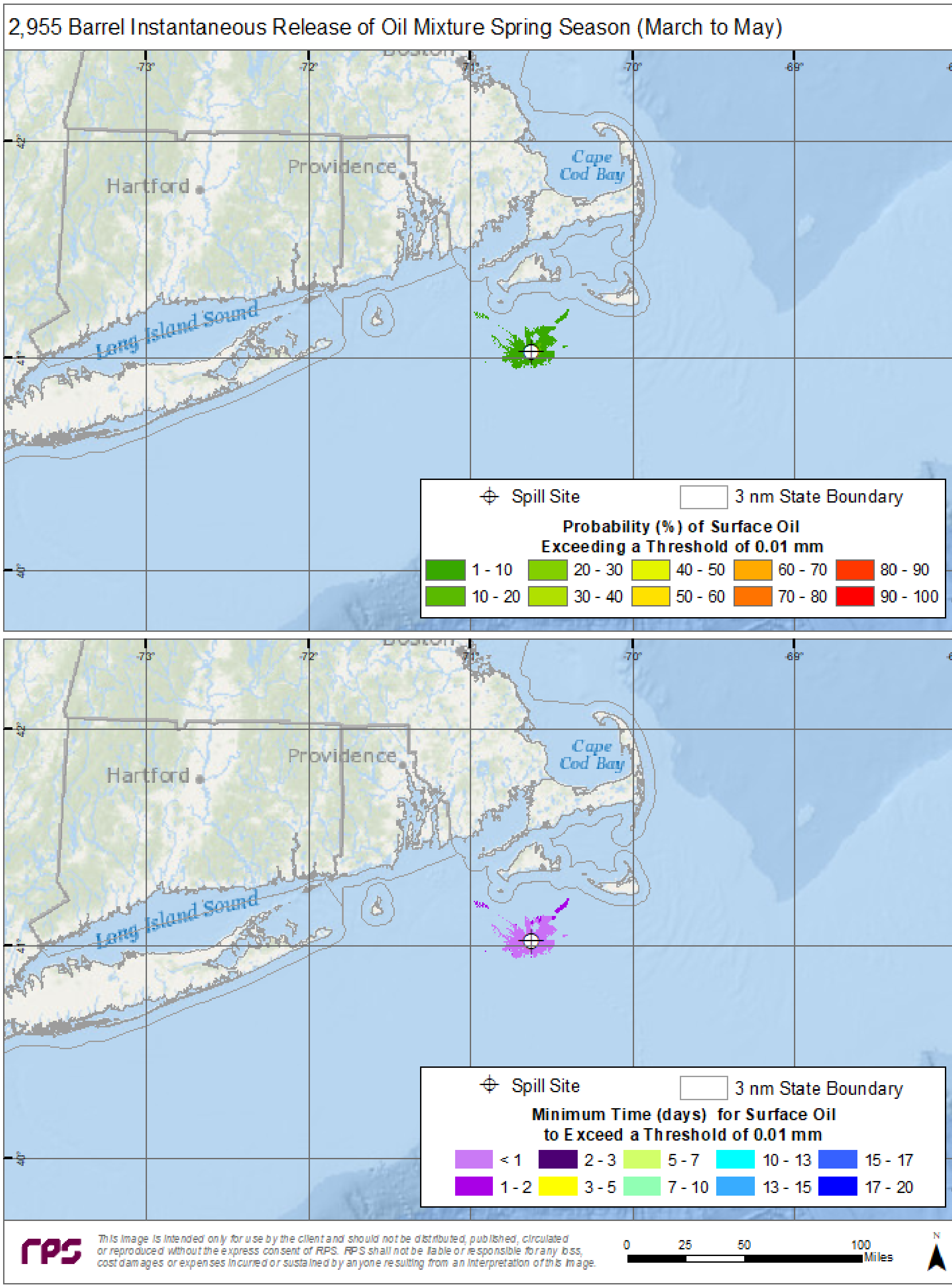


Figure 18. Top Panel—Probability of surface oiling above a minimum thickness of 10 µm (10 g/m² on average over the grid cell) during spring months for an instantaneous release from the 804 MW Phase 1 ESP location. Bottom Panel—Minimum time for surface oiling to occur at thicknesses greater than 10 g/m².

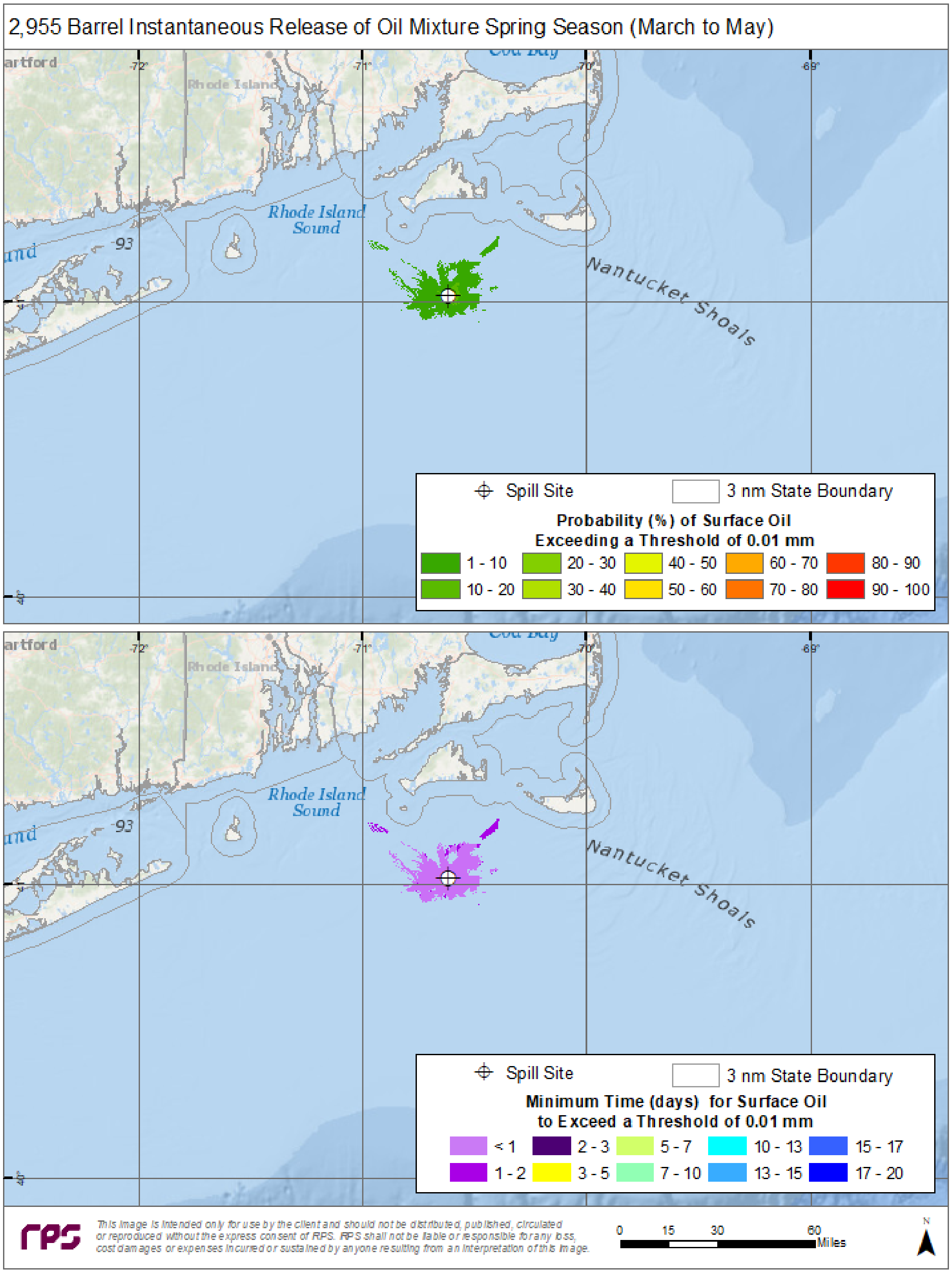


Figure 19. Detail View. Top Panel—Probability of surface oiling above a minimum thickness of 10 µm (10 g/m^2 on average over the grid cell) during spring months for an instantaneous release from the 804 MW Phase 1 ESP location. Bottom Panel—Minimum time for surface oiling to occur at thicknesses greater than 10 g/m^2.

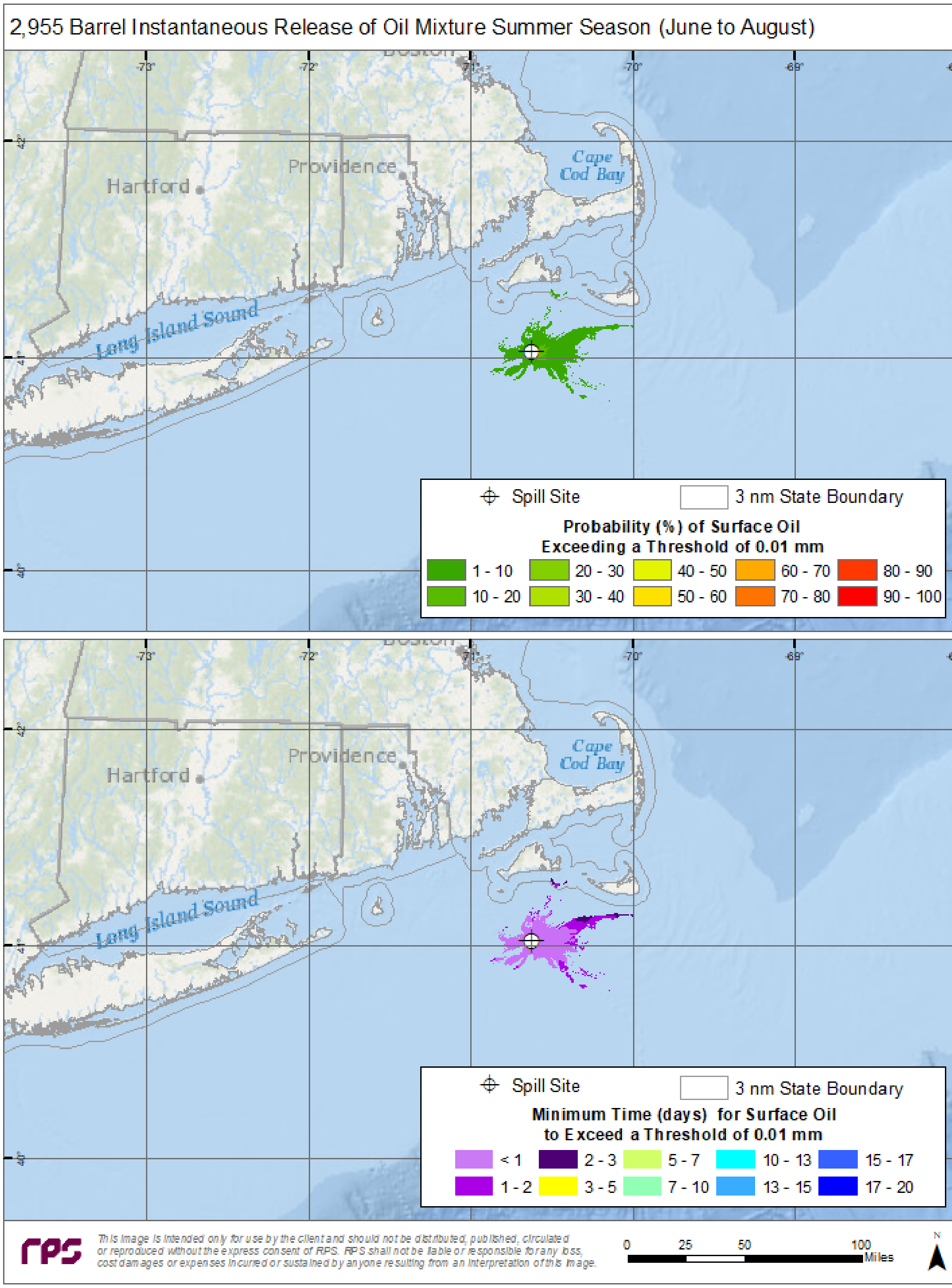


Figure 20. Top Panel–Probability of surface oiling above a minimum thickness of 10 µm (10 g/m² on average over the grid cell) during summer months for an instantaneous release from the 804 MW Phase 1 ESP location. Bottom Panel—Minimum time for surface oiling to occur at thicknesses greater than 10 g/m².

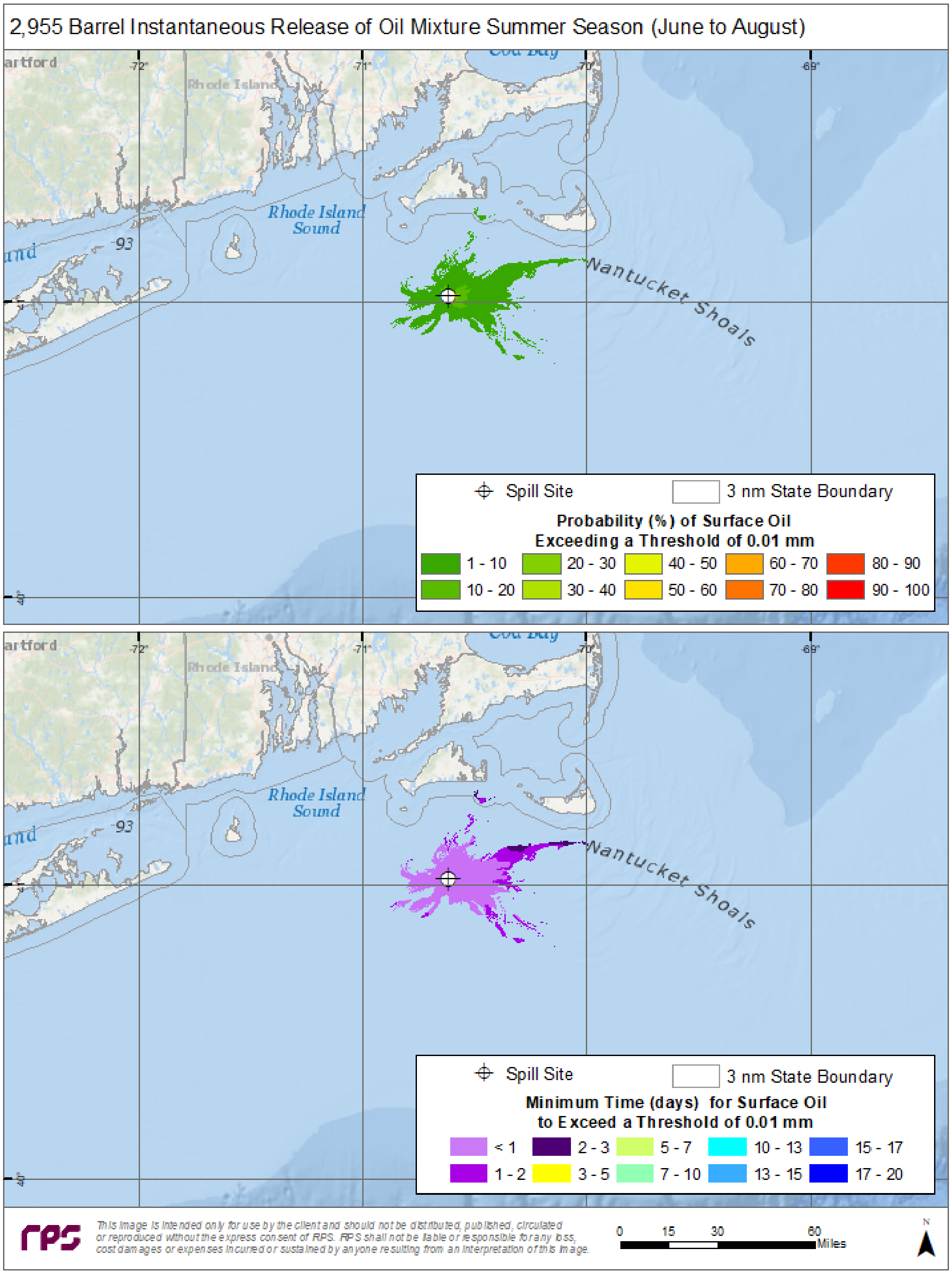


Figure 21. Detail View. Top Panel—Probability of surface oiling above a minimum thickness of 10 µm (10 g/m^2 on average over the grid cell) during summer months for an instantaneous release from the 804 MW Phase 1 ESP location. Bottom Panel—Minimum time for surface oiling to occur at thicknesses greater than 10 g/m^2.

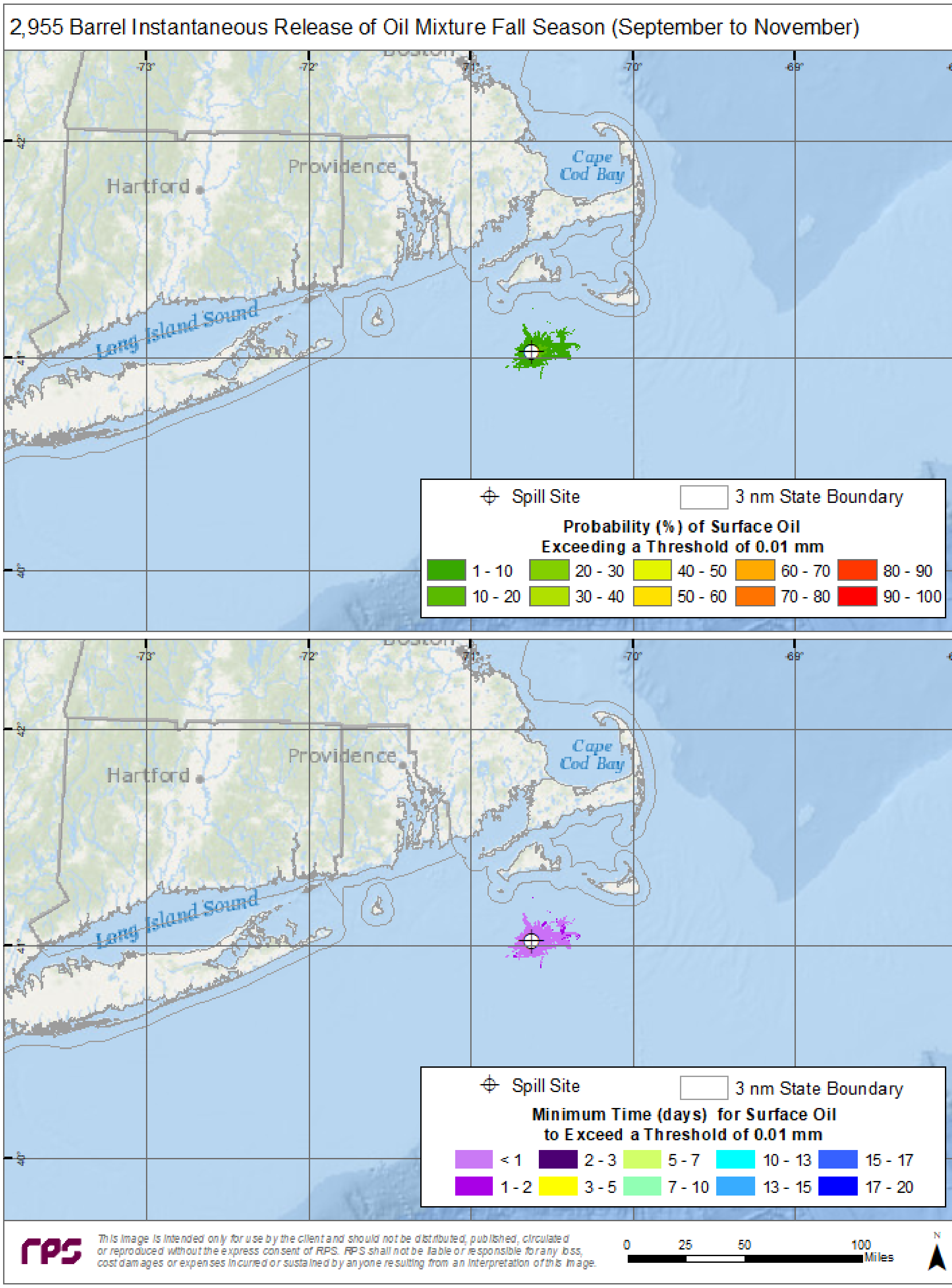


Figure 22. Top Panel—Probability of surface oiling above a minimum thickness of 10 µm (10 g/m^2 on average over the grid cell) during fall months for an instantaneous release from the 804 MW Phase 1 ESP location. Bottom Panel—Minimum time for surface oiling to occur at thicknesses greater than 10 g/m^2.

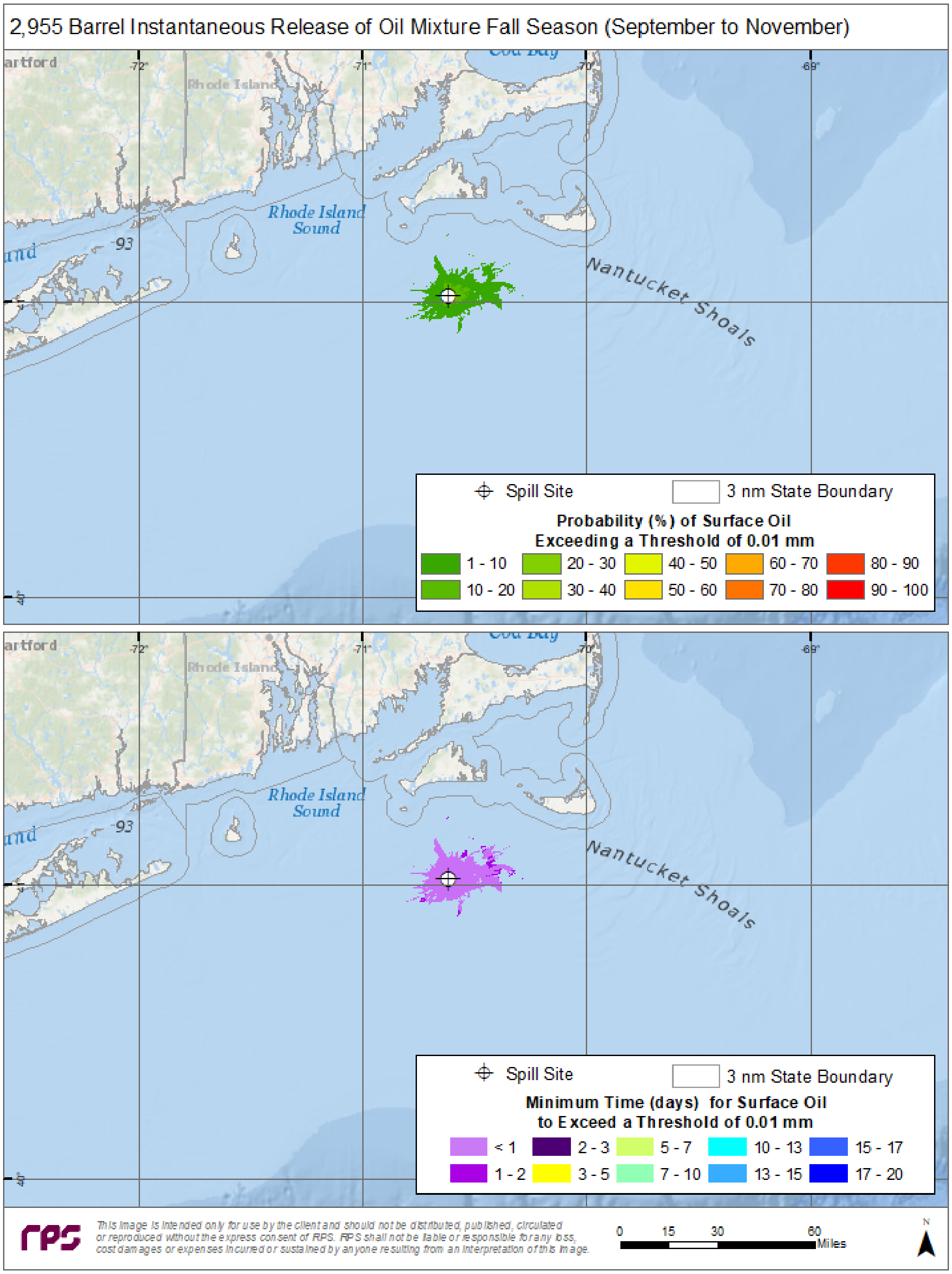


Figure 23. Detail View. Top Panel—Probability of surface oiling above a minimum thickness of 10 µm (10 g/m^2 on average over the grid cell) during fall months for an instantaneous release from the 804 MW Phase 1 ESP location. Bottom Panel—Minimum time for surface oiling to occur at thicknesses greater than 10 g/m^2.

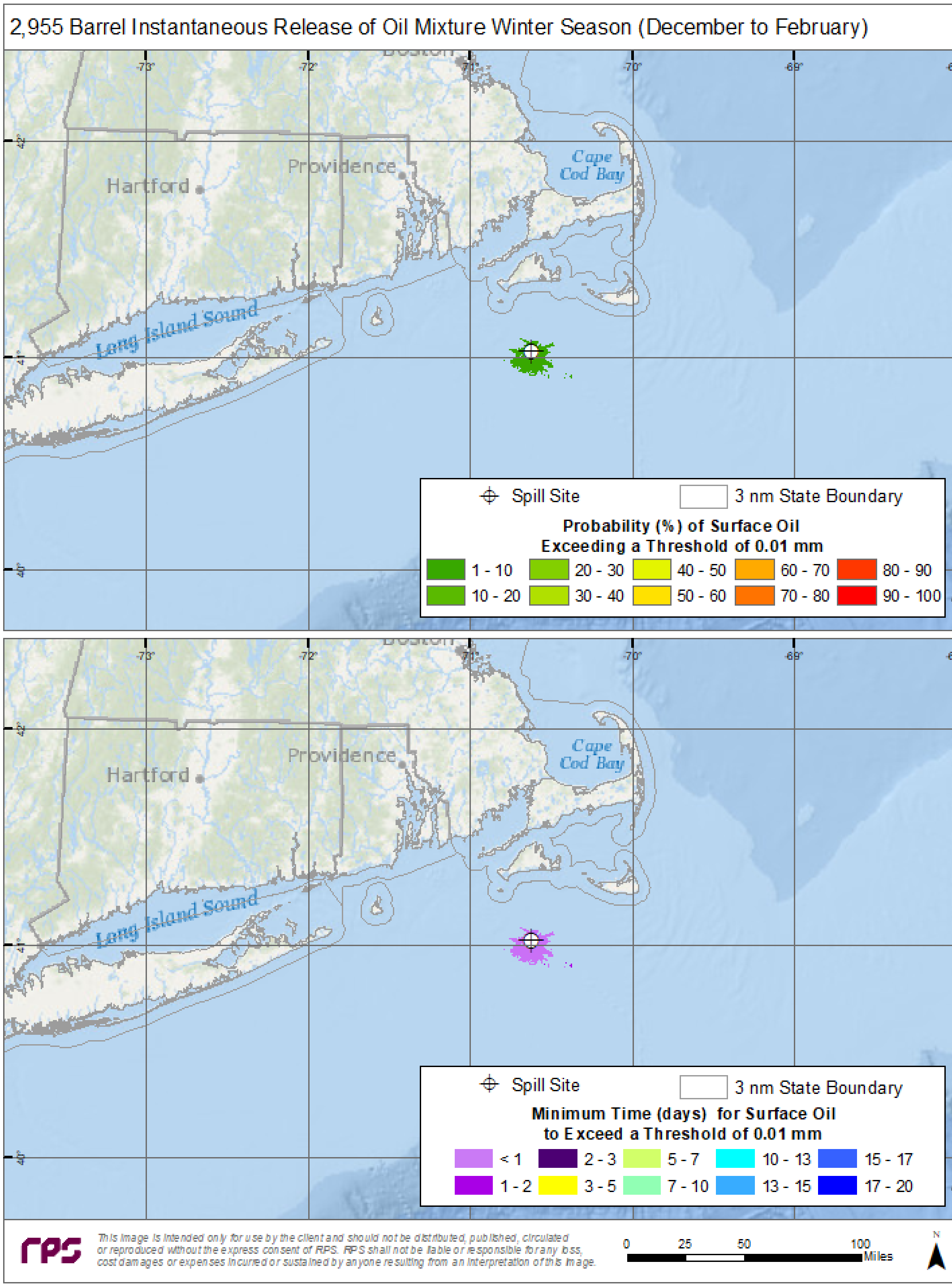


Figure 24. Top Panel—Probability of surface oiling above a minimum thickness of 10 µm (10 g/m^2 on average over the grid cell) during winter months for an instantaneous release from the 804 MW Phase 1 ESP location. Bottom Panel—Minimum time for surface oiling to occur at thicknesses greater than 10 g/m^2.

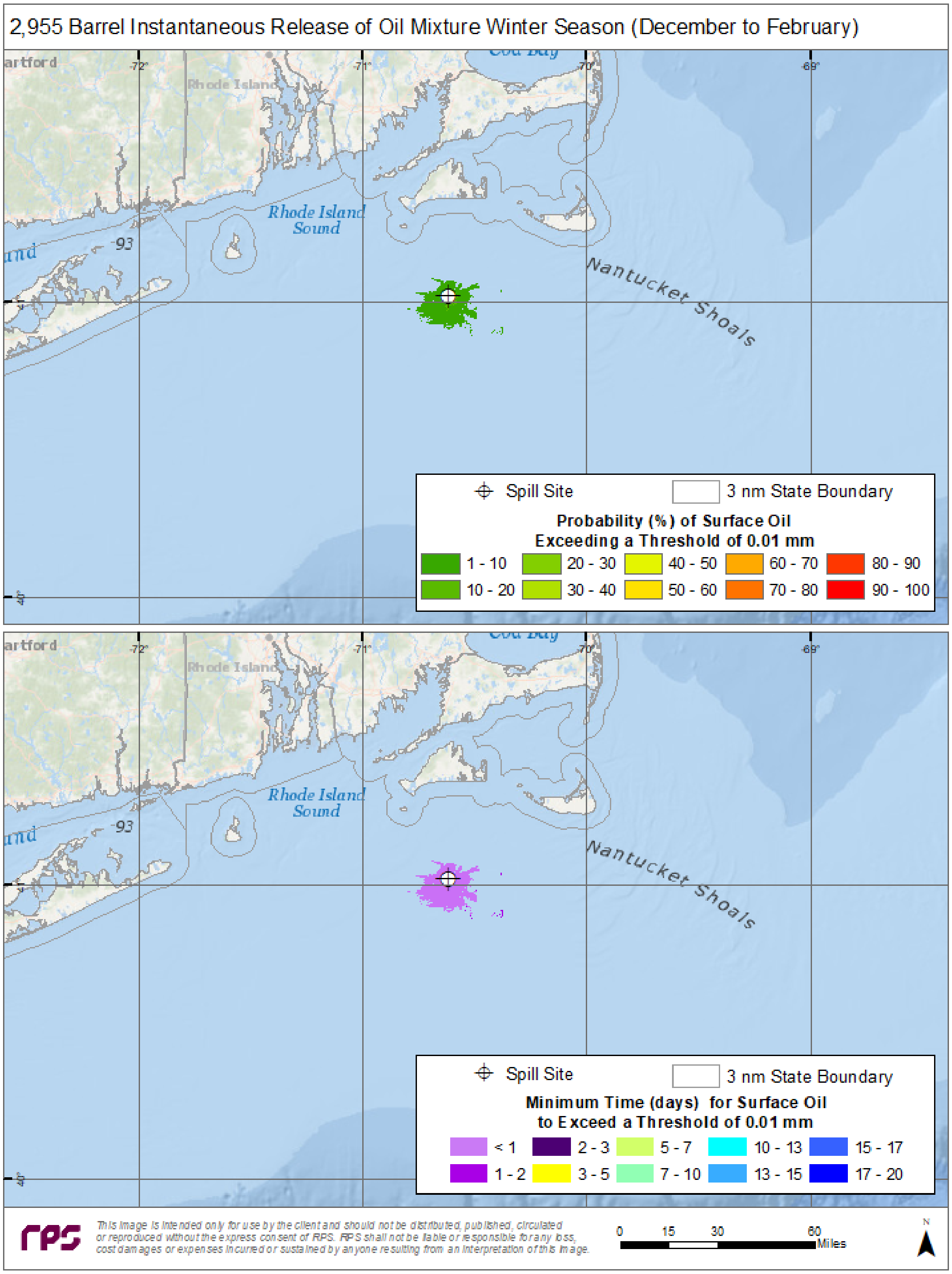


Figure 25. Detail View. Top Panel—Probability of surface oiling above a minimum thickness of 10 µm (10 g/m^2 on average over the grid cell) during winter months for an instantaneous release from the 804 MW Phase 1 ESP location. Bottom Panel—Minimum time for surface oiling to occur at thicknesses greater than 10 g/m^2.

4.1.2 Oil Contamination to Shore

The following figures illustrate the results of oil contamination to the shoreline for the worst case oil spill scenarios over each season at the 804 MW Phase 1 spill location. Figure 26 to Figure 29 indicate that, in all seasons, there is a 1–30% probability that oil above a minimum thickness of 100 μm (100 g/m^2 on average over the grid cell) released from the 804 MW Phase 1 ESP location would reach the shorelines of Martha's Vineyard and Nantucket within one to three days of the release. There is a lower probability (less than 10%) of oil above the threshold reaching the shorelines of Rhode Island and Massachusetts more than two days following the release. There is also a relatively small (less than 10%) potential for shoreline contamination to occur above 100 g/m^2 on parts of Long Island in the spring; however, the oiling would not occur for at least seven days after the release in most cases and would likely be largely mitigated with response measures within this time.

The spring scenarios are expected to have the largest spatial extent of shoreline oiling due to the prevailing winds and currents during that season. It is important to note again that these scenarios are very conservative and do not include the use of oil spill response equipment, which the Proponent would implement in the case of a spill.

As described above and shown in Figure 17, the differences in the footprint for the surface and shoreline oil contamination are a result of the surface oil less than 100 μm (100 g/m^2 on average over the grid cell) traveling farther distances and beginning to pile up on shore. It is important to note that oil contamination to the shoreline has a cumulative effect over an individual run, since oil that hits the shoreline is stranded there, and more oil can accumulate.

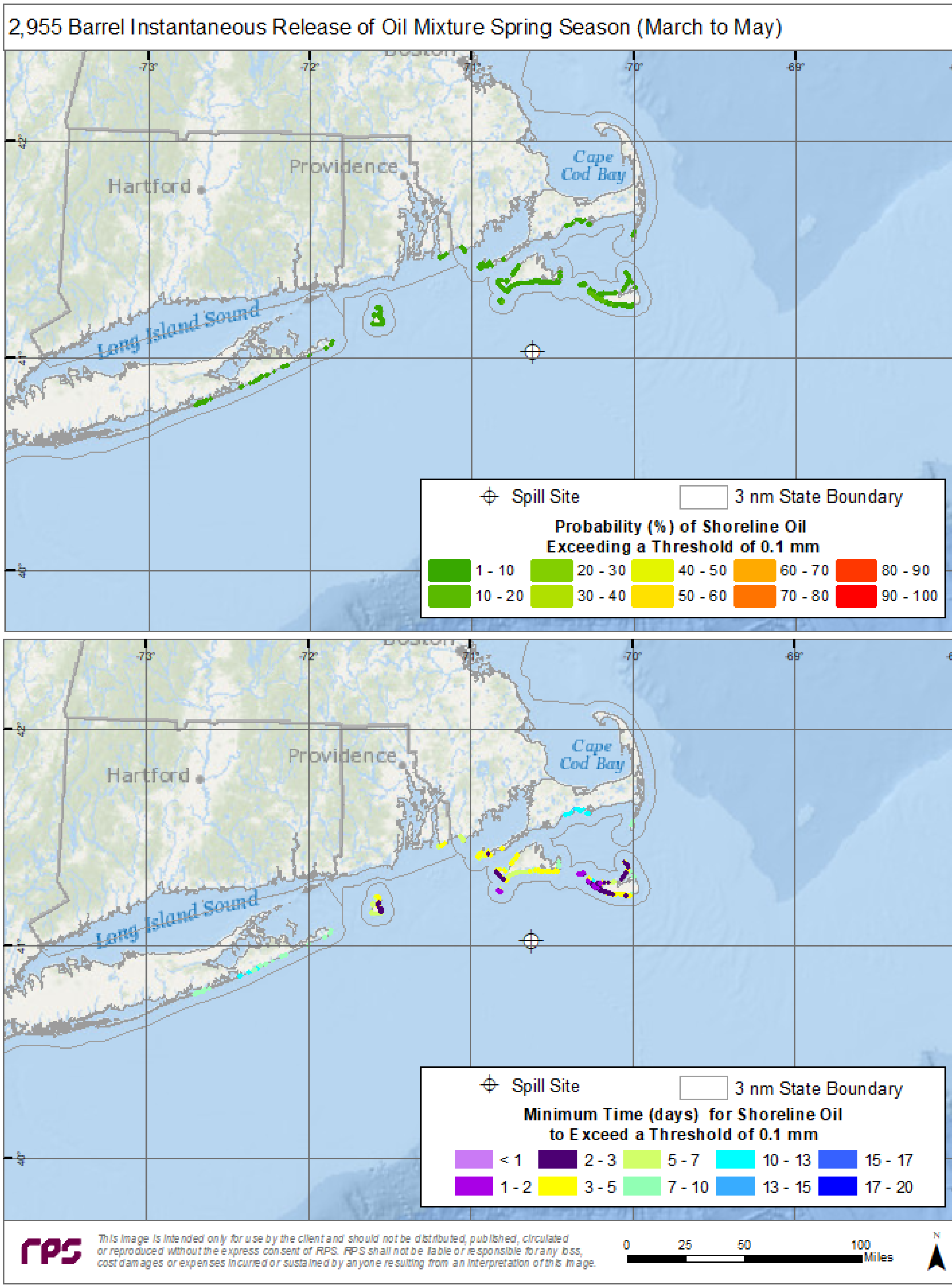


Figure 26. Top Panel—Probability of shoreline oiling above a minimum thickness of 100 µm (100 g/m^2 on average over the grid cell) during spring months for an instantaneous release from the 804 MW Phase 1 ESP location. Bottom Panel—Minimum time for shoreline oiling to occur at thicknesses greater than 100 g/m^2.

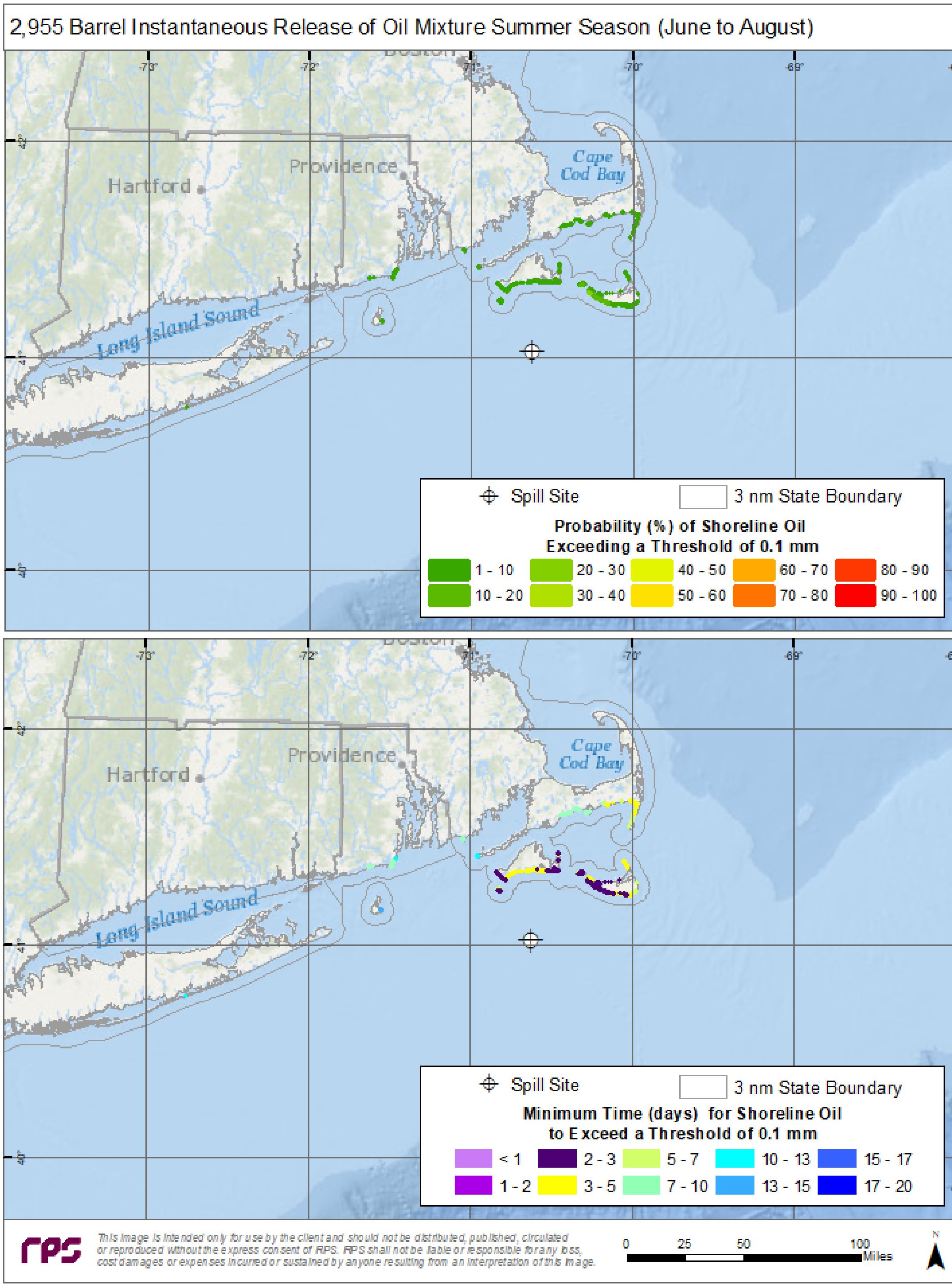


Figure 27. Top Panel—Probability of shoreline oiling above a minimum thickness of 100 µm (100 g/m^2 on average over the grid cell) during summer months for an instantaneous release from the 804 MW Phase 1 ESP location. Bottom Panel—Minimum time for shoreline oiling to occur at thicknesses greater than 100 g/m^2.

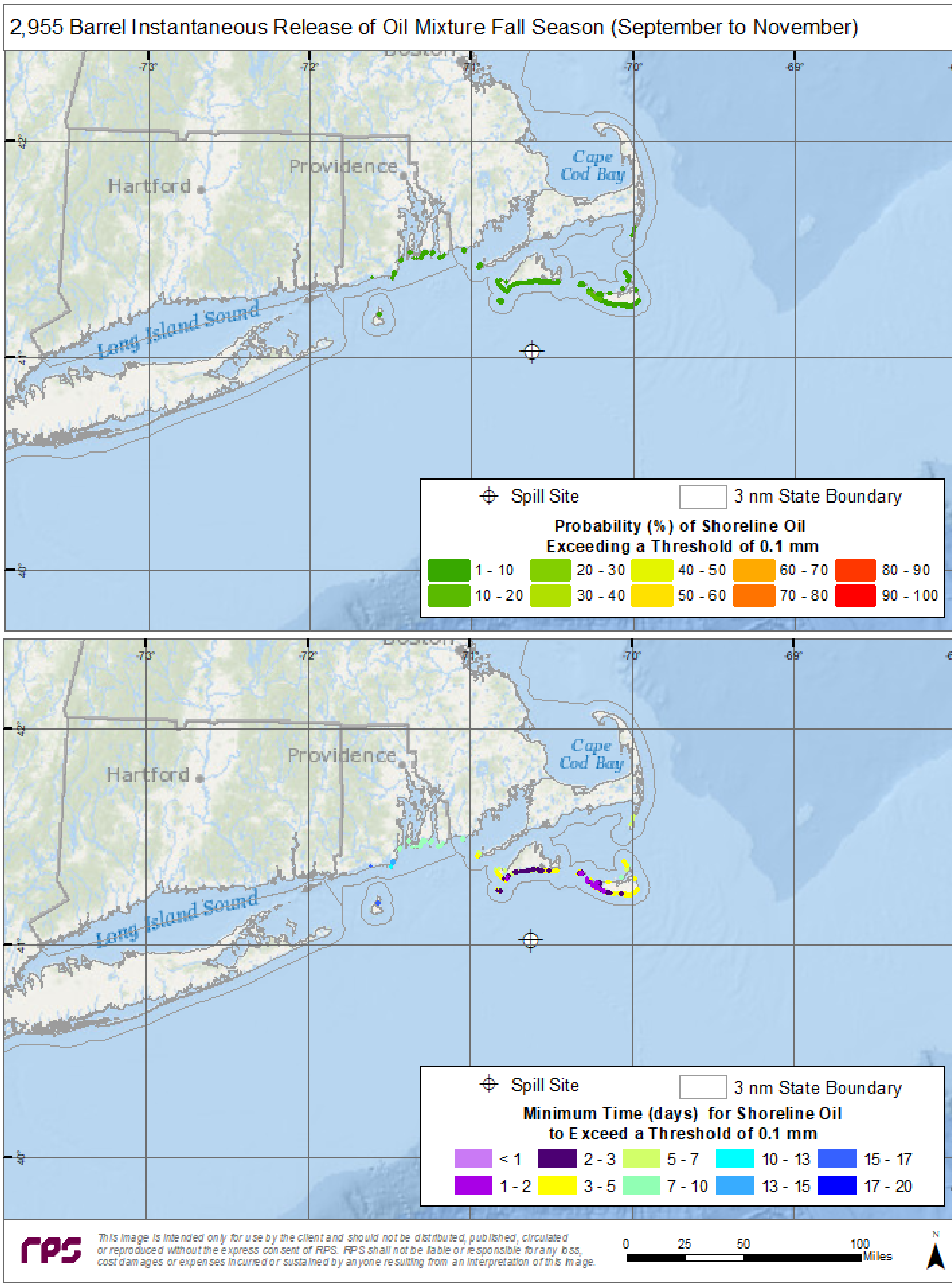


Figure 28. Top Panel—Probability of shoreline oiling above a minimum thickness of 100 µm (100 g/m^2 on average over the grid cell) during fall months for an instantaneous release from the 804 MW Phase 1 ESP location. Bottom Panel—Minimum time for shoreline oiling to occur at thicknesses greater than 100 g/m^2.

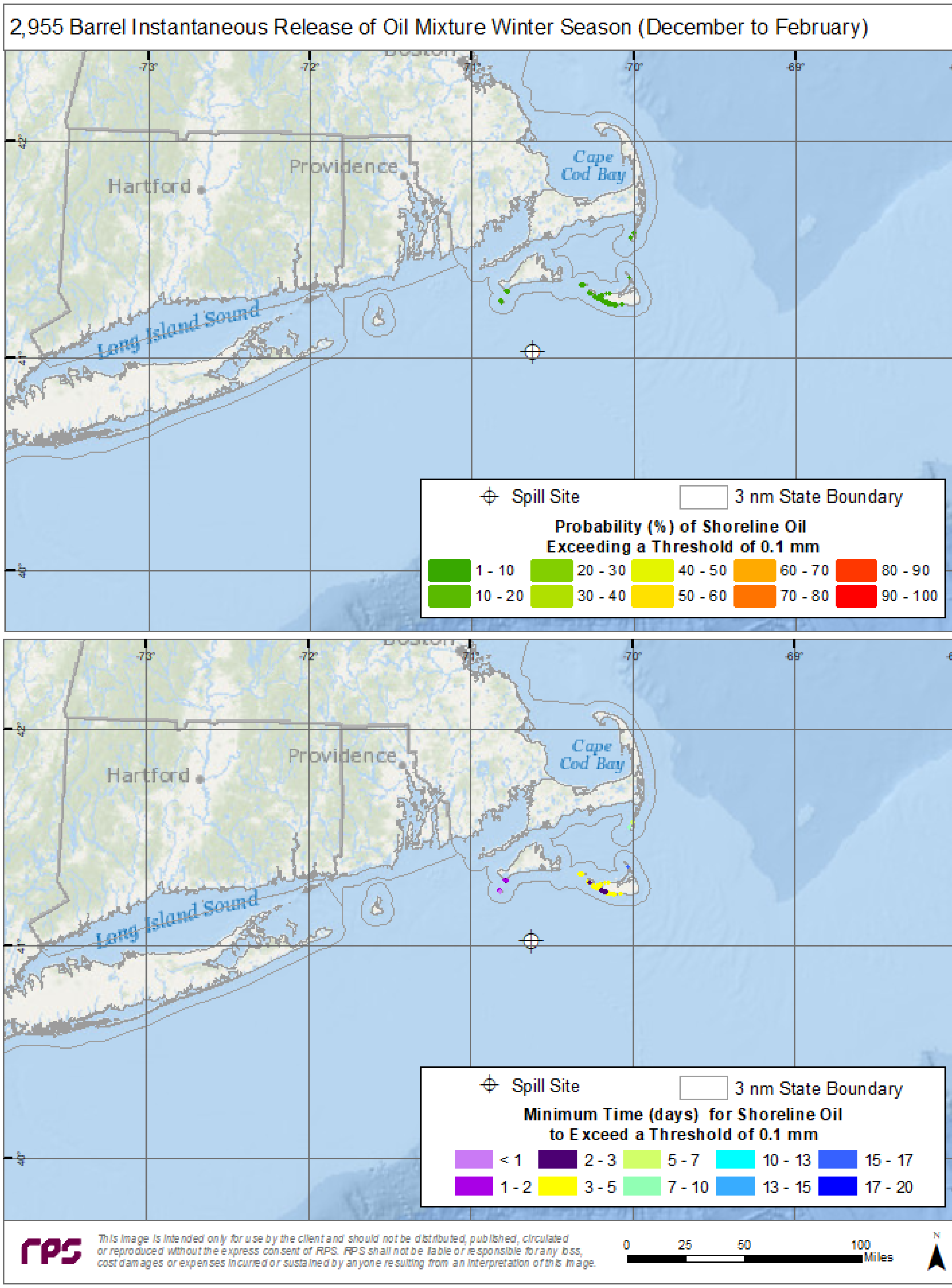


Figure 29. Top Panel—Probability of shoreline oiling above a minimum thickness of 100 µm (100 g/m^2 on average over the grid cell) during winter months for an instantaneous release from the 804 MW Phase 1 ESP location. Bottom Panel—Minimum time for shoreline oiling to occur at thicknesses greater than 100 g/m^2.

4.2 1,200 MW Phase 2 Site

4.2.1 Oil Contamination to Water Surface

Figure 30 to Figure 37 provide the results of surface oil contamination for the spill scenarios over each season. In all four seasons, the sea surface area exposed to oil exceeding the 10 g/m^2 threshold is contained within a radius up to approximately 80.5km (50 mi) of the 1,200 MW Phase 2 ESP spill location, with the largest stochastic contour comprised of 1–10% probability. The furthest extents of the 1–10% probability footprint generally lie on the edge of Rhode Island and Nantucket Sounds and were contacted by oil within about two to five days from release at the earliest. Three seasons (spring, summer, and fall) (Figure 30 to Figure 35, respectively) demonstrate similar water surface oiling probability footprints while the winter scenario depicts a relatively smaller footprint centralized around the spill site. It is important to note again that these scenarios are very conservative and do not include the use of oil spill response equipment which the Proponent would implement in the case of a spill. The OSRP describes the planned oil spill response.

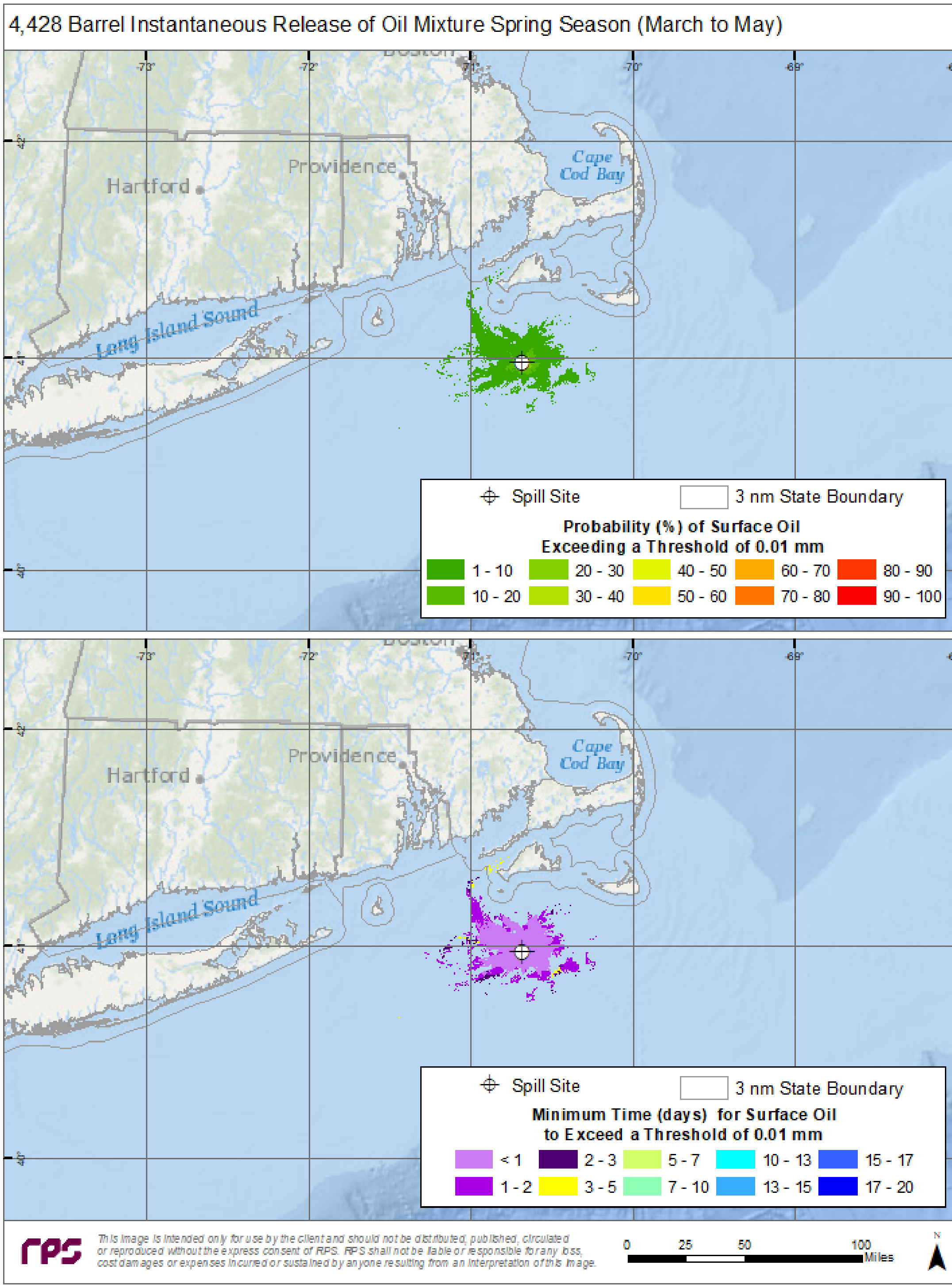


Figure 30. Top Panel—Probability of surface oiling above a minimum thickness of 10 µm (10 g/m^2 on average over the grid cell) during spring months for an instantaneous release from the 1,200 MW Phase 2 ESP location. Bottom Panel—Minimum time for surface oiling to occur at thicknesses greater than 10 g/m^2.

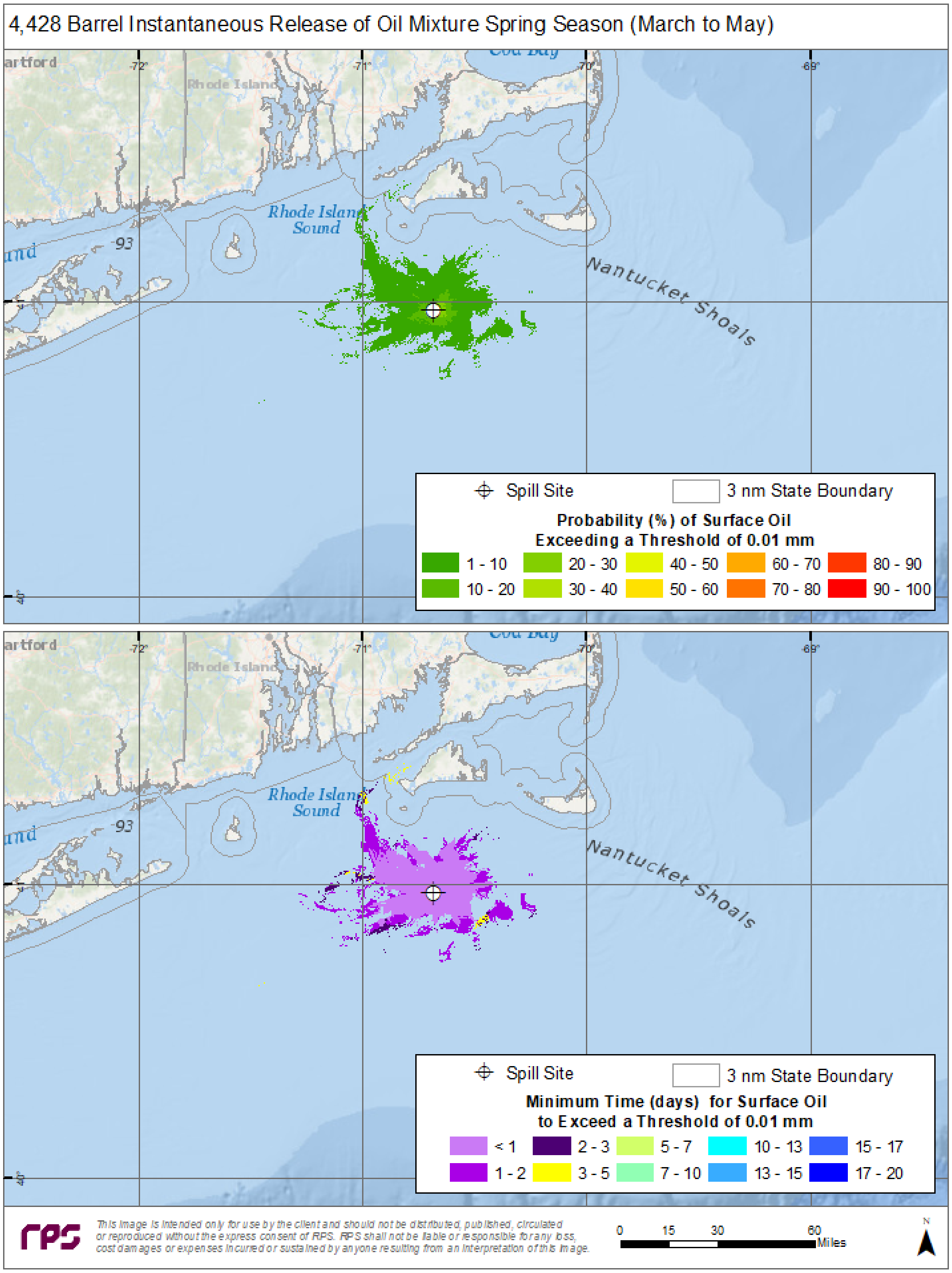


Figure 31. Detail View. Top Panel—Probability of surface oiling above a minimum thickness of 10 µm (10 g/m^2 on average over the grid cell) during spring months for an instantaneous release from the 1,200 MW Phase 2 ESP location. Bottom Panel—Minimum time for surface oiling to occur at thicknesses greater than 10 g/m^2.

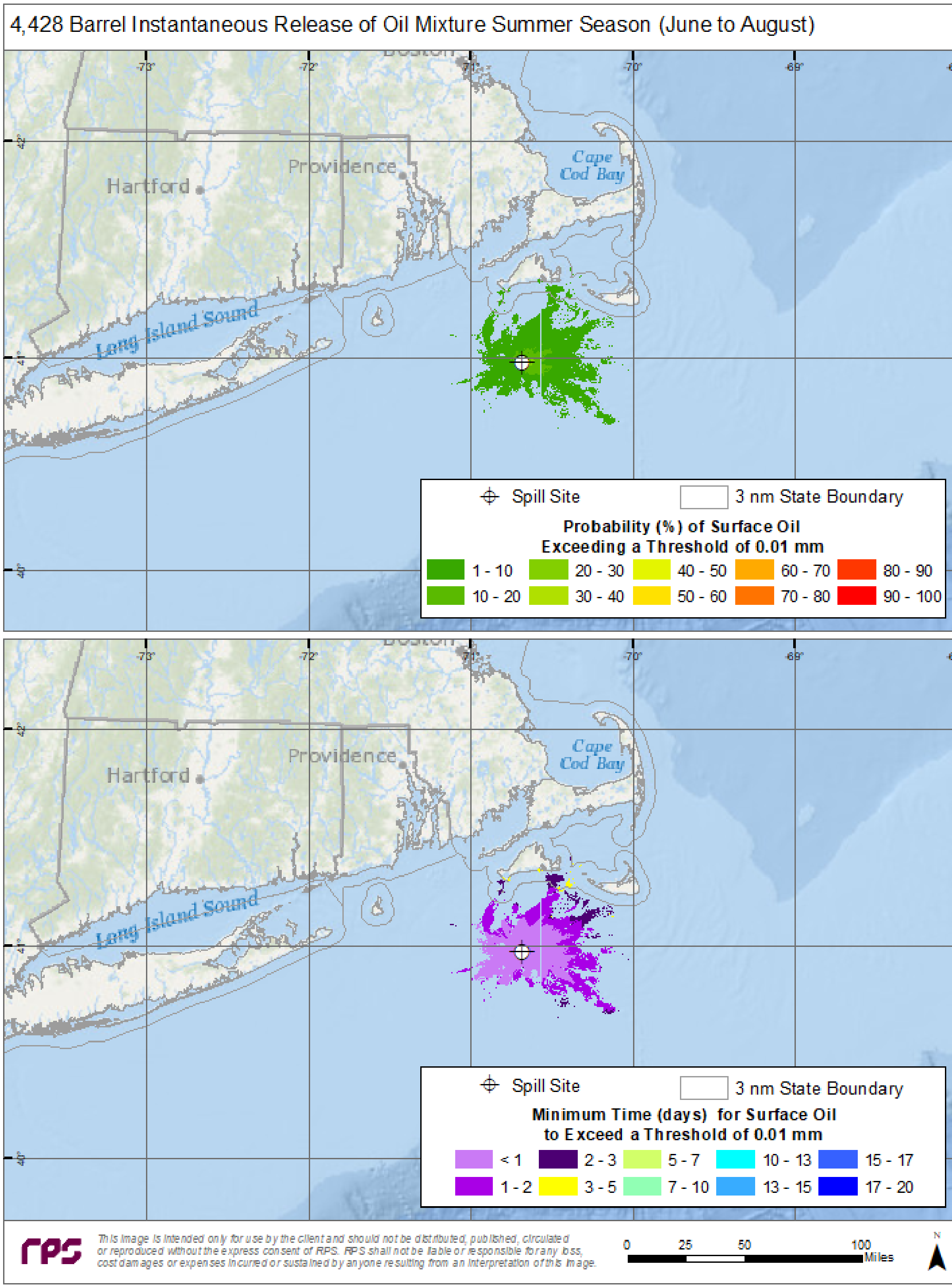


Figure 32. Top Panel—Probability of surface oiling above a minimum thickness of 10 µm (10 g/m^2 on average over the grid cell) during summer months for an instantaneous release from the 1,200 MW Phase 2 ESP location. Bottom Panel—Minimum time for surface oiling to occur at thicknesses greater than 10 g/m^2.

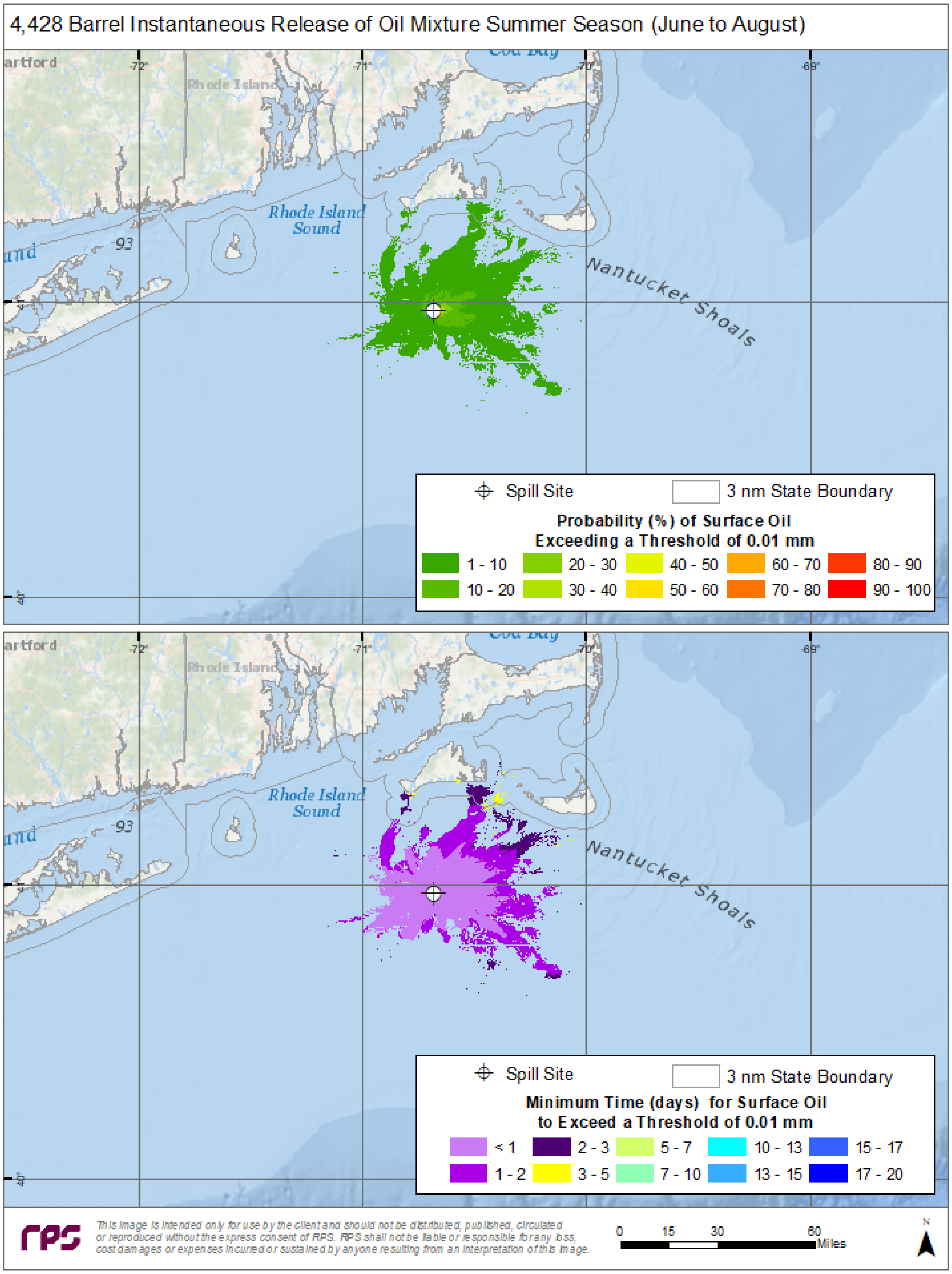


Figure 33. Detail View. Top Panel—Probability of surface oiling above a minimum thickness of 10 µm (10 g/m^2 on average over the grid cell) during summer months for an instantaneous release from the 1,200 MW Phase 2 ESP location. Bottom Panel—Minimum time for surface oiling to occur at thicknesses greater than 10 g/m^2.

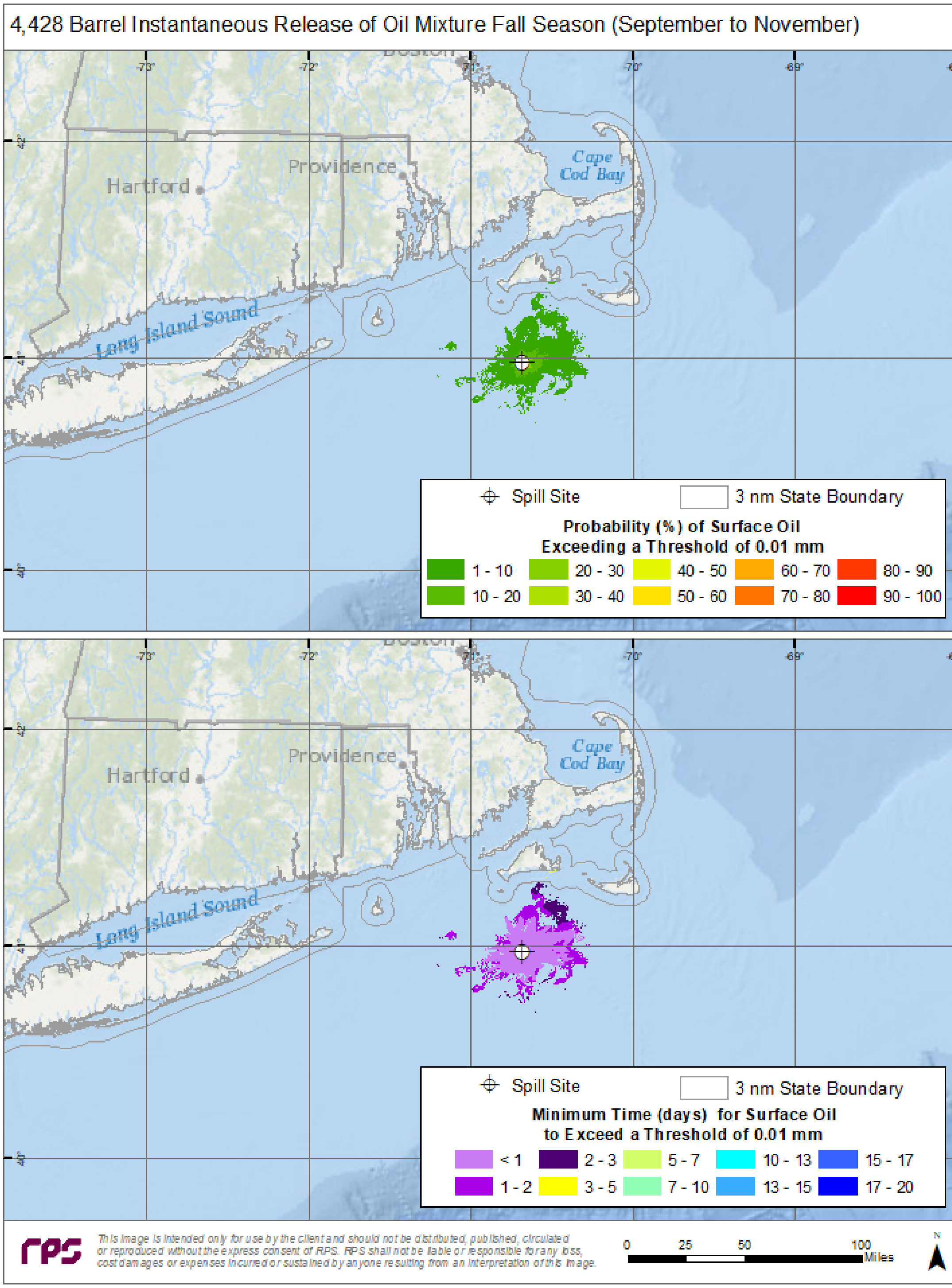


Figure 34. Top Panel—Probability of surface oiling above a minimum thickness of 10 µm (10 g/m^2 on average over the grid cell) during fall months for an instantaneous release from the 1,200 MW Phase 2 ESP location. Bottom Panel—Minimum time for surface oiling to occur at thicknesses greater than 10 g/m^2.

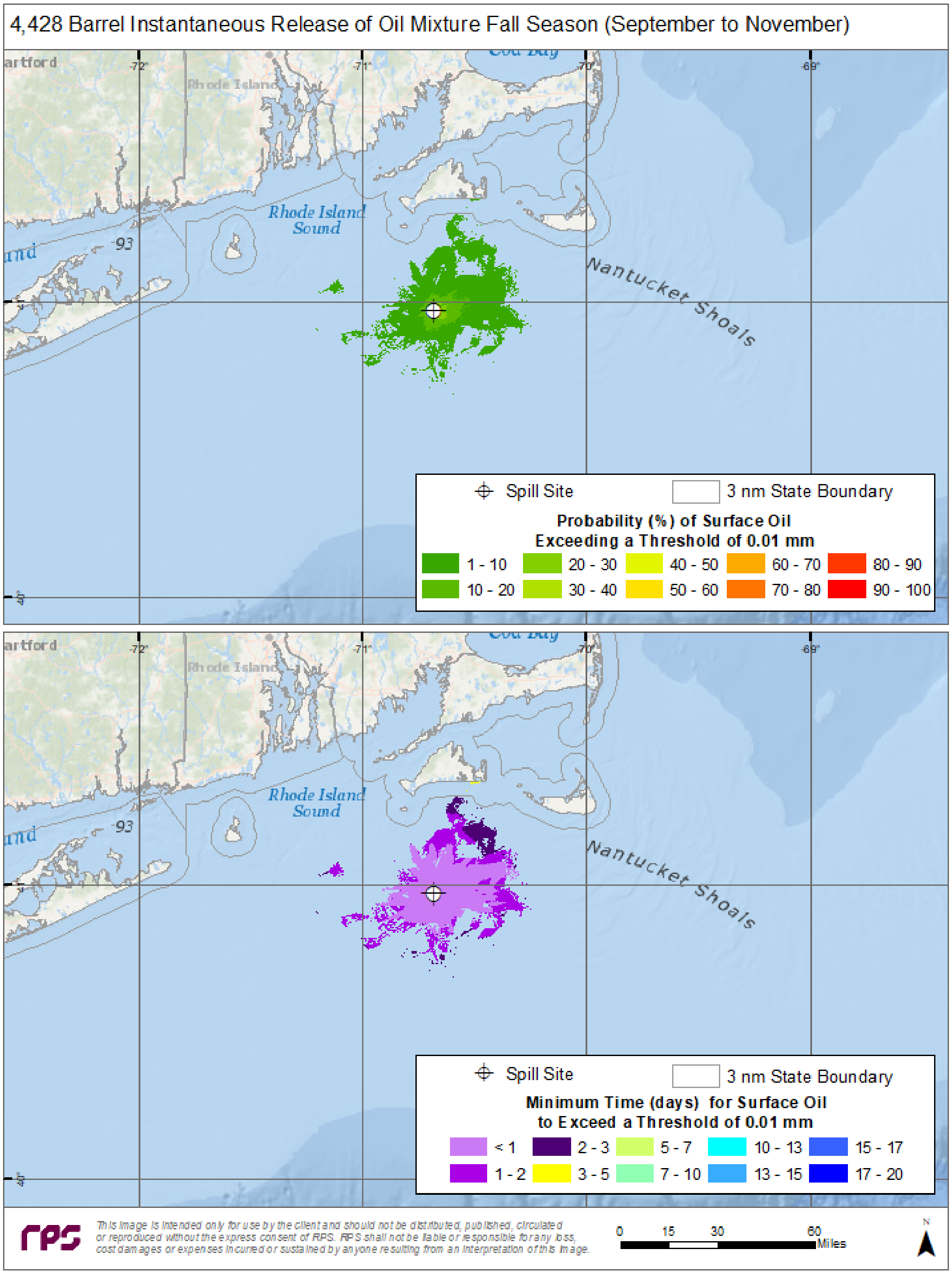


Figure 35. Detail View. Top Panel—Probability of surface oiling above a minimum thickness of 10 µm (10 g/m² on average over the grid cell) during fall months for an instantaneous release from the 1,200 MW Phase 2 ESP location. Bottom Panel—Minimum time for surface oiling to occur at thicknesses greater than 10 g/m².

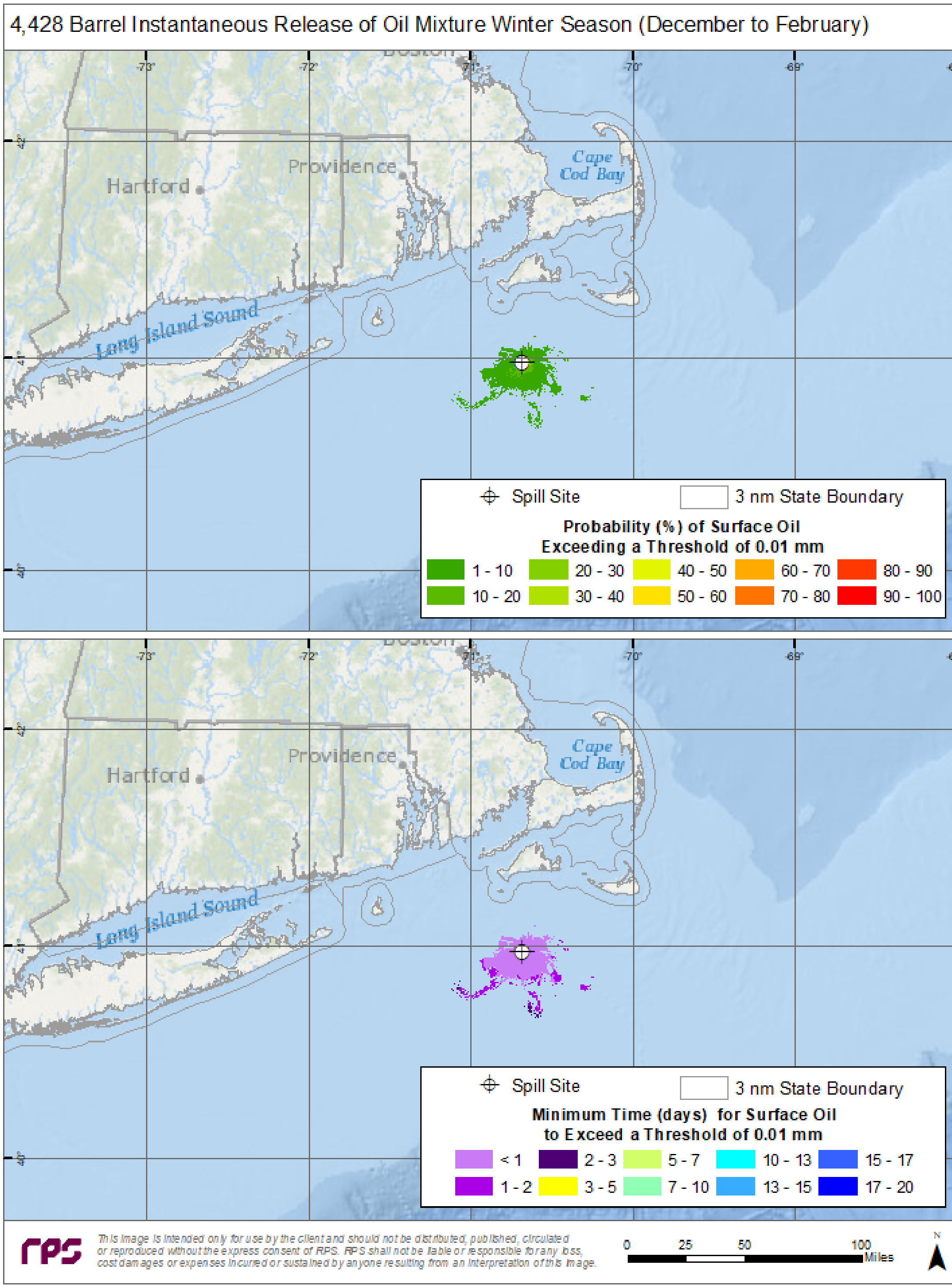


Figure 36. Top Panel—Probability of surface oiling above a minimum thickness of 10 µm (10 g/m^2 on average over the grid cell) during winter months for an instantaneous release from the 1,200 MW Phase 2 ESP location. Bottom Panel—Minimum time for surface oiling to occur at thicknesses greater than 10 g/m^2.

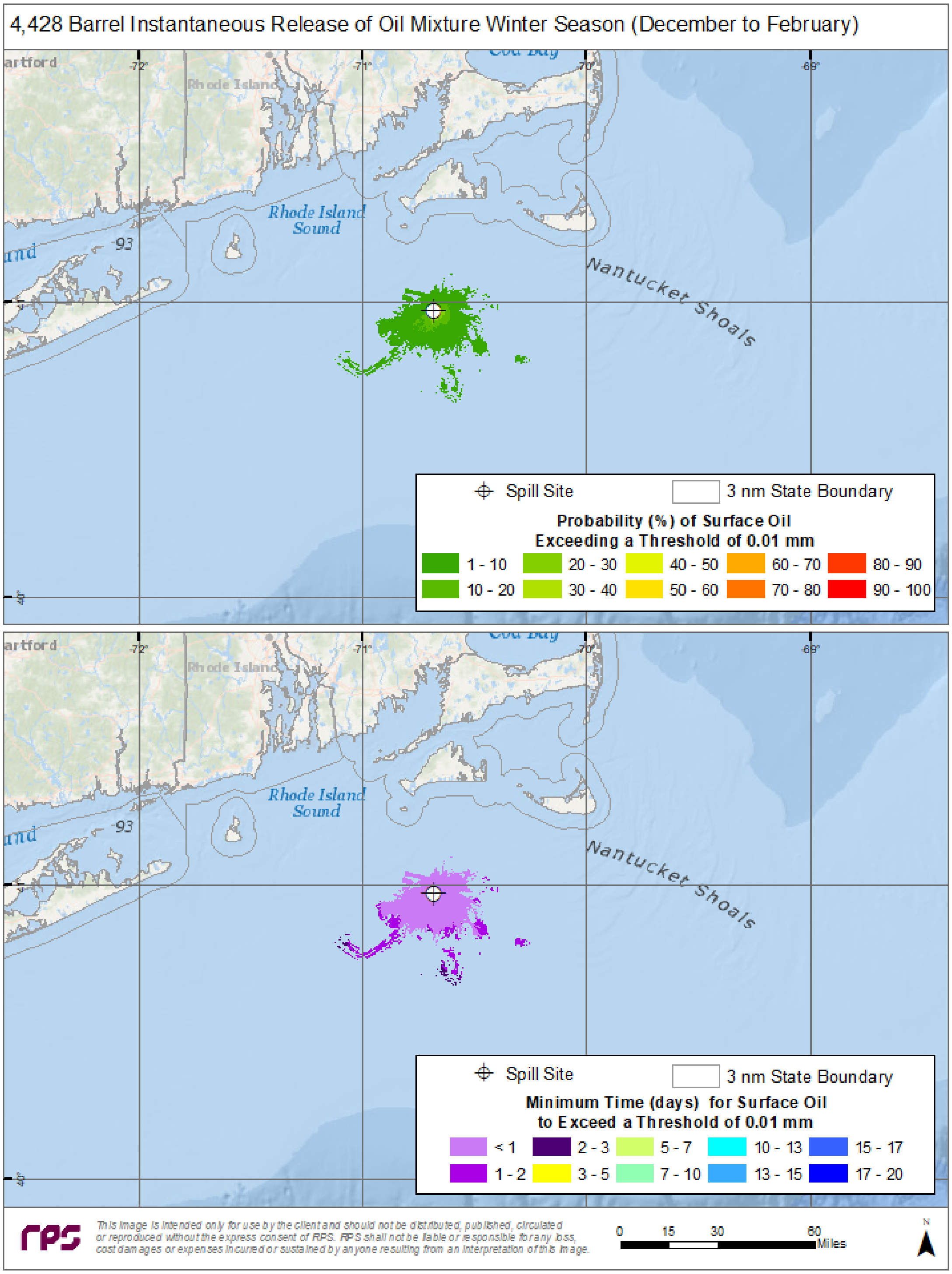


Figure 37. Detail View. Top Panel—Probability of surface oiling above a minimum thickness of 10 µm (10 g/m^2 on average over the grid cell) during winter months for an instantaneous release from the 1,200 MW Phase 2 ESP location. Bottom Panel—Minimum time for surface oiling to occur at thicknesses greater than 10 g/m^2.

4.2.2 Oil Contamination to Shore

The following figures illustrate the results of oil contamination to the shoreline for the worst case oil spill scenarios over each season at the 1,200 MW Phase 2 spill location. Figure 38 to Figure 41 indicate that, in all seasons, there is a 1–40% probability that oil above a minimum thickness of 100 µm (100 g/m^2 on average over the grid cell) released from the 1,200 MW Phase 2 ESP location would reach the shorelines of Martha's Vineyard and Nantucket within a minimum of one to three days of the release. There is a lower probability (less than 20%) of oil above the threshold reaching the shorelines of Rhode Island and Massachusetts in two or more days following the release. There is also a relatively small (less than 10%) probability for shoreline contamination to occur above 100g/m^2 along the shorelines of Long Island and Connecticut in all seasons expect winter; however, the timing for this to happen is longer (less than five days) in most cases and would likely be largely mitigated with response measures.

The spring scenarios are expected to have the largest spatial extent of shoreline oiling due to the prevailing winds and currents during that season. It is important to note again that these scenarios are very conservative and do not include the use of oil spill response equipment which the Proponent would implement in the case of a spill. The details of this planned response are contained in the OSRP.

As described above and shown in Figure 17, the differences in the footprint for the surface and shoreline oil contamination are a result of the surface oil less than 100 µm (100 g/m^2 on average over the grid cell) traveling farther distances and beginning to accumulate on shore. It is important to note that oil contamination to the shoreline has a cumulative effect over an individual run, since oil that hits the shoreline is stranded there, and more oil can accumulate.

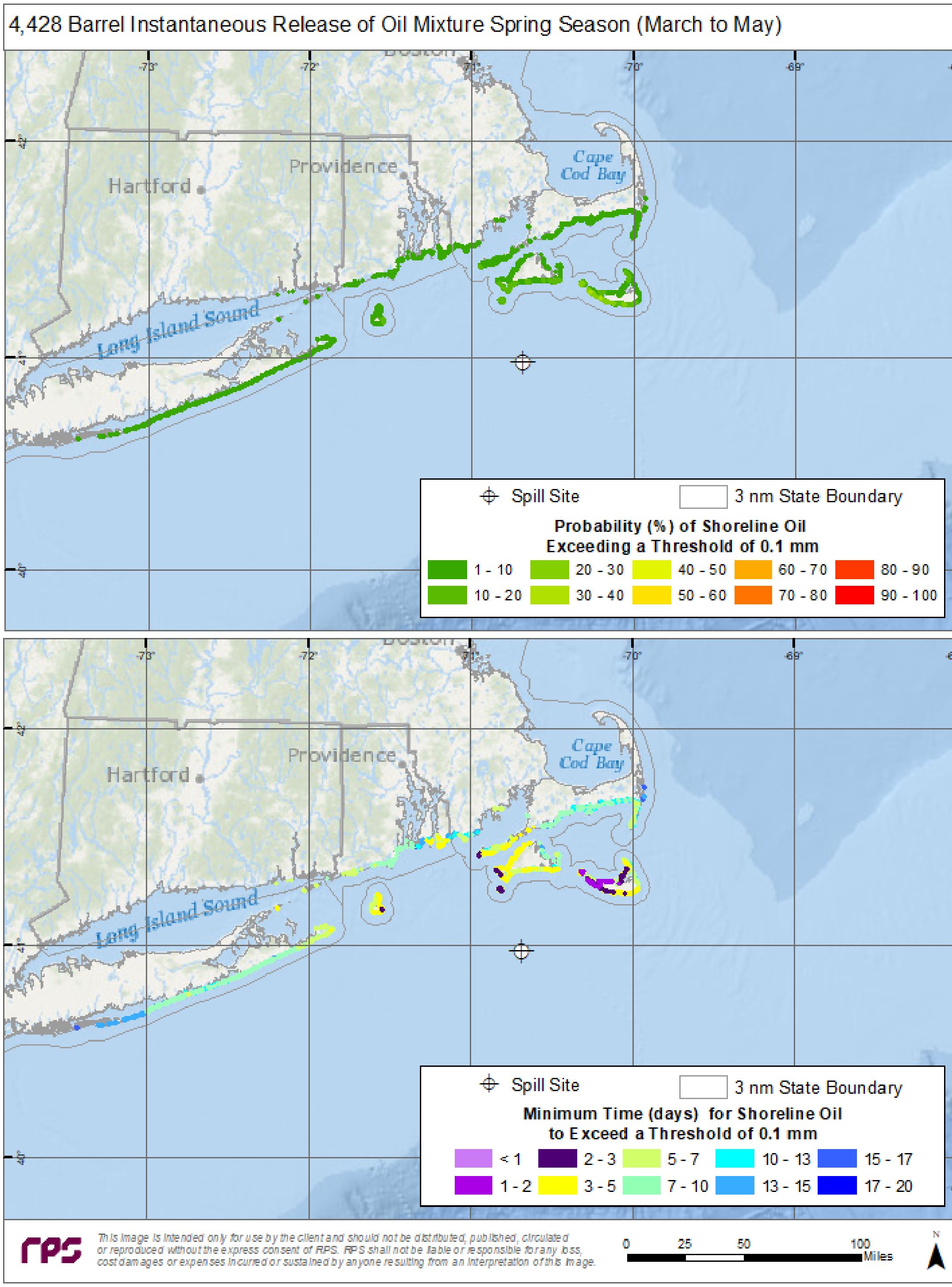


Figure 38. Top Panel—Probability of shoreline oiling above a minimum thickness of 100 µm (100 g/m² on average over the grid cell) during spring months for an instantaneous release from the 1,200 MW Phase 2 ESP location. Bottom Panel—Minimum time for shoreline oiling to occur at thicknesses greater than 100 g/m².

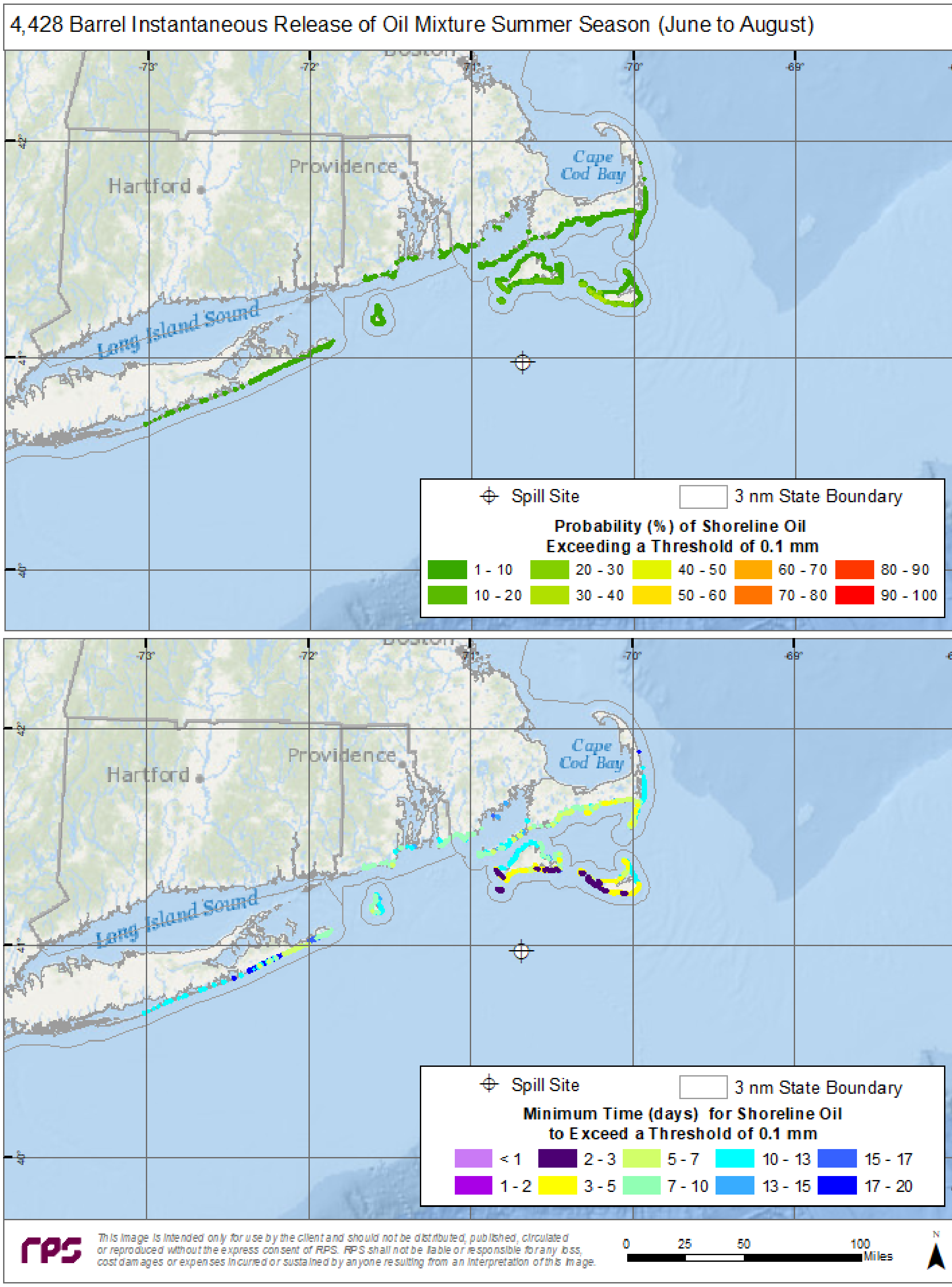


Figure 39. Top Panel—Probability of shoreline oiling above a minimum thickness of 100 µm (100 g/m^2 on average over the grid cell) during summer months for an instantaneous release from the 1,200 MW Phase 2 ESP location. Bottom Panel—Minimum time for shoreline oiling to occur at thicknesses greater than 100 g/m^2.

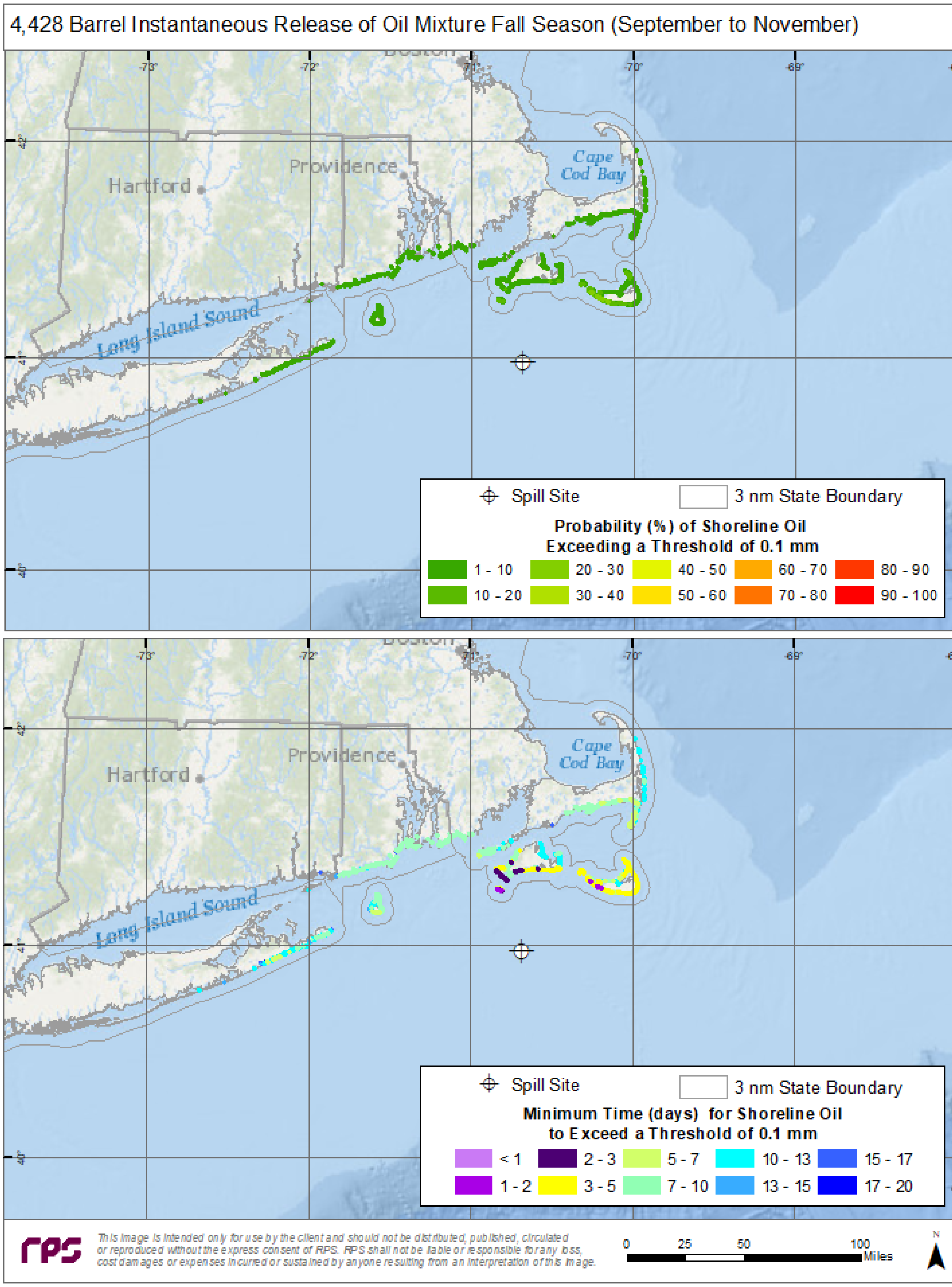


Figure 40. Top Panel—Probability of shoreline oiling above a minimum thickness of 100 µm (100 g/m^2 on average over the grid cell) during fall months for an instantaneous release from the 1,200 MW Phase 2 ESP location. Bottom Panel—Minimum time for shoreline oiling to occur at thicknesses greater than 100 g/m^2.

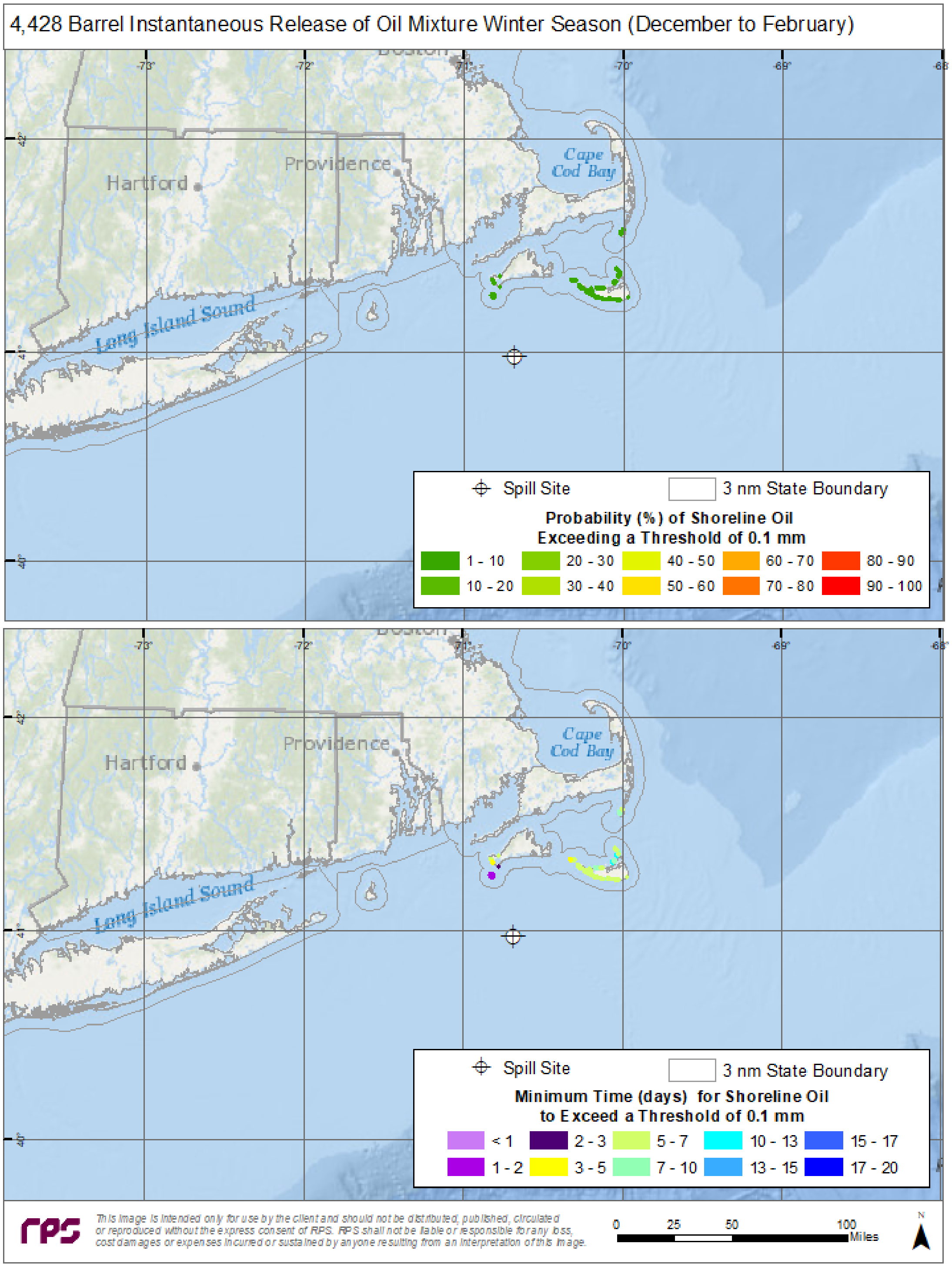


Figure 41. Top Panel—Probability of shoreline oiling above a minimum thickness of 100 µm (100 g/m^2 on average over the grid cell) during winter months for an instantaneous release from the 1,200 MW Phase 2 ESP location. Bottom Panel—Minimum time for shoreline oiling to occur at thicknesses greater than 100 g/m^2.

4.3 Conclusions

This oil spill modeling study assesses the trajectory and weathering of a catastrophic release of all oil contents from the topple of an ESP located closest to shore within the SWDA for two different scenarios: an 804 MW ESP in Phase 1 and a 1,200 MW ESP in Phase 2. These are the most conservative (i.e., highest) discharge volumes from each Phase. Each of the scenarios simulate worst case discharges with an extremely small probability of such a catastrophic event occurring. In addition to the low probability of such events, the oil spill scenarios modeled in this study are for relatively small volumes compared to container vessel releases or oil well platforms. The scenarios also assume that no oil spill response or mitigation would occur, which is a very conservative assumption and would not happen in practice. As discussed in further detail in Section 2.3.4 of the OSRP (See COP Appendix I-A), in the event of a spill, response equipment employed on water would be used to prevent the spread of a spill, contain the oil to as small an area as possible, and protect sensitive areas before they are impacted.

Based on the environmental datasets analyzed as input for the oil spill modeling, the following conclusions can be drawn:

- Winds in the region are moderate, generally blowing from the northwest (winter) or southwest sector (summer) with monthly average wind speeds ranging from 6–10 m/s (13–22 mph). The strongest winds are found in December and January, and the weakest winds are in August.
- Average currents at the spill site flow up to approximately 19 cm/s (0.6 ft/s), with a predominant east/east-southeastward and west/west-southwestward direction.
- Wind drift is the primary agent of surface transport throughout the year in the region of the SWDA.

Based on the results of the stochastic spill trajectory analysis assessing potential spills of all oil contents of one ESP located closest to shore in each Phase, the following conclusions can be made:

- The sea surface area exposed to oil exceeding the 10 g/m^2 threshold is predicted to be contained within a radius up to 54 km (34 mi) of the 804 MW Phase 1 ESP spill location, up to 80.5 km (50 mi) of the 1,200 MW Phase 2 ESP spill location, and up to 73 km (45 mi) for all four seasons. The stochastic footprint of exposed surface waters was smallest for the winter simulation, likely due to increased winds and surface waves that enhanced vertical entrainment into the water column.
- In all seasons for each of the sites, there is a 1–40% probability of oil above a minimum thickness of 100 µm (100 g/m^2 on average over the grid cell) reaching the shorelines of Martha’s Vineyard and Nantucket within a minimum of one to three days from release. There is a lower probability (less than 20%) of oil above the threshold reaching the shorelines of Rhode Island and Massachusetts less than 2 days following the release. There is the relatively small (less than 10%) potential for shoreline contamination to occur above 100 g/m^2 on parts of Long Island and Connecticut; however, the elapsed time for this to happen is much longer (greater than 10 days) in most cases and would likely be largely mitigated with response measures.

As noted, the stochastic spill trajectory analysis conservatively assesses a catastrophic release of all oil contents from a Phase 1 or Phase 2 ESP located closest to shore and does not consider mitigation measures. In the unlikely event of a worst case discharge, the Proponent plans to employ response equipment on water to prevent the spread of the spill, contain the oil to as small an area as possible, and protect sensitive areas before they are impacted (See COP Appendix I-A). Therefore, any potential impacts from an oil release are likely to be less than predicted by the conservative worst case discharge scenario.

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Appendix A – Oil Spill Modeling System - Description

OILMAP/SIMAP Introduction

OILMAP and SIMAP are part of RPS' comprehensive oil spill modeling system comprised of several interactive modules to reproduce the transport and fate of oil releases in different environments: land, water, and atmosphere. The impact assessment module – SIMAP – was derived from the physical fates and biological effects submodels in the Natural Resource Damage Assessment Models for Coastal and Marine and Great Lakes Environments (NRDAM/CME and NRDAM/GLE), which were developed for the U.S. Department of the Interior (USDOI) as the basis of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) Natural Resource Damage Assessment (NRDA) regulations for Type A assessments (French et al., 1996; Reed et al., 1996). The physical fates model has been validated with more than 20 case histories, including the *Exxon Valdez* and other large spills (French McCay, 2003, 2004; French McCay and Rowe, 2004), and test spills designed to verify the model's transport algorithms (French et al., 1997). The wildlife mortality model has also been validated with more than 20 case histories, including the *Exxon Valdez*, that verify the values are reasonable (French and Rines, 1997; French McCay 2003, 2004; French McCay and Rowe, 2004). The technical documentation for SIMAP is in French McCay (2003, 2004, 2009).

Applications for OILMAP/SIMAP include impact assessment; hindcast/forecast of spill response; Natural Resource Damage Assessment (NRDA); contingency planning; ecological risk assessment; cost-benefit analysis, and drills and education. The model may be run for a hindcast/forecast of a specific release, or be used in stochastic mode to evaluate the probable distribution of contamination.

OILMAP/SIMAP contains several major components:

- The physical fates model estimates surface distribution and subsurface concentrations of the spilled oil and its components over time.
- The biological effects model estimates impacts resulting from a spill scenario on fish, invertebrates, wildlife, and for each of a series of habitats (environments) affected by the spill.
- The probability of impact from an oil discharge is quantified using the 3-D stochastic model.
- Currents that transport contaminant(s) and organisms are entered using the graphical user interface or generated using a (separate) hydrodynamic model. Alternatively, existing current data sets may be imported.
- Environmental, chemical, and biological databases supply required information to the model for computation of fates and effects.
- The user supplies information about the spill (time, place, oil type, and amount spilled) and some limited environmental conditions at the time (such as temperature and wind data).

As with RPS' other modeling systems, OILMAP/SIMAP is easily applied to a wide variety of conditions. It is set up and runs within RPS' standard Geographic Information System (GIS) or ESRI's ArcView GIS, and can be applied to any aquatic environment (fresh or salt) in the world. It uses any of a variety of hydrodynamic data file formats (1-, 2- and 3-dimensional; time varying or constant) and allows 2-D vertically-averaged current files to be created within the program system when modeled currents are not available. Outputs include easily interpreted visual displays of dissolved and particulate concentrations and trajectories over time, as appropriate to the properties of the chemical being simulated. An optional biological exposure model is available to evaluate areas and volumes exposed above concentrations of concern and to predict the impacts on exposed fish and wildlife.

OILMAP/SIMAP specifically simulates the following processes:

- initial plume dynamics;
- slick spreading, transport, and entrainment of floating oil;
- evaporation and volatilization (to atmosphere);
- transport and dispersion of entrained oil and dissolved aromatics in the water column;
- dissolution and adsorption of entrained oil and dissolved aromatics to suspended sediments;
- sedimentation and re-suspension;
- natural degradation
- shoreline entrainment, and
- boom and dispersant effectiveness.

The physical and biological models require environmental, oil and biological data as inputs. One of RPS' strengths is the ability to synthesize data from disparate sources. The data come from many sources including government and private data services, field studies and research. Modeling techniques are used to fill in "holes" in the observational data, thus allowing complete specification of needed data. The environmental database is geographical, including data of the following types: coastline, bathymetry, shoreline type, ecological habitat type, and temporally varying ice coverage and temperature. This information is stored in the simplified geographic information system. The chemical database includes physical-chemical parameters for a wide variety of oils and petroleum products. Data have been compiled by RPS from existing, but diffuse, sources.

An oil spill is simulated using site-specific wind, current, and other environmental data gathered from existing information, on-line services, and/or field studies. Shoreline and habitat types, as well as bathymetry, are mapped and gridded for use as model input. The physical, chemical, and toxicological properties of the spilled oil are provided by the oil database or updated to the specific conditions of the release. The model estimates the fate of the oil over time. The model outputs are time-varying concentrations and mass per unit area on surfaces (i.e., water surface, shoreline, sediments), which quantifies exposure to aquatic biota and habitats. Atmospheric loading in space and time is also computed, and provides input to air dispersion models.

Decay / Degradation Processes

Degradation, also known as decay, is the result of several processes in the water column and sea surface. Decay represents both biodegradation and photolysis. Photolysis is a chemical breakdown process energized by ultraviolet light from the sun as it penetrates the oceans sea surface layer. Biodegradation occurs when microbes metabolize oil as a carbon source, producing carbon dioxide and water as by-products. The biodegradable portion of various crude oils can vary, ranging from 11% to 90% (NRC, 1985). Not all types of organisms utilize the same oil components, nor are all types of organisms present in all locations.

In the RPS oil spill model, degradation is applied to all oil components present in the sea surface, shoreline, and in the water column. The degradation rate captures all degradation processes (e.g., photolysis and biodegradation) and is calculated for each environmental compartment. Degradation rates are constant throughout the simulation and based on empirical evidence. Oil degradation rates in OILMAP's oil database are based on French et al., 1996. The following table lists the different degradation rates used in this modeling study for each compartment, expressed in day^{-1}. It should be noted that these rates are being re-evaluated based on new findings in particular for the water column; however, the rates used in this study can be considered conservative (i.e., slightly underestimating decay in the water column).

Table A-1. Oil Decay rates used in OILMAP for each marine compartment and oil components (THC range).

Environmental Compartment	Oil exposed to air (surface (0-1m), shoreline)	Oil in water column	Oil in sediments
Daily Decay Rate (1/day)	0.001	0.240 – THC1 (1-180 C) 0.078 – THC2 (180-265 C) 0.042 – THC3 (265-380C) 0.01 – Residual oil	0.001

Model Uncertainty / Limitations

The model has been developed over many years to include as much information as possible to simulate the fates and effects of oil spills. However, as in all science, there are significant gaps in knowledge and the ability to simulate the detailed behavior of organisms and ecosystems. Typically, assumptions based on available scientific information and professional judgment are made in the development of the model, which represent our best assessment of the processes and potential mechanisms for effects (consequences) that would result from oil spills.

The major sources of uncertainty in the oil fates and biological effects model are:

- Oil contains thousands of chemicals of varying physical and chemical properties that determine their fate in the environment. In addition, those chemicals (their properties) change over time. The model must treat the oil as a mixture of a limited number of hydrocarbon components, grouping chemicals by physical-chemical properties.
- The fates model contains a series of algorithms that are simplifications of complex physical-chemical processes. These processes are understood to varying degrees, but can dramatically vary depending on the environmental conditions (e.g., cold vs warm waters).
- Organisms are assumed uniformly distributed in affected habitats they occupy for the duration of the spill simulation. The accuracy of this assumption varies between organisms, but the objective is to assess potential effects for an average-expected condition, which is what this assumption most closely resembles.
- Biological effects are quantified based on acute exposure and toxicity of contaminant concentrations as a function of degree and duration of exposure. The SIMAP model used is not designed to address long-term, chronic exposure to pollutants.
- The model treats each spill as an isolated pollution event and does not account for any potential cumulative effects.
- Various physical / environmental parameters including river flow, depth / sea bottom roughness, total suspended solids concentration, etc. were not sampled extensively at each location of the extended domain (hundreds of square kilometers). What limited data that did exist was applied to each location, leading to a certain degree of homogenization of the environmental (marine/coastal) conditions.

In addition, in any given oil spill, the fates and effects will be highly related to the specific environmental conditions, the precise locations of organisms, and a myriad of details related to the event. Thus, the results are a function of the scenarios simulated and the accuracy of the input data used. The goal of this study was not to capture every detail that could potentially occur, but to describe the range of possible consequences so that an informed analysis could be made as to the likely effects of spills under various scenarios. The model inputs are designed to provide representative conditions to such an analysis. Thus, the modeling is used to provide quantitative guidance in the analysis of the spill scenarios being considered.

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