

Block Island Transmission System Wood River Alternative Critical Issues Analysis

Prepared for



Prepared by



160 Federal Street, 3rd Floor
Boston, MA 02110

January 2012

EXECUTIVE SUMMARY

Tetra Tech EC, Inc. (Tetra Tech) has prepared this Critical Issues Analysis (CIA) for Deepwater Wind Block Island Transmission, LLC (Deepwater) to support the siting and development of the Block Island Transmission System (BITS). The BITS is a proposed 34.5 kilovolt (kV) alternating current (AC) bi-directional submarine transmission cable from Block Island to the Rhode Island mainland. In connection with BITS, Deepwater Wind Block Island, LLC proposes to develop the Block Island Wind Farm (BIWF), an approximately 30 megawatt (MW) offshore wind farm located approximately 3 miles southeast of Block Island, Rhode Island. The BITS will serve two purposes: (1) exporting excess power from the proposed BIWF to the mainland, and (2) supplying electrical power from the existing transmission grid on the Rhode Island mainland to Block Island.

The purpose of the CIA is to evaluate existing offshore, coastal, and onshore resources, features, and uses that may preclude, constrain, or otherwise affect routing of a transmission line. Critical issues include exclusionary spatial constraints that preclude transmission line siting and environmental resources that do not preclude siting but may be affected by the Project and result in delays in permitting or increases in cost and, therefore, should be avoided to the extent possible and addressed early in project planning.

This CIA evaluates the proposed Wood River alternative for connecting the BITS line from Block Island to the mainland. The Wood River alternative consists of approximately 15 miles of submerged cable and approximately 10 miles of upland cable, with a landfall near the Charlestown Town Beach. Tetra Tech has identified several environmental constraints that present significant challenges for the permitting schedule, community acceptance, and costs related to environmental surveys and mitigation. Tetra Tech has provided recommendations for addressing these issues; however, some critical issues may be difficult to resolve and other route options should be considered.

Available benthic mapping suggests that the substrate along the portion of the route within state waters off of Charlestown consists of bedrock close to the surface. An HDD to the landfall location may be challenging due to hard substrate that extends several miles into state waters. Agencies and the fishing community will express concern at other forms of installation due to the high quality lobster habitat that coincides with this substrate.

The coastal and onshore portions of the route present the greatest environmental and permitting challenges. The prevalence of biological resources and conservation areas in the vicinity of the Wood River alternative limit routing options to the Wood River substation through the salt pond region of Rhode Island. Agencies and conservation groups may request that the entire extent of the 10-mile upland route be buried underground. Potentially costly avoidance, minimization, and restoration measures would be necessary to address impacts to the natural resources within the salt pond region. The Narragansett Tribe land interests in Charlestown suggest an increased archaeological sensitivity in the area. Additionally, the route traverses densely populated residential areas.

Table ES-1 summarizes the environmental issues that have been identified in this CIA by potential to affect project cost, schedule, and overall feasibility and provides recommendations for addressing each issue.

Table ES-1. Summary of Critical Issues and Recommendations

Critical Issue	Findings	Recommendation
Potential Critical Issues		
Substrate Conditions and Benthic Habitat	Bedrock close to the surface in several locations. The hard substrate coincides with high quality benthic phase lobster habitat.	A HDD may be infeasible in some areas due to bedrock. Conduct geophysical and geotechnical studies to determine substrate conditions and extent of hard substrate. Consult with CRMC and RIDEM to identify lobster fishery concerns and the restoration and mitigation efforts that would be required.
Submerged Aquatic Vegetation	SAV present in salt ponds near cable landing.	Avoid disturbance to salt ponds where SAV is present, which significantly limits viable options for landfall and crossing from the barrier beach to the upland area.
Contaminated Sediments	North Cape tank barge spill occurred directly east of cable landfall location. Potential for contaminated sediments unknown.	Sediment analysis required to determine level of contamination. Viability of traversing the area is dependent on the results of the sediment analysis.
Rhode Island Salt Pond Region	Salt Ponds are ecologically sensitive areas that are located along the southern Rhode Island coast, limiting viable land fall locations. Route near the Salt Ponds requires additional level of permitting in accordance with the Salt Pond Special Area Management Plan. Disturbance during construction would require outreach to organizations interested in preserving and restoring the Salt Ponds and may require costly mitigation.	Avoid disturbance to salt ponds, which significantly limits viable options for landfall and crossing from the barrier beach to the upland area.
Cultural Resources and Tribal Interests	Onshore route traverses areas of potential high sensitivity for traditional cultural properties.	Further consultation with the Narragansett THPO is required to determine which portions of the route they consider to be of low, moderate, and high sensitivity. Field testing would then be required to determine presence or absence of tribal artifacts.
Issues of Concern		
Conservation Lands	Route follows public rights-of-way; however, several conservation areas are present near the route.	Conduct outreach to organizations with conservation interest in the vicinity of the route. Bury cable underground to address wildlife issues.
National Wildlife Refuges and State Wildlife Management Areas	Route follows public rights-of-way; however several habitat areas are present near the route.	Conduct outreach to organizations with conservation interest in the vicinity of the route. Bury cable underground to address wildlife concerns.

Table ES-1. Summary of Critical Issues and Recommendations

Critical Issue	Findings	Recommendation
Scenic Areas	Proposed route would cross the Post Road Scenic Byway and designated scenic area.	Bury cable underground to address visual impact concerns.
Other Issues for Consideration and Coordination		
Existing Pipelines, Cables, and Obstructions	Proposed route would cross one telecommunications cable. Avoids mapped shipwrecks, disposal sites, and other underwater obstructions.	A cable crossing agreement would be required for one crossing.
Vessel Traffic Lanes	Proposed route crosses designated fairway.	Careful coordination and notification to USCG required during construction to ensure vessel safety within designated fairway.
Residential Development	Cable landing and onshore route in densely populated area.	Evaluate extent of existing utilities within right-of-way. Conduct outreach to local community.
Glacial Moraine	Glacial moraines are designated as Areas of Particular Concern. Offshore portion of the route does not cross any areas designated as glacial moraines.	No recommended action.

TABLE OF CONTENTS

1.0 INTRODUCTION	1
2.0 METHODOLOGY	2
3.0 RESULTS	3
3.1 Offshore and Coastal Constraints.....	3
3.2 Onshore Constraints	5
4.0 CONCLUSIONS AND RECOMMENDATIONS	8
5.0 REFERENCES.....	9

TABLES

Table ES-1.	Summary of Critical Issues and Recommendations	ES-2
Table 1.	Project Siting Constraints	2

FIGURES

Figure 1.	Project Area
Figure 2.	Offshore Constraints
Figure 3.	Coastal and Onshore Constraints
Figure 4.	Landing Constraints
Figure 5.	Landing Aerial

1.0 INTRODUCTION

Tetra Tech EC, Inc. (Tetra Tech) has prepared this Critical Issues Analysis (CIA) for Deepwater Wind Block Island Transmission, LLC (Deepwater) to support the siting and development of the Block Island Transmission System (BITS). The BITS is a proposed 34.5 kilovolt (kV) alternating current (AC) bi-directional submarine transmission cable from Block Island to the Rhode Island mainland. In connection with BITS, Deepwater Wind Block Island, LLC proposes to develop the Block Island Wind Farm (BIWF), an approximately 30 megawatt (MW) offshore wind farm located approximately 3 miles southeast of Block Island, Rhode Island. The BITS will serve two purposes: (1) exporting excess power from the proposed BIWF to the mainland, and (2) supplying electrical power from the existing transmission grid on the Rhode Island mainland to Block Island.

The purpose of the CIA is to evaluate existing offshore, coastal, and onshore resources, features, and uses that may preclude, constrain, or otherwise affect routing of a transmission line. Critical issues include exclusionary spatial constraints that preclude transmission line siting and environmental resources that do not preclude siting but may be affected by the Project and result in delays in permitting or increases in cost and, therefore, should be avoided to the extent possible and addressed early in project planning.

This CIA evaluates the proposed Wood River alternative for connecting the BITS line from Block Island to the mainland (**Figure 1**). The Wood River alternative consists of approximately 15 miles of submerged cable and approximately 10 miles of upland cable, with a landfall near the Charlestown Town Beach.

2.0 METHODOLOGY

The CIA consists of constraints mapping and literature review. A route walkover was not conducted for the proposed route to inspect existing utilities and site conditions. Tetra Tech evaluated the proposed route based on readily available spatial data regarding coastal and offshore environmental constraints. The constraints data consists of publicly available Geographic Information System (GIS) onshore and offshore environmental data obtained primarily from NOAA's ArcIMS Web Feature Services, U.S. Geological Survey (USGS), GEODAS Design-a-Grid (Bathymetry), and ESRI 9.3 Data that Tetra Tech has worked with extensively in the past. State-level data was compiled from available state GIS sources, such as the Rhode Island SAMP and RIGIS databases. **Table 1** lists typical siting constraints applicable to an offshore transmission cable.

Table 1. Project Siting Constraints

Offshore Siting Constraints	
Obstructions	UXO areas
Known shipwreck locations	Dredge Areas
Transmission cables	USACE Sand Borrow areas
Communications cables	Shoals
Pipelines	Reefs
Fairways and shipping lanes	Artificial reefs
Precautionary areas	Flyways
Anchorage areas	Fish Havens
Dumpsites	Established Fishing Areas
Marinas	Aquaculture Facilities
Beacons and buoys	USFWS Significant Water Habitat
Recreational areas	Marine Protected Areas
Military practice areas	Critical/Essential Fish Habitats
Typical Coastal and Onshore Siting Constraints	
Federal lands	National Wildlife Refuges
State lands	Wild and Scenic Rivers
Estuaries	Sensitive Scenic Vistas
Parks (National, State, Local)	National Register of Historic Places sites and structures
National Wetland Inventory	Roads
Wildlife Management Areas	Cities
Wilderness Areas	Substations

3.0 RESULTS

Section 3.0 summarizes the results of the constraints mapping and literature review and discusses the potential critical issues for the Wood River alternative. Recommendations for addressing the identified critical issues are provided in Section 4.0.

3.1 Offshore and Coastal Constraints

The offshore portion of the Wood River alternative traverses approximately 15 miles of submerged lands through federal and state territorial waters. The route originates from a proposed substation location on the eastern end of Block Island and makes landfall in Charlestown, Rhode Island between Ninigret Pond and Green Hill Pond (**Figure 1**).

3.1.1 Potential Critical Issues

Substrate Conditions and Benthic Habitat

The offshore approach to the cable landing is located near an area of cobble-gravel pavement. The mapped area extends along the shoreline off of Trustom Pond and Cards Pond in South Kingston to the east of the proposed landfall location (Carey personal communication 2009a; Boothroyd et al 2007; not depicted on figures). The subsurface within the state waters off of this part of the Rhode Island coast is a mix of stratified material and interbedded till, with bedrock close to the surface in several locations. **An HDD may not be feasible** where the hard substrate is close to the surface and extends over 2 miles offshore. In addition to presenting cable installation challenges, the **benthic habitat that coincides with these substrate conditions is considered high quality benthic phase lobster habitat** (Carey personal communication 2009b) which would present significant challenges during permitting and construction. A cable placement in this habitat could disturb the cobble bottom and be difficult to restore because it is not an active mobile bed but rather a pavement of gravel and cobbles that move during large storms but otherwise provide protection for juvenile lobsters.

Submerged Aquatic Vegetation

The route does not cross mapped areas of submerged aquatic vegetation (SAV). Eelgrass in particular is of conservation concern to state and federal agencies. While the offshore approach to the cable landfall is outside of mapped SAV, the portion of the Wood River route that crosses the narrow channel between Ninigret Pond and Green Hill Pond is along the bridge connecting the barrier beach to the rest of the mainland along Charlestown Beach Road. **The potential for SAV and other environmental permitting issues related to permitting a cable through the sensitive habitats of the salt ponds limits the viable crossing areas to that bridge.** Determining the feasibility of crossing along the bridge would require a field visit and assessment of the existing structure.

Contaminated Sediments

The area directly east of the cable landfall location is the site of the 1996 North Cape tank barge spill at Moonstone Beach. The grounding of the North Cape tank barge and the tug Scandia after the tug caught fire resulted in a spill of an estimated 828,000 gallons of home heating oil into Block Island

Sound and surrounding tidal waters (NOAA *et al* 2002). **Figure 3** indicates that both Ninigret Pond and Green Hill Pond have been mapped by the NOAA National Ocean Service Office of Response and Restoration, Hazardous Materials Response Division to support oil spill planning and response. According to the RI Ocean SAMP, the oil was a relatively light and readily aerosolized petrochemical that moved in a plume east toward Point Judith. The potential for contaminated sediments near the proposed landfall exists and the hydrocarbon concentrations within the sediments is currently unknown (RI Ocean SAMP 2011). A sediment analysis would be required to determine the level of contamination. **Viability of traversing the area is dependent on the results of the sediment analysis.**

3.1.2 Other Issues for Consideration and Coordination

Existing Pipelines, Cables, and Obstructions

The U.S. Submarine Cable Act of 1888 (47 USC Chapter 2) prohibits damage to submarine telecommunications cables, intentional or accidental. Other cables that represent a constraint, primarily for turbine siting, are oceanic corridors designated for power cables and pipelines. The Wood River alternative would cross one telecommunications cable, identified as an AT&T cable in the RI Ocean SAMP. A cable crossing agreement would be required for crossing. The offshore cable route avoids other mapped shipwrecks, disposal sites, and other underwater obstructions.

Vessel Traffic Lanes

Shipping safety fairways (fairways) are lanes or corridors in which artificial islands or fixed structures, whether temporary or permanent, are not permitted (33 CFR 165,195[a]). A Traffic Separation Scheme (TSS) is an internationally recognized vessel routing designation which separates opposing flows of vessel traffic into lanes, including a zone between lanes where traffic is to be avoided (33 CFR 167.5). Vessels are not required to use any designated TSS, but failure to use one, if available, would be a major factor for determining liability in the event of a collision. Additionally, at the state level, the RI SAMP designates Areas of High Intensity Commercial Traffic, designated shipping lanes, recommended vessel routes, and ferry routes as Areas of Particular Concern. The Wood River alternative is located approximately 4 miles west of any designated TSS. The cable route would cross a designated fairway; however, the fairway route does not represent a siting constraint. Deepwater should coordinate closely with the USCG and plan to obtain USCG approvals for work in designated vessel traffic lanes prior to installation.

Glacial Moraines

The RI Ocean SAMP designates glacial moraines within the SAMP area as Areas of Particular Concern due to their importance as habitat areas for fish (and commercial and recreational fishing) and due to their relative structure permanence and structural complexity. Ocean SAMP policies require that offshore developments avoid Areas of Particular Concern or minimize and mitigate significant adverse impacts. While this designation applies more directly to wind turbines, these areas are more likely to contain sensitive benthic habitats. Impacts to these habitats would have to be evaluated and the results presented to the CRMC, RIDEM, and NOAA Fisheries. The Wood River alternative does not cross any areas designated as glacial moraines in the RI Ocean SAMP.

3.2 Onshore Constraints

The Wood River alternative makes landfall in Charlestown, Rhode Island at the barrier beach between Ninigret Pond and Green Hill Pond. This alternate would involve overhead or underground construction generally following existing road rights-of-way through the populated coastal areas for 10 miles to the Wood River substation. From the landfall location, the upland route follows Charlestown Beach Road north to Matunuck Schoolhouse Road (Route 1A) where the route turns west for approximately 1 mile before crossing Route 1 and heading north along Route 2/112 towards the existing transmission right-of-way. The last leg of the route follows an existing transmission right-of-way west to the Wood River substation. While the route follows existing road rights-of-way to a great extent, Tetra Tech has identified several environmental constraints near the cable landfall and onshore route.

3.2.1 Potential Critical Issues

Rhode Island Salt Pond Region

The cable would make landfall and begin the upland portion of the route between Ninigret Pond and Green Hill Pond. These saltwater ponds are two of several salt ponds enclosed by barrier beaches along the southern Rhode Island coast west of Point Judith in Charlestown, South Kingstown, Narragansett, and Westerly. The salt ponds are coastal lagoons (shallow and productive marine embayments separated by barrier spits) that provide important ecosystem and habitat functions, including prime habitat for commercial and recreational fin and shellfish, resting and feeding stops for waterfowl migrating along the Atlantic flyway, and support for variety of human uses (CRMC 1999; Sea Grant 2011a). Ninigret Pond has an average depth of 4.3 feet and Green Hill Pond has an average depth of 2.6 feet (Sea Grant 2011b) areas of mapped eelgrass occur within the salt ponds.

The Rhode Island Coastal Resources Management Council (CRMC) manages this region through the Salt Pond Region Special Area Management Plan (Salt Pond SAMP; CRMC 1999). Permitting a cable through this coastal region would require an additional level of permitting to demonstrate compliance with the Salt Pond SAMP compared to other coastal landfall locations not managed through a SAMP. The additional level of review would likely result in a longer permitting timeframe for the CRMC Assent and require additional avoidance, minimization, and mitigation measures. Because an HDD under the entire length of the salt ponds would present permitting challenges, the extent of these ponds along the southern Rhode Island coast west of Point Judith limits the areas available for a cable landfall in this area to narrow strips of developed land and beaches between the ponds. The sand dunes along the coastline further limit suitable areas for landfall. The Wood River alternative comes ashore in a limited area at the town beach to the west of a mapped sand dune (Figure 4).

Cultural Resources and Tribal Interests

Four sites listed on the National Register of Historic Properties occur within 0.5 mile of the proposed route: Fort Ninigret, District Schoolhouse Number 2, the Royal Indian Burial Ground, and the Joseph Jeffery House. A segment of the onshore portion of the Wood River route is adjacent to the Historic Village of the Narragansett Indian Tribe. While there are no official

reservation boundaries for the Tribe in Rhode Island, the Historic Village area to the west of Routes 2/112 is designated as a historic district (**Figure 3**). Additionally, in 1978 the Tribe settled with the State of Rhode Island for the return of 1,800 acres of undeveloped reservation lands, which are concentrated in Charlestown (Narragansett Tribe 2011). Proximity of the route to the historic Narragansett Tribal lands presents a significant critical issue for the viability of the route. Further consultation with the Narragansett Tribal Historic Preservation Officer (THPO) is required to determine which portions of the route they consider to be of low, moderate, and high sensitivity. Field testing would then be required to determine presence or absence of tribal artifacts.

3.2.2 Issues of Concern

Conservation Lands

Figures 2 and 3 show “Local Conservation Lands”, which are both municipal and non-governmental lands protected through fee simple ownership, conservation, or other restrictive easements, and “State Conservation Lands”, which are lands specifically protected by the State of Rhode Island through fee title ownership, conservation easement, or deed restriction (RIGIS 2010). The cable landfall would traverse through two properties designated as Town Beaches, owned by the Town of Charlestown. The upland portion of the route along Routes 2/112 is located along the eastern boundary of local conservation lands that also coincide with the Ninigret National Wildlife Refuge (NWR). Several properties within one-quarter mile to the east of the route are conservation lands pertaining to the Nature Conservancy, South County Conservancy, and the Beechwood Homeowners. The route west along the existing transmission right-of-way crosses the Carter Preserve, managed by the Nature Conservancy. The area around the Carter Preserve has also been evaluated as a Natural Heritage Area (RIGIS 1990).

Because the route follows public RIDOT or local rights-of-way, Deepwater Wind will have to negotiate right-of-way agreements with RIDOT and local governments and easements from the non-governmental organizations will not be necessary. However, these entities are likely to express interest in the BITS project, provide comments during permitting, and request that the cable be buried underground to avoid wildlife and visual impacts in these areas.

National Wildlife Refuges and State Wildlife Management Areas

The Ninigret National Wildlife Refuge (NWR) is a complex with land area along the Ninigret Salt Pond and further inland adjacent to the Wood River route. The Burlingame State Management Area is located to the west of the route (**Figure 3**). The Indian Cedar Swamp Management Area (not depicted) is also located to the west of the route adjacent to the Burlingame area. The prevalence of managed wildlife habitats and parks near the southern shore of Rhode Island present a constraint to finding alternate routes to the Wood River substation from a landing point at one of the barrier beaches in this area. Right-of-way agreements would be necessary from the federal and state management agencies to cross public lands.. The current route avoids these sensitive habits and parks. However, the proximity of these areas indicates that the managing entities are likely to express interest in the BITS project, provide comments during permitting, and request that the cable be buried underground to avoid wildlife impacts in these areas.

Scenic Areas

The Wood River upland cable route would cross the Post Road Scenic Byway, which coincides with approximately 7 miles of Route 1 from the South Kinston town line through Charlestown to the Westerly town line (RIDOT 2011). RIDOT would likely express concern over any overhead crossings of a scenic byway and require burial of the cable. Additionally, RIDEM has designated the entire barrier beach along Ninigret Pond as a scenic area (**Figure 3**).

3.2.3 Other Issues for Consideration and Coordination

Residential Development

The Wood River alternative would follow RIDOT rights-of-way through densely populated residential areas (**Figure 5**). These rights-of-way may already be congested with utilities and the local communities are likely to express concern during public meetings related to electromagnetic fields, disturbance during construction, and other issues related to a low-voltage transmission line.

4.0 CONCLUSIONS AND RECOMMENDATIONS

The offshore portion of the Wood River alternative avoids many of the mapped environmental constraints identified by Tetra Tech. The route would involve one cable crossing, which can be addressed through a cable crossing agreement with the cable operator. Available benthic mapping suggests that the substrate along the portion of the route within state waters off of Charlestown consists of bedrock close to the surface. An HDD to the landfall location may be challenging due to hard substrate that extends several miles into state waters. Agencies and the fishing community will express concern at other forms of installation due to the high quality lobster habitat that coincides with this substrate.

The coastal and onshore portions of the route present the greatest environmental and permitting challenges. The prevalence of biological resources and conservation areas in the vicinity of the Wood River alternative limit routing options to the Wood River substation through the salt pond region of Rhode Island. Agencies and conservation groups may request that the entire extent of the 10-mile upland route be buried underground. Potentially costly avoidance, minimization, and restoration measures would be necessary to address impacts to the natural resources within the salt pond region. The Narragansett Tribe land interests in Charlestown suggest an increased archaeological sensitivity in the area. Additionally, the route traverses densely populated residential areas.

Based on the results of the CIA, Tetra Tech suggests the following recommended actions and subsequent steps:

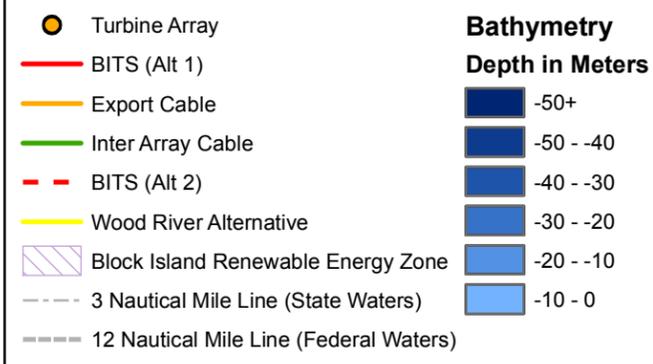
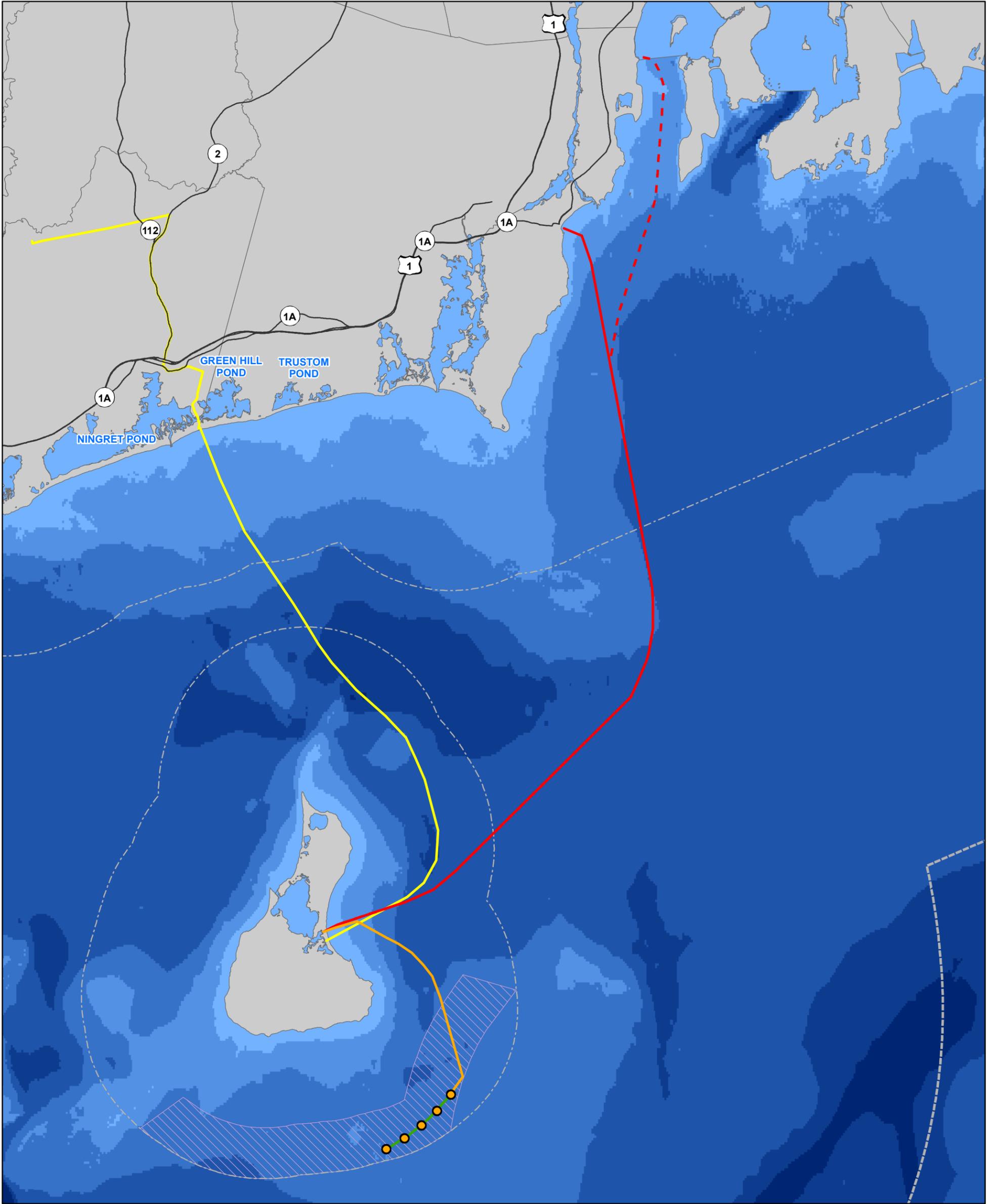
1. Evaluate the feasibility of burying the cable underground along the entire length of the upland route
2. Consult with the Narragansett Tribe and identify level of previous disturbance along the roadway to evaluate the archaeological sensitivity along the route.
3. Conduct a sediment analysis to evaluate potential for contaminated sediments along the approach to the landfall location.

5.0 REFERENCES

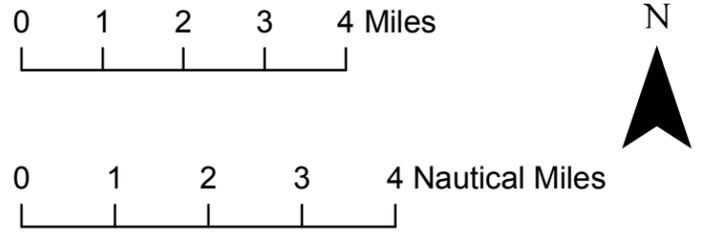
- Boothroyd, Jon C., Bryan A. Oakley, Jonathan D. Alvarez and. "Benthic Geologic Habitats of the Matunuck-Green Hill Shoreface, Rhode Island (Abstract)." Abstracts With Programs - Geological Society of America. 39(1):70. February 2007.
- Carey, Drew. 2009b. Personal e-mail communication between Drew Carey, CoastalVision, and Clint Plummer, Deepwater Wind, September 16, 2009.
- Carey, Drew. 2009a. Personal e-mail communication between Drew Carey, CoastalVision, and Clint Plummer, Deepwater Wind, September 22, 2009.
- CRMC. 1999. Rhode Island's Salt Pond Region: A Special Area Management Plan, April 12, 1999. Accessed October 2011 at http://www.crmc.ri.gov/regulations/SAMP_SaltPond.pdf.
- Narragansett Tribe. 2011. Historical Perspective of the Narragansett Indian Tribe. Accessed online November 2011 at <http://www.narragansett-tribe.org/history.html>.
- NOAA, RIDEM, USFWS. 2002. Draft Shellfish Restoration Plan and Supplemental Environmental Assessment for the North Cape Oil Spill, May 2002. Accessed October 2011 at http://www.darrp.noaa.gov/northeast/north_cape/pdf/ncshlea.pdf.
- RI Ocean SAMP. 2011. Rhode Island Ocean Special Area Management Plan, May 4, 2011.
- RIDOT. 2011. Scenic Roadways. Accessed October 2011 at <http://www.dot.state.ri.us/programs/scenic/index.asp>.
- RIGIS. 1990. Natural Heritage Areas. Rhode Island Geographic Information System (RIGIS) Data Distribution System, URL: <<http://www.edc.uri.edu/rigis>>, Environmental Data Center, University of Rhode Island, Kingston, Rhode Island (last date accessed: 22 July 2009).
- RIGIS. 2010.
- State Conservation Lands; StaCons10. Rhode Island Geographic Information System (RIGIS) Data Distribution System, URL: <<http://www.edc.uri.edu/rigis>>, Environmental Data Center, University of Rhode Island, Kingston, Rhode Island (last date accessed: 22 April 2010).
- Municipal & Non-Governmental Organization Conservation Lands; LocCons10. Rhode Island Geographic Information System (RIGIS) Data Distribution System, URL: <<http://www.edc.uri.edu/rigis>>, Environmental Data Center, University of Rhode Island, Kingston, Rhode Island (last date accessed: 22 April 2010).
- Sea Grant. 2011a. A Daytripper's Guide to Rhode Island. Accessed October 2011 online at <http://seagrant.gso.uri.edu/daytrip/>. Relevant mapping at http://seagrant.gso.uri.edu/daytrip/pdfs/map_chas_sk.pdf

Sea Grant. 2011b. Rhode Island South Shore Sea Grant Project, Ninigret Pond General Features Data and Green Hill Pond General Features Data. Accessed October 2011 at <http://seagrant.gso.uri.edu/coasts/ninigret/NinigretGFD.html> and <http://seagrant.gso.uri.edu/coasts/greenhill/greenhillGFD.html>.

FIGURES



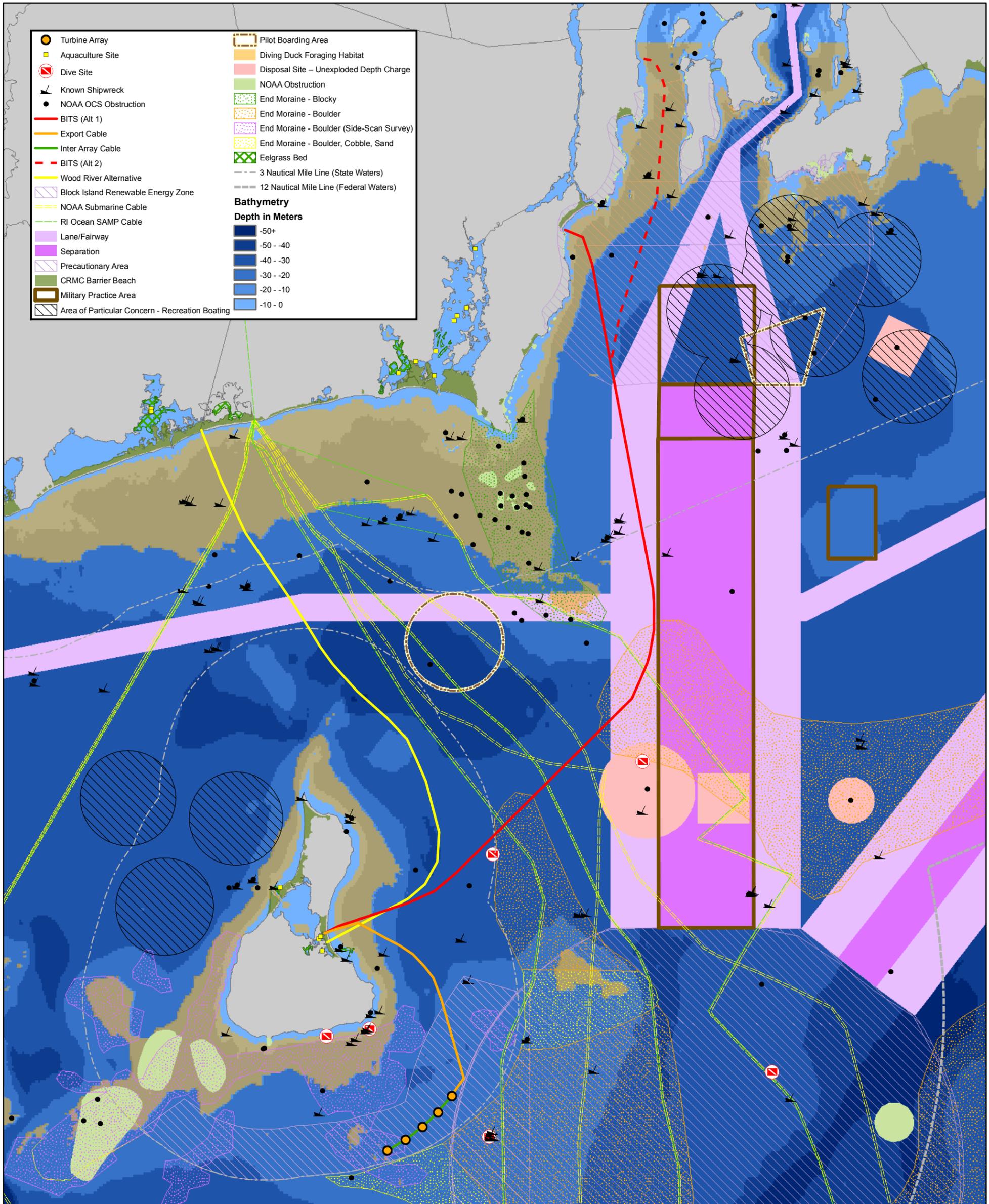
**Deepwater Wind
 Block Island Wind Farm
 and Block Island
 Transmission System
 Wood River Alternative**
 Figure 1:
 Project Area



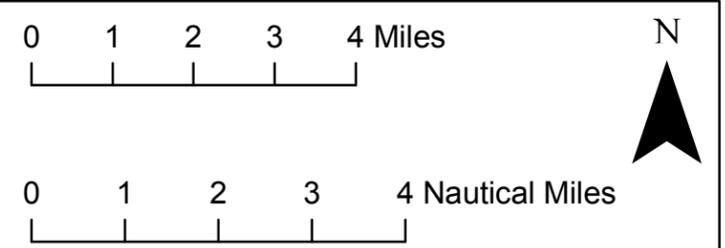
November 2011



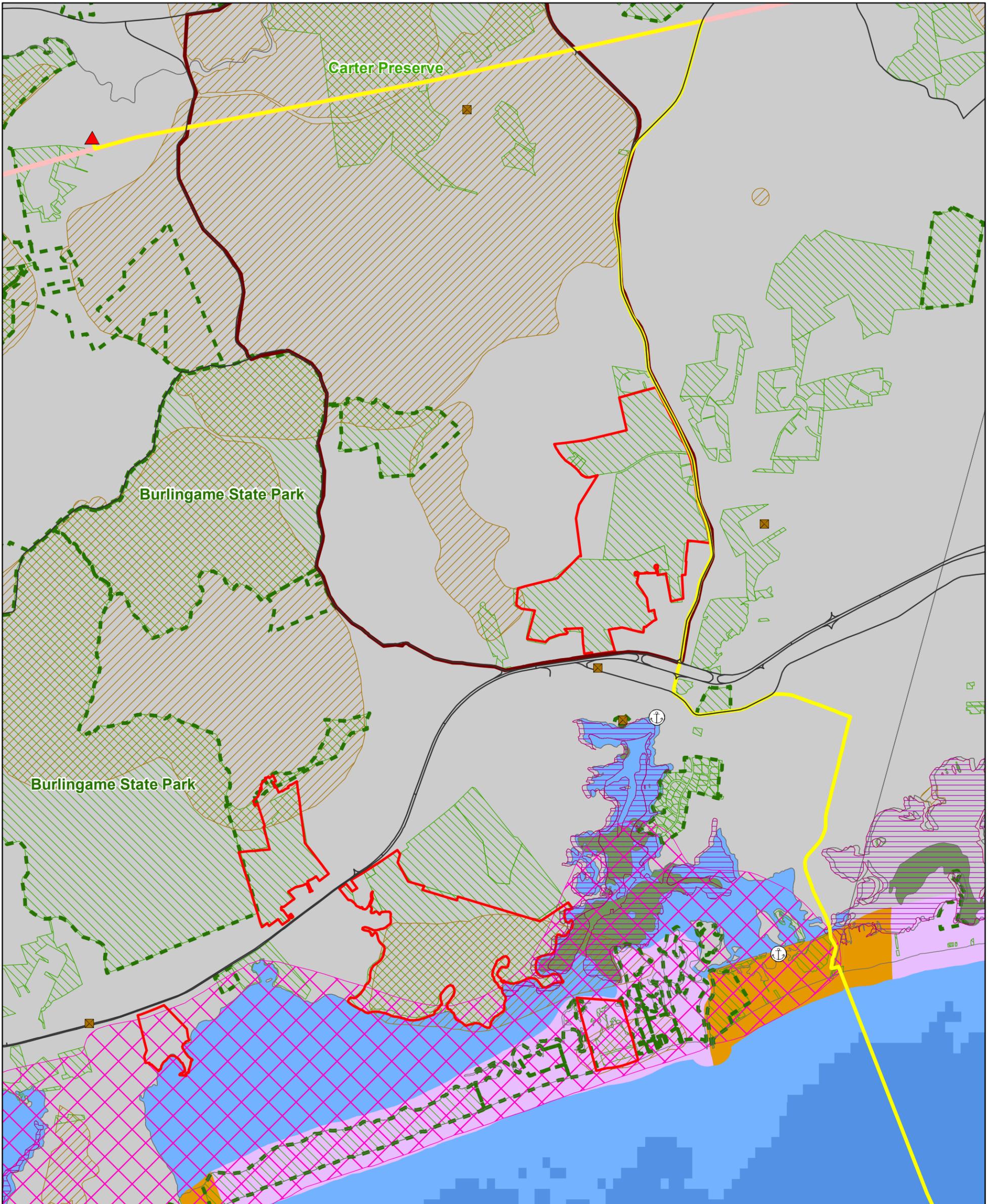
File: P:\Deepwater\Working\Deepwater RI GIS\GIS\Spatial\MXD1
 BMAP_D_02\20111103_WoodRiver20111103_Figure1_ProjectArea.mxd
 Drawn by: william.scales
 Coordinate System: NAD 1983 StatePlane Rhode Island FIPS 3800 Feet



Deepwater Wind
 Block Island Wind Farm
 and Block Island
 Transmission System
 Wood River Alternative
 Figure 2:
 Offshore Constraints



November 2011



- ▲ Wood River Substation
 - Wood River Alternative
 - T Marina
 - Historical Site
 - Transmission Right-of-Way
 - Local Conservation Land
 - State Conservation Land
 - Ninigret National Wildlife Refuge
 - NOAA NOS Habitat
 - Natural Heritage Area
 - Barrier Beach (Developed)
 - Barrier Beach (Undeveloped)
 - Scenic Area
 - Aquatic Beds (eelgrass)
 - Historic Village of the Narragansetts
- Bathymetry**
Depth in Meters
- 50+
 - 50 - -40
 - 40 - -30
 - 30 - -20
 - 20 - -10
 - 10 - 0

Deepwater Wind
Block Island Wind Farm
and Block Island
Transmission System
Wood River Alternative
Figure 3:
Coastal & Onshore
Constraints
 November 2011

0 0.25 0.5 0.75 1 Miles

0 0.25 0.5 0.75 1 Nautical Miles

N



File: F:\Deepwater\Working\Deepwater RI GIS\GIS\Spatial\MXD\BWF_DWG\20111103_WoodRiver\20111103_Figure3_CoastalOnshore.mxd
 Drawn by: william.scales
 Coordinate System: NAD 1983 StatePlane Rhode Island FIPS 3800 Feet

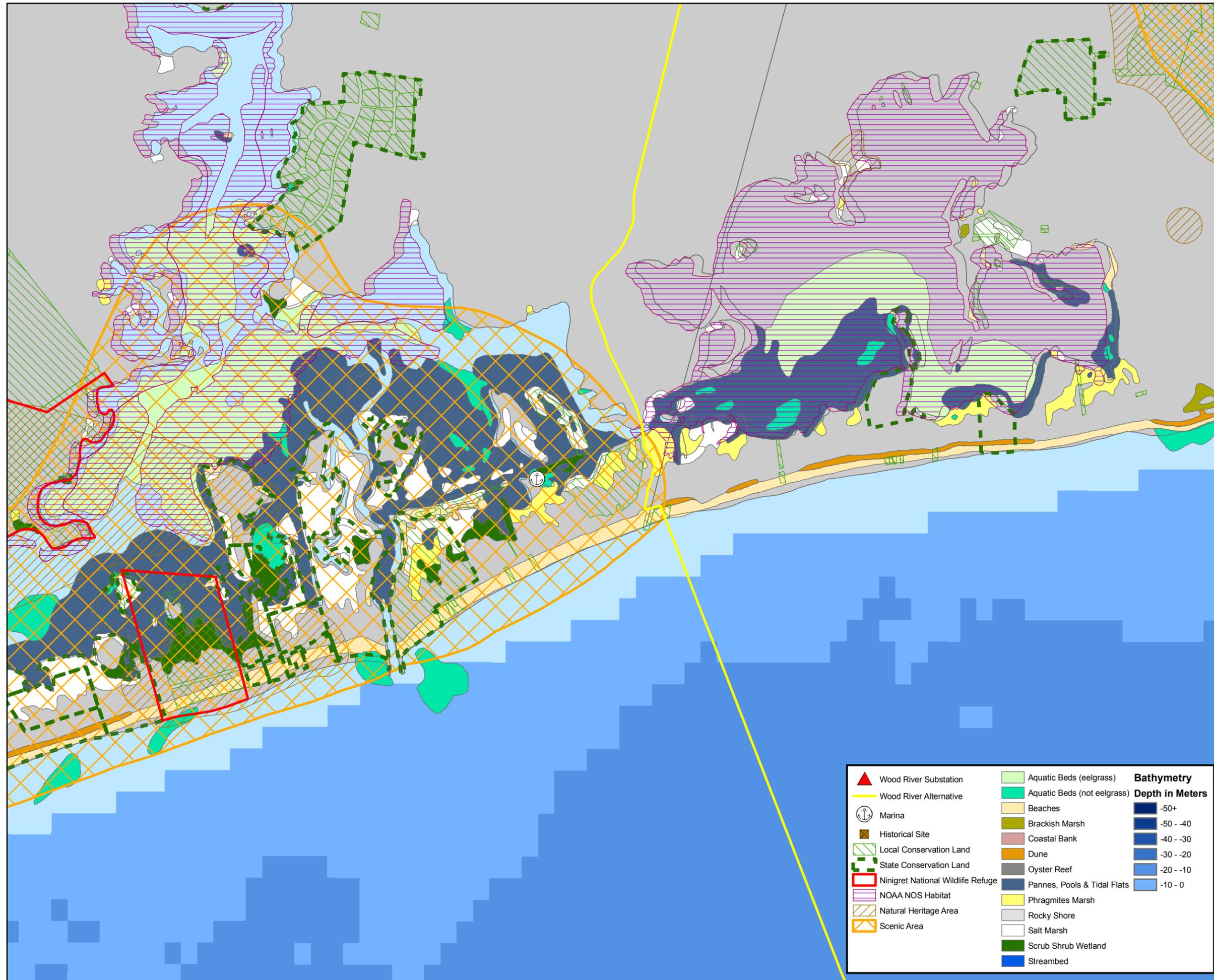
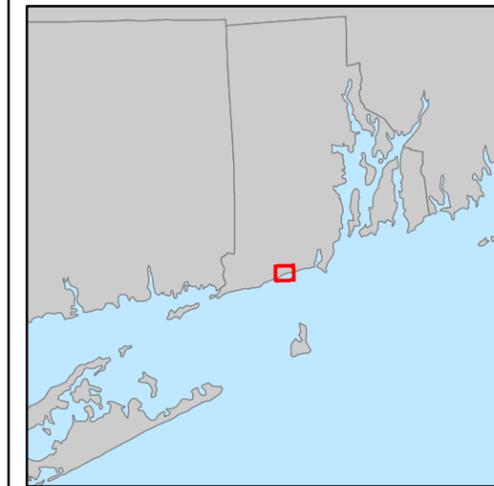
Deepwater Wind Block Island Wind Farm and Block Island Transmission System Wood River Alternative

Figure 4: Landing Constraints

November 2011

0 0.1 0.2 0.3 0.4 Miles

0 0.08 0.16 0.24 0.32 Nautical Miles



	Wood River Substation		Aquatic Beds (eelgrass)	Bathymetry Depth in Meters
	Wood River Alternative		Aquatic Beds (not eelgrass)	
	Marina		Beaches	-50+
	Historical Site		Brackish Marsh	-50 - -40
	Local Conservation Land		Coastal Bank	-40 - -30
	State Conservation Land		Dune	-30 - -20
	Ninigret National Wildlife Refuge		Oyster Reef	-20 - -10
	NOAA NOS Habitat		Pannes, Pools & Tidal Flats	-10 - 0
	Natural Heritage Area		Phragmites Marsh	
	Scenic Area		Rocky Shore	
			Salt Marsh	
			Scrub Shrub Wetland	
			Streambed	



Deepwater Wind
Block Island Wind Farm
and Block Island
Transmission System
Wood River Alternative
Figure 5:
Landing
Aerial

November 2011

0 0.1 0.2 0.3 0.4 Miles

0 0.08 0.16 0.24 0.32 Nautical Miles



File: P:\Deepwater\Working\Deepwater RI GIS\GIS\Spatial\MXD\
BWF_DCE20111103_WoodRiver20111103_Figures_LandingAerial.mxd
Drawn by: william.scales
Coordinate System: NAD 1983 StatePlane Rhode Island FIPS 3800 Feet