2.0 PROPOSED ACTION AND ALTERNATIVES

2.1 Proposed Action

Deepwater Wind anticipates that the Lead and Cooperating Agencies will define the Proposed Action, for the purpose of NEPA review, as the issuance of the USACE Individual Permit (for the construction, operation, and decommissioning of the BIWF and BITS) and the BOEM ROW Grant for the BITS (for construction, operation, and decommissioning of the BITS). Because construction, operation, and decommissioning of the BIWF and BITS are considered a consequence of the federal permit issuance, this ER evaluates the environmental impacts and benefits of the Project.

2.2 Methodology for Evaluating Alternatives

In developing the BIWF and BITS, Deepwater Wind considered alternatives to the development of the proposed Project (the Preferred Alternative), including:

- The No Action Alternative
- Alternative locations for the BIWF Project infrastructure, including:
  - alternative locations for the WTG Array
  - alternative locations for the BIWF Collection System
- Alternative locations for the BITS Project infrastructure, including:
  - alternative locations for the BITS Cable route
  - alternative locations for the BITS switchyards
- Alternative technologies for the BIWF, including:
  - alternative WTGs
  - alternative foundations

In evaluating the comparative merits of the various alternatives, Deepwater Wind considered not only environmental impacts of the alternatives, but also the ability of the alternatives to achieve the purpose and need of the Project. As described in Section 1.0, the proposed Project will help satisfy the need for renewable energy as established by the RIWINDS program, codified by Rhode Island State Legislations (RIGL §§ 39-26-1 et seq and 39-26.1-7); and as defined by the Joint Development Agreement (JDA) executed between the State and Deepwater Wind. In combination, these actions called for a renewable energy project that:

- utilizes wind energy;
- has a name plate capacity of no more than 30 MW and consists of no more than 8 WTGs;
- is located in state waters;
- is cost-effective;
- enhances the electric reliability and environmental quality of the Town of New Shoreham, Rhode Island; and
- interconnects Block Island and the Rhode Island mainland.

Sections 2.3 through 2.5 discuss the various alternatives considered and provide a comparison of the alternatives with respect to their environmental, technical, and financial consequences. Section 2.6 summarizes the preferred alternative.
2.3 No Action Alternative

Under the No Action Alternative, the federal permitting agencies would not issue the necessary permits for the Project, and therefore, the Project would not be constructed. If Deepwater Wind did not undertake the development of the BIWF and BITS, the impacts directly associated with the construction and operation of the Project would be avoided. However, as a consequence, the environmental benefits and objectives of the Project to deliver renewable, clean energy to Rhode Island, including Block Island residents, would not be realized. Specifically, the BITS would be the first cable interconnecting Block Island with the regional transmission system onshore, providing access to substantially lower cost and cleaner electricity for Block Island residents. Also, a smaller-scale offshore wind project within the Rhode Island Renewable Energy Zone is an important step in meeting both Rhode Island’s renewable energy goals as well as regional and national goals of increasing economic growth, improving environmental quality, and enhancing national energy security. For these reasons the No Action Alternative is not considered to be a preferred alternative and is therefore excluded from further analysis in this ER.

2.4 Alternative Location(s) for the BIWF and BITS Infrastructure

2.4.1 WTG Array Alternatives

The policy of the State of Rhode Island, principally the RI Ocean SAMP, dictated the viable alternative locations for the WTG Array. Through the RI Ocean SAMP process, the State of Rhode Island evaluated existing environmental conditions and marine uses to designate an area for renewable energy development within state territorial waters that would minimize the potential impact to natural resources (benthic ecology, birds, marine, mammals, sea turtles, fisheries resources, and habitat), and existing human uses (commercial and recreational fishing, cultural and historic sites, recreation and tourism, marine transportation, navigation, and infrastructure). This designated area is referred to as the “Renewable Energy Zone.” Given the requirement for the Project to be located within the Renewable Energy Zone established by the RI Ocean SAMP and within state waters of Rhode Island, all potential locations not within this established Zone were excluded from further siting consideration.

Within the Renewable Energy Zone, the analysis of potential locations for the WTG Array considered a variety of factors. Specifically, the following preliminary Project-specific siting criteria were applied to both minimize environmental impacts and ensure the economic and technical feasibility of the Project:

- Avoid hard substrates (e.g., cobble, boulders, bedrock) that could adversely affect Project costs and feasibility.
- Locate the WTGs in areas of the greatest wind energy potential with a minimum spacing of not less than 5 rotor-diameters (approximately 0.5 mi [805 m]) to maximize Project productivity and cost-effectiveness to enable the BIWF to maximize the “Wind Outperformance Adjustment Credit” provided for in the PPA, which benefits Rhode Island rate payers.
- Locate the WTGs as far as possible from shore while still remaining with the state waters and the Renewable Energy Zone to minimize potential visual impact to the maximum extent possible.
- Avoid the crossing of navigation features such as vessel traffic lanes, ferry routes, and boat racing routes to minimize potential impacts to marine uses.
• Avoid important marine habitats including hard bottom complexes (e.g., cobble, boulders) to minimize potential impacts to marine species.
• Avoid avian migration routes and foraging areas to minimize potential impact to avian species.
• Avoid cultural marine resource sites (pre-contact and post-contact).

These criteria were then evaluated against applicable federal and state guidance, agency consultation, and public outreach. Based upon the results of this analysis, two potential WTG Array locations were identified within the Renewable Energy Zone. As depicted in Figure 2.4-1, WTG Array Alternative 1 are located approximately 3 mi (4.8 km) southwest of Block Island; and WTG Array Alternative 2 is located approximately 3 mi (4.8 km) southeast of Block Island.

Both WTG Array Alternatives 1 and 2 are located within the Renewable Energy Zone and are comparable in terms of visual and wind resources selection criteria; however, WTG Array Alternative 1 was found to have several disadvantages. Specifically, WTG Array Alternative 1 is located near a potential sea duck foraging area and thus could have a greater impact on avian species. Alternative 1 will require that the Inter-Array Cable pass through the ridge of a terminal moraine that extends south from Block Island’s southern shore. Installation of cables through this area of moraine will likely require cutting techniques that will have more significant environmental impacts than installation via jet plow. Alternative 1 requires the Export Cable to traverse an area of undisturbed cobbles, which poses both a potential geophysical obstruction to cable installation and impacts to benthic habitat.

In contrast, WTG Array Alternative 2 is primarily located in soft bottom substrate and avoids areas of hard bottom, which minimizes potential impacts to important marine habitats and obstructions to WTG and cable installation. In addition, Alternative 2 creates a shorter route for the Export Cable to Block Island and allows for the use of jet plowing for installation, which reduces both environmental impacts and costs.

For these reasons, Deepwater Wind determined that the WTG Array Alternative 2 was preferable to WTG Array Alternative 1 within the RI Ocean SAMP Renewable Energy Zone and Alternative 1 was thus excluded from further consideration.

### 2.4.2 BIWF Collection System Alternatives

The BIWF Collection System comprises the following components:

- BIWF Generation Switchyard (part of the Block Island Substation);
- Submarine and terrestrial Export Cable; and
- Submarine Inter-Array Cable.

The following sections discuss the alternatives considered for each component of the BIWF Collection System and compare the alternatives for their environmental, technical, and financial consequences. The siting of the Inter-Array Cable has been dictated by the selection and studies performed in support of the WTG Array alternatives analysis and therefore is not discussed further in this section.
Figure 2.4-1  Alternative Locations for the WTG Array
2.4.2.1 Block Island Substation and Switchyard Alternatives

The BIPCO property complex located at the corner of Beach and Ocean Avenues is the only electrical distribution facility on Block Island and therefore the only location where the BIWF and BITS could interconnect.\(^4\) However, Deepwater Wind evaluated the potential location for the Block Island Substation, which includes the BIWF Generation and BITS Island Switchyards, within the BIPCO property boundary. Deepwater Wind employed the following environmental and engineering/construction criteria to identify a site for the Block Island Substation:

- Minimize use of locations with contamination;
- Avoid or minimize impacts to wetlands and associated buffers;
- Avoid or minimize disturbance to previously undisturbed areas within the BIPCO property;
- Select a site that will minimize visual impacts to surrounding areas; and
- Select a site that will minimize impacts to other sensitive environmental receptors in surrounding area.

Based on these criteria, three potential substation locations for the new Block Island Substation were identified within the existing BIPCO property complex (Figure 2.4-2).

As depicted in Figure 2.4-2, Substation Alternative A is located on the eastern side of the BIPCO property, west of the DOT garage. Substation Alternative B is located on the southwestern side of the BIPCO property complex on land that is currently owned by the estate of Marjorie McGinnes, and currently contains one existing residential structure and one existing light industrial structure. Substation Alternative C is located at the northern corner of the BIPCO complex at the intersection of Beach and Ocean Avenues.

Based on the interconnection and substation location selection criteria and results of the site-specific environmental and engineering surveys, it was determined that all three alternatives on the BIPCO property complex are feasible for development. However, based on feedback from the BIPCO property owner, Alternative C was removed from further consideration. On April 3, 2012, the Town of New Shoreham Zoning Board of Review unanimously approved a Special Use Permit for the Block Island Substation. The Special Use Permit allows for construction of the Block Island Substation at either the Alternative A or B, but indicates a preference for Alternative A, which is also Deepwater Wind’s preferred alternative. A copy of the decision is included in Appendix A. On April 11, 2012, the Town of New Shoreham Planning Board unanimously approved the Development Plan Review for the proposed work on the BIPCO property. A copy of the decision is included in Appendix A. Given the viability of both Substation Alternatives A and B, each of these locations is considered for development as part of the Preferred Alternative.

\(^4\) Physically other locations would be possible; however, any alternative would then also involve interconnecting with the BIPCO site, so other alternatives were excluded from further consideration as the impacts would always be greater than the evaluated alternative.
Figure 2.4-2  Block Island Substation Alternatives
2.4.2.2 Submarine Export Cable Route Alternatives

The Export Cable will interconnect the BIWF from its northernmost WTG with the electrical grid on Block Island. A multiphase approach was used in assessing potential submarine routes for the Export Cable and its associated landing location including a detailed desktop analysis of existing seafloor mapping information. This information included, but was not limited to, data provided by the RI Ocean SAMP, RIGIS, and the U.S. Geological Survey (USGS) to identify potential routes; screening-level marine route surveys to evaluate the feasibility of the specific routes that could be considered as alternatives; and a detailed site-specific route survey of the preferred alternative.

Environmental and engineering/construction routing criteria that were used in evaluating the alternative routes for the Export Cable included the following:

- Minimize the total length of Export Cable including:
  - reducing the total length of the marine cable route to minimize impacts to the surrounding marine environment, and
  - selecting a shore landing location that allows for minimal impact and minimal terrestrial distance to the Block Island Substation;
- Avoid impacting sensitive biological habitat (e.g., eelgrass) and cultural marine resource sites (pre- and post-contact);
- Avoid hard substrates (e.g., cobble, boulders, bedrock) that could adversely affect power costs and make use of the jet plow infeasible or increase the duration and impact of cable installation;
- Minimize impact to existing marine uses (e.g., vessel traffic lanes); and
- Select a site that will minimize impacts to other sensitive environmental receptors in surrounding area.

In identifying potential landfall locations for the Export Cable on Block Island, Deepwater Wind considered the following:

- Avoidance or minimization of disturbance to sensitive coastal areas, habitat, and resources (e.g., eelgrass, beach dunes);
- Avoidance of hard substrates (e.g., cobble, boulders, bedrock) that could adversely affect power costs and make use of the jet plow infeasible or increase the duration and impact of cable installation;
- Availability of a cable shore landing location with sufficient construction workspace; and
- Avoidance or minimization of impacts on the local community on Block Island.

Using these criteria Deepwater Wind identified three potential Export Cable Alternatives from the northernmost WTG to three potential landing locations on Block Island. As depicted on Figure 2.4-3, each of the three alternatives is located on the eastern side of Block Island, near Old Harbor. Given the preferred location of the WTG Array as described in Section 2.4.1 and the Block Island Substation as discussed in Section 2.4.2.1, any other landfall location would have resulted in a longer cable route, which would increase impacts and cost effectiveness.
Figure 2.4-3  Export Cable Route Alternatives

Deepwater Wind
Block Island Wind Farm
and
Block Island Transmission System
Environmental Report
Export Cable Route Alternatives

September 2012
As shown on Figure 2.4-3, Export Cable Alternative 1 initiates at the northernmost WTG and terminates on privately owned land on the west side of Corn Neck Road, at its intersection with Beach Avenue. Export Cable Alternative 2 also makes landfall on private land on Corn Neck Road, while Export Alternative 3 makes landfall on Crescent Beach on publicly owned land the east side of Corn Neck Road.

Each of the three alternatives considered was comparable in the following ways:

- The submarine portions of the cable are not significantly different in length and would therefore not result in a substantial difference in Project cost.
- Each alternative landfall location allows for a short terrestrial cable route installation to the preferred Block Island Substation.
- The geophysical conditions along the alternative routes and on the eastern side of Block Island are conducive to both jet-plow and HDD construction methodologies.

Despite these advantages, Export Cable Alternative 2 would result in the direct impact of a confirmed eelgrass bed. To avoid impacts to this important marine habitat, Deepwater Wind eliminated Export Cable Alternative 2 from further consideration.

Of the remaining alternatives considered, Export Cable Alternative 3 offers a number of advantages over Export Cable Alternative 1. Specifically, the proposed landing location for Export Cable Alternative 3 is on publicly owned land, which will avoid impacts to private property. Alternative 3 has softer substrate material that facilitates shore landing by jet plow and HDD allowing for minimal duration and impact of the shore landing. The proposed landfall location meets the spatial needs of HDD and jet plow construction activities without impacting sensitive environmental features on Block Island (e.g., beach dunes) and offers sufficient space for additional construction staging, minimizes the need for additional construction staging locations on Block Island, and improves the cost-effectiveness of the Project. Finally, the Alternative 3 shore landing allows for a marine cable route alignment that avoids impacts to offshore sensitive environmental features (e.g., eelgrass). For these reasons, Deepwater Wind has selected Export Cable Alternative 3 as the preferred alternative.

Based on the detailed site-specific surveys performed on Export Cable Alternative 3 in fall of 2011 and winter of 2012, the entire 200-ft (61 m) centerline corridor for the proposed route has been determined to be feasible for development.

2.4.2.3 Terrestrial Export Cable Route Alternatives

Terrestrial cable route alignments for the Export Cable were evaluated from the preferred landfall location described in Section 2.4.2.2 to the BIPCO property preferred site location for the Block Island Substation discussed in Section 2.4.2.1.

The following is a list of the environmental and engineering/construction routing criteria that were used in evaluating the alternative routes for the terrestrial portion of the Export Cable route:

- Minimize the distance between the preferred landfall location and the preferred substation location.
- Maximize the use of existing rights-of-way to avoid and/or minimize potential impacts to existing utilities, infrastructure, and the local community.
- Avoid or minimize potential impacts to environmental, archaeological, and cultural resources.
Based on these criteria, two Export Cable alignments to connect the preferred landfall location with the BIPCO property were identified (see Figure 2.4-3).

As depicted in Figure 2.4-3, Terrestrial Alignment 1 runs south from the preferred landfall location within an existing right-of-way on Corn Neck Road, turns west along the existing right-of-way on Beach Avenue, and then turns southeast onto an existing access road to the BIPCO property. Terrestrial Alignment 2 follows existing rights-of-way from the preferred landfall location south along Corn Neck Road, west on Beach Avenue, and turns south onto Ocean Avenue within an existing right-of-way, before turning southwest onto an existing access road to the BIPCO property.

An evaluation of the two alternative alignments found them both comparable in linear distance and use of existing right-of-way. However, Terrestrial Alignment 1 offers a distinct advantage over Terrestrial Alignment 2 by avoiding historic underground contamination that extends north from the BIPCO property under Ocean Avenue.

For these reasons, Terrestrial Alignment 1 was selected as the preferred alternative and Terrestrial Alignment 2 was excluded from further consideration.

### 2.4.3 BITS

The BITS comprises the following components:

- BITS Island Switchyard (part of the Block Island Substation);
- Rhode Island mainland switchyard; and
- Submarine and terrestrial BITS Cable.

The following sections discuss the alternatives considered for each component of the BITS and compare the alternatives for their environmental, technical, and financial consequences. Because the BITS facilities on Block Island will be co-located with the BIWF facilities along the terrestrial cable route and at the Block Island Substation, the alternatives analysis for the BITS on Block Island is as described in Sections 2.4.2.1 and 2.4.2.2 and therefore is not discussed further in this section.

#### 2.4.3.1 BITS Mainland Interconnection Alternatives

In 2007, BIPCO completed an Electric Resource Planning Study that included an economic analysis of new supply and demand-side management options for BIPCO (HDR 2007). One of the new supply options considered by this analysis was a submarine cable connecting Block Island to the mainland. The study, which did not contain engineering details, identified two potential routes and points of interconnection owned by TNEC at:

- Langworthy Substation near Westerly, Rhode Island (Langworthy Alternative)
- Wood River Substation near Wood River Junction, Rhode Island (Wood River Alternative)

Based on the BIPCO Study, the Langworthy Alternative results in a 14.5 mi (23.3 km) submarine cable route from Block Island to a landing location on the Rhode Island mainland near the Weekapaug Breachway and a 2 mi (3.2 km) terrestrial cable to make the final connection to the existing Langworthy Substation.

The Wood River Alternative results in a 13.3 mi (21.4 km) submarine cable route from Block Island to a landing location on the Rhode Island mainland near Quonochontany Pond and a 9.5 mi (15.3 km) terrestrial cable route to make the final connection to the existing Wood River Substation.
In 2009, Deepwater Wind conducted a preliminary engineering and environmental analysis to identify one or more viable points of interconnection with the existing TNEC distribution system on the mainland, including a detailed review of the 2007 BIPCO study (HDR 2007). The same selection criteria that were used to evaluate the Export Cable route and points of interconnection and substation locations on Block Island (see Sections 2.4.2.1 and 2.4.2.2) were used to evaluate these routes and substation locations. Based on this criteria, Deepwater Wind’s preliminary analysis determined that interconnection at the Langworthy Substation would not be cost effective, due to the significant number of upgrades required to support the additional power produced by the BIWF. Accordingly, the Langworthy Alternative was excluded from further consideration.

Preliminary analysis found that the Wood River Substation could cost effectively support the delivery of power from the BIWF. Deepwater Wind then engaged Tetra Tech to prepare a Critical Issues Analysis evaluating the viability of an alignment connecting Block Island to the mainland at one of these two locations (Tetra Tech 2011). This study identified engineering and environmental issues that would adversely affect the cost effectiveness of the Project. Accordingly, the Wood River interconnection was excluded from further consideration.

Further coordination and analysis of suitable interconnection alternatives on the Rhode Island mainland were conducted in coordination with TNEC from 2009 through 2012. Results of this coordination and analysis identified three potential points of interconnection that could successfully accept power from the BIWF (Figure 2.4-4). These locations include the following:

- Interconnection with TNEC’s Feeder 3307 at the end of Albro Lane in South Kingston, Rhode Island (Albro Lane Alternative).
- Interconnection with TNEC’s Feeder 3302 near the near the Narragansett Department of Public Works (DPW) maintenance facility in Narragansett, Rhode Island (Narragansett Alternative).
- Interconnection with TNEC’s existing Bonnet Substation in Narragansett, Rhode Island (Bonnet Alternative).

As depicted in Figure 2.4-4, interconnection with Feeder 3307 (Albro Lane Alternative) will require constructing a new switchyard—the Albro Lane Switchyard—on private property in South Kingston, Rhode Island, proximate to TNEC’s existing 3307 right-of-way and other existing commercial uses. Interconnecting with Feeder 3307 is not expected to require any material system upgrades. The Albro Lane Alternative will require a combination of overhead and buried cable along existing and private rights-of-way for a distance of 2.1 mi (3.4 km) including crossing of a major road, Route 1. Given the cost and engineering challenges with the long route and the Route 1 crossing, the Albro Lane Alternative was excluded from further consideration.

Interconnecting with Feeder 3302 under the Narragansett Alternative will require construction of a new switchyard—the Narragansett Switchyard—on public property in Narragansett, Rhode Island, proximate to TNEC’s existing 3302 right-of-way and the Narragansett DPW garage. Interconnecting with Feeder 3302 is expected to require replacing approximately 1 mi (1.6 km) of the existing Feeder 3302 between the new Narragansett Switchyard and the existing Wakefield Substation with new overhead wire in the same location as the existing wire. Additionally, interconnection with Feeder 3302 is expected to require certain protection upgrades at the Wakefield Substation.
Figure 2.4-4  BITS Alternative 1 Rhode Island Mainland Interconnection Alternatives
The Bonnet Alternative includes the expansion of the existing TNEC Bonnet Substation near the URI Bay Campus in Narragansett, Rhode Island. Interconnecting at the Bonnet Substation is expected to require replacing approximately 9 mi (14.5 km) of the existing Feeder 3302 between the existing Bonnet Substation and the existing Wakefield Substation in South Kingston, Rhode Island, with new overhead wire in the same location as the existing wire. Additionally, interconnection at the Bonnet Substation is expected to require certain protection upgrades at the Wakefield and Bonnet Substations.

Based on site-specific studies, both the Narragansett and Bonnet Alternatives were found to be feasible for development because of their location close to the proposed TNEC point-of-interconnection, proximity to shore, and compatible surrounding land uses. However, the Narragansett Alternative was found to be more attractive than the Bonnet Alternative for the following reasons:

- the Bonnet Alternative is a longer and more expensive submarine cable route;
- the Bonnet Alternative is technically a more complicated landfall, and therefore more costly; and
- upgrade of Feeder 3302 will be expensive and has potential adverse environmental impacts to both wetlands and residences.

For these reasons, the Narragansett Alternative was determined to be the Preferred Alternative and the Bonnet Alternative was excluded from further considerations.

2.4.3.2 BITS Submarine Cable Route Alternatives

The environmental and engineering/construction routing criteria that were used in evaluating the alternative routes for the BITS submarine cable are the same as those described for the Export Cable in Section 2.4.2.2. Based upon these selection criteria, Deepwater Wind identified five preliminary submarine cable alignments from the preferred cable landfall location on Block Island to the Rhode Island mainland. These alternatives are depicted on Figure 2.4-5 and include the following:

- BITS Alternative 1 runs northeasterly from the preferred Block Island landing location before turning north and terminating at the preferred landfall location in Narragansett, Rhode Island near the Narragansett Town Beach. The total length of BITS Alternative 1 is approximately 21.8 mi (35.1 km).
- BITS Alternative 2 follows the same route as the BITS Alternative 1 route from Block Island to the area west of Point Judith, Rhode Island, where the BITS Alternative 2 proceeds farther north toward the URI Bay Campus. The total length of BITS Alternative 2 is approximately 25.9 mi (41.7 km).
- BITS Alternative 3 runs northeasterly from Old Harbor before turning north and then northwest and terminating at the preferred landfall location in Narragansett, RI. The total length is 20.59 mi (33.1 km).
- BITS Alternative 4 runs northeasterly from Old Harbor, to the west of Alternative 2 before turning north and then northwest and terminating at the preferred landfall location in Narragansett, RI. The total length is 18.9 mi (30.4 km).
Figure 2.4-5  BITS Route Alternatives
• BITS Alternative 5 follows the path of Alignment 1 when it leaves Old Harbor. Alternative 3 leaves the path of Alternative 1 when it turns to the northeast to circumvent an area of rocky substrate, Point Judith shoal that extends southward from Point Judith. The path then turns north and then northwest before terminating the preferred landfall location in Narragansett, Rhode Island. The total length is 20.9 mi (33.6 km).

Based on the detailed sediment profile imaging (SPI) survey conducted along the cable routes in the fall of 2009 (Appendix D), BITS Alternatives 3 and 4 were found to pass through an area with hard substrates and were thus excluded from further consideration.

BITS Alternatives 1, 2, and 5 were found to be comparable in both technical feasibility and environmental impacts; however, BITS Alternative 5 crosses into the Traffic Separation Zone and was therefore excluded from further consideration.

Deepwater Wind conducted detailed site-specific geophysical and geotechnical, marine benthic and marine archeological investigations along BITS Alternatives 1 and 2 in the fall 2011/winter 2012 (Appendices E, F, and P). Based on the route selection criteria and the results of the site-specific environmental and engineering surveys, although feasible, BITS Alternative 2 was found to be technically more complicated and costly. BITS Alternative 2 would also require additional upgrades to connect with TNEC’s existing Bonnet substation. For these reasons, BITS Alternative 2 has been excluded from further consideration and BITS Alternative 1 was determined to be the Preferred Alternative.

2.4.3.3 BITS Alternative 1 Landfall Alternatives

Deepwater Wind evaluated several potential landing locations on the Rhode Island mainland for BITS Alternative 1 in the vicinity of Narragansett Town Beach. The prospective landfall locations were evaluated using the same screening criteria discussed in Section 2.4.2.2. Based upon these criteria, three potential landfall locations were identified (Figure 2.4-6).

As depicted on Figure 2.4-6, Mainland Landfall Alternative 1 would bring the BITS cable ashore on state-owned land at State Pier #5. Mainland Landfall Alternative 2 would bring the cable to shore on town-owned land at Gazebo Park, and Mainland Landfall Alternative 3 would result in the BITS cable coming to shore in the parking lot of Narragansett Town Beach.

Further evaluation of Mainland Landfall Alternative 1 revealed disadvantages. Namely, this alternative would land BITS Alternative 1 at a rock pier. There are, to Deepwater Wind’s knowledge, currently no available as-built drawings to determine the depth of the pier foundations. In addition, this alternative landing location is in an area comprising large gravel, boulders, and exposed bedrock that will prevent the successful use of HDD to bring the cable ashore. Finally, the site does not afford enough space to support the necessary HDD construction equipment. Due to these conditions, construction of a landfall at the State Pier will be technically challenging, if even feasible, and costly. Accordingly, Mainland Landfall Alternative 1 was excluded from further consideration.

Evaluation of Mainland Alternative 2 revealed that the area contains large gravel, boulders, and exposed bedrock. Although physical space for an HDD construction workspace is potentially available, the lack of as-built drawings for the seawall construction at this landfall location and the requirement to drill through bedrock under the seawall will add both significant time to the construction schedule and cost. Additionally, Mainland Landfall Alternative 2 is located proximate to a number of new housing units, which might be disturbed. Accordingly, Mainland Landfall Alternative 2 was excluded from further consideration.
Figure 2.4-6  BITS Alternative 1 Landfall Locations
In contrast to Mainland Alternatives 1 and 2, Mainland Alternative 3 offers a number of advantages. Specifically, Mainland Alternative 3 located is on publicly owned land, which will avoid impacts to private property and eliminate the need to obtain easements from private parties for construction activities. The BITS cable route to this landfall location is through predominantly soft sandy substrate making the use of both the HDD and jet plow methodologies technically feasible and cost-effective. In addition, the proposed landfall location meets the spatial needs of HDD construction activities and offers sufficient space for additional construction staging. For these reasons, Deepwater Wind has selected Mainland Landfall Alternative 3 as the preferred alternative.

2.4.3.4 BITS Alternative 1 Terrestrial Cable Route Alternatives

Based upon the results of the interconnection, submarine cable route, and landing alternatives analysis described in Sections 2.4.3.1 through 2.4.3.3, Deepwater Wind evaluated potential terrestrial cable route alignments from the BITS Alternative 1 preferred landing location to the preferred Narragansett Switchyard Alternative in Narragansett, Rhode Island. Using the same siting criteria as applied to the terrestrial portion of the Project cable routes on Block Island (Section 2.4.2.3), Deepwater Wind identified three potential terrestrial alignments to the preferred Narragansett Switchyard (see Figure 2.4-4). The selection of these alternatives was also further informed by wetland, cultural, and civil surveys (desktop and field) conducted in the fall of 2011, and the winter, spring and summer of 2012.

As depicted in Figure 2.4-4, Mainland Alignment 1 initiates from the preferred landfall location at the Narragansett Town Beach at an existing TNEC’ riser pole located in the Town Beach parking lot. From this riser pole, Mainland Alignment 1 follows TNEC’s existing overhead distribution system right-of-way along Narragansett Avenue (Route 1A) to the DPW access road and interconnection at the proposed Narragansett Switchyard. This alignment will require up to eight new poles and upgrades to up to 30 existing poles.

Mainland Alignment 2 also consists of an overhead route from the riser pole in the Narragansett Town Beach parking lot. This alternative follows the existing TNEC overhead distribution system along Narragansett Avenue (Route 1A) to its intersection with Wanda Street. The overhead alignment follows Wanda Street, a residential street, to its interconnection with Strathmore Road, also a residential street. From Strathmore Road, the route interconnects Narragansett Avenue (Route 1A) again to the DPW access road and then interconnects at the proposed Narragansett Switchyard. This alignment will require approximately six new poles and upgrades to up to approximately 28 existing poles.

Mainland Alignment 3 follows the same proposed route as Alternative 1; however, this route will be located underground along existing road rights-of-way of Boston Neck Road and Narragansett Avenue. This route also requires a new right-of-way along the DPW access road leading to the proposed Narragansett Switchyard.

Alignments 1 and 2, which are predominantly overhead construction rather than buried cable, were found to offer a number of advantages relative to Alignment 3. Specifically, Alignments 1 and 2 minimize the extent of construction disturbance along the roadways, thereby reducing potential traffic, infrastructure, and local community impacts. In addition, ground disturbance will be limited to the installation of new and replacement poles along an existing utility right-of-way thereby minimizing potential environmental impacts. In contrast, Alignment 3 will require constructing a new concrete encased duct bank in State and Town roads. Alignments 1 and 2 also represent substantial cost savings to the Project over Alignment 3.
because of the route distance and construction/installation techniques. For these reasons, Alignment 3 has been excluded from further consideration.

Alignment 2 includes a portion of route along Wanda Street, which is a residential road, whereas Alignment 1 offers the advantage of staying off that street. For this reason, Alignment 1 was selected as the preferred alternative and Alignments 2 and 3 were excluded from further consideration.

### 2.5 Alternative Technologies

#### 2.5.1 Wind Turbine Generators

Deepwater Wind considered multiple currently available offshore turbine technologies in designing the preferred WTG Array as described in Section 2.4.1. Specifically, Deepwater Wind considered the environmental, technical, and financial consequences of the following WTGs and associated combinations to fulfill the purpose and need of the Projects:

- Eight 2.5 MW WTGs = 20 MW BIWF capacity;
- Eight 3.6 MW WTGs = 28.8 MW BIWF capacity;
- Six 5.0 MW WTGs = 30 MW BIWF capacity; and
- Five 6.0 MW WTGs = 30 MW BIWF capacity.

Due to economies of scale, a 30-MW project was determined to be materially more cost effective than smaller project sizes. Therefore, based on the need for cost effectiveness, project sizes smaller than 30 MW were excluded from consideration.5

The configuration consisting of five 6-MW WTGs has the ability to achieve the 30-MW target Project size with the fewest number of WTGs. The use of fewer turbines improves the cost effectiveness of the Project by expediting installation and minimizing environmental impacts, particularly visual impacts and bottom disturbances. As well, use of the larger turbine has the potential for increasing the Wind Outperformance Adjustment Credit, thereby increasing benefits to Rhode Island ratepayers.

For these reasons, a project configuration consisting of five 6.0-MW WTGs was selected as the preferred alternative and other project configurations and turbines were excluded from further consideration.

#### 2.5.2 Foundations

Deepwater Wind considered various currently available foundation technologies in designing the preferred WTG Array as described in Section 2.4.1. Specifically, Deepwater Wind considered the environmental, technical, and financial consequences of the following foundation technologies to fulfill the purpose and need of the Project:

- Monopiles;
- Steel-piled jackets;
- Gravity-based structures; and
- Floating foundations.

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5 In addition, the statutory basis for this Project limited the size of the project to 30 MW. Accordingly, arrays larger than 30 MW were excluded from consideration.
Deepwater Wind evaluated each foundation type based on suitability for the bottom type and water depths for the preferred WTG Array, cost effectiveness, demonstrated success in similar commercial applications, and the supply chain available to support their cost-effective fabrication and installation.

Monopile WTG foundations have been cost effectively installed in water depths of up to 60 ft (18.3 m). A brief suitability assessment of monopile foundations found that the weight of the monopiles would be significantly heavier than jackets at this water depth and thus more costly. Because the Renewable Energy Zone established by the RI Ocean SAMP comprises water depths that are deeper (approximately 80 ft 24.4 km] than the monopiles’ cost-effective range, monopiles were excluded from further consideration.

Steel-piled jacket foundations allow WTGs to be installed in deeper waters compared to monopile foundations using currently available technology. The waters in the Renewable Energy Zone are of a suitable depth to successfully install WTGs using jacket foundations. Jacket foundations have been used in the offshore oil and gas industry for many years, and their application to WTGs has been proven in commercial European offshore wind projects. Additionally, there is a robust U.S.-based supply chain for the construction and installation of steel-piled jackets.

Gravity-based structures were found to be commercially proven and technically feasible given the conditions within the Renewable Energy Zone, but were not cost-effective when compared with steel-piled jackets. Additionally, supply chain issues were identified in setting up for only five foundations. As such, gravity-based structures were excluded from further consideration.

Because floating platforms are still in the development stage, are generally aimed at cost-effective installations at much deeper water depths, and have not been deployed in commercial offshore wind applications, they are not currently considered technically feasible for the Project and were excluded from further consideration.

Due to their cost effectiveness, proven application in numerous offshore wind installations, their ability to meet the Project site conditions and the existence of an established supply chain in the United States, the jacket foundation has been selected as preferred foundation alternative.

### 2.6 Preferred Alternative

Deepwater Wind’s analysis indicates that the proposed location of the BIWF, BITS, and associated facilities as depicted in Figure 1.1-1 (Section 1.1) and turbine technology represent the preferred alternative under the Proposed Action. Section 3.0 provides a detailed description of the Preferred Alternative, including specifics regarding the location, installation, operation, and maintenance and removal of the facilities. Section 4.0 describes the potential environmental impacts resulting from the construction, operation, and decommissioning of the Project and proposed mitigation measures.