MAYFLOWER WIND

Appendix I2. Bat Risk Assessment

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MAYFLOWER WIND

Prepared for:
Mayflower Wind Energy LLC

Final Bat Risk Assessment

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Quality Information

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Revision History

Revision	Revision date	Details	Authorized	Name	Position
0	2/3/2021	COP Submittal	Yes	Nancy Palmstrom	Project Manager
1	8/27/2021	Revised to include Brayton Point Onshore Project Area and updated Falmouth Project Design Envelope, and in response to BOEM comments	Yes	Kristen Durocher	Deputy Project Manager
2	10/27/2021	Response to BOEM comments	Yes	Kristen Durocher	Deputy Project Manager
3	2/4/2022	Revised Brayton Point HVDC layout. Updates to: Figure 2-3 Figure 4-2 Table 4-2	Yes	Kristen Durocher	Deputy Project Manager

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Acronyms and Abbreviations

Abbreviation or Acronym	Definition
3D/E	3D/Environmental
AIS	Air-Insulated Substation
BOEM	Bureau of Ocean Energy Management
CFR	Code of Federal Regulations
CMR	Code of Massachusetts Regulations
COP	Construction and Operations Plan
dB	Decibel (unweighted)
dBA	A-weighted decibel
DCR	Massachusetts Department of Conservation and Recreation
DFW	Division of Fisheries and Wildlife
E	Endangered Species
ECC	Export Cable Corridor
EMF	Electromagnetic Field or Electric and Magnetic Field
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FR	Federal Register
ft	foot/feet
GIS	Gas-Insulated Substation
Ha	hectare
HDD	Horizontal Directional Drilling
HVAC	High Voltage Alternating CUrrent
HVDC	High Voltage Direct Current
IISD	International Institute for Sustainable Development
IPF	Impact Producing Factor
JBCC	Joint Base Cape Cod
kHz	kilohertz
km	kilometer
kV	kilovolt
LED	Light-emitting Diode
m	meter
MassGIS	Massachusetts Bureau of Geographic Information
Mayflower Wind	Mayflower Wind Energy LLC
MESA	Massachusetts Endangered Species Act
mi	mile
NHESP	Natural Heritage and Endangered Species Program
NWR	National Wildlife Refuge
OCS	Outer Continental Shelf
O&M	Operations & Maintenance
OSP	Offshore Substation Platform
OST	Onshore Transmission

POI	Point of Interconnection
RIDEM	Rhode Island Department of Environmental Management
RIGIS	Rhode Island Geographic Information System
RIGL	Rhode Island General Law
ROW	Right of Way
SRANK	State Rank
RSZ	Rotor-swept Zone
SC	Species of Special Concern
SWAP	State Wildlife Action Plan
SWG	State and Tribal Wildlife Grant
T	Threatened Species
U.S.	United States
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WEST	Western EcoSystems Technology, Inc.
WTG	Wind Turbine Generator

1.0 Introduction

Mayflower Wind Energy LLC (Mayflower Wind) proposes an offshore wind renewable energy generation project (the Project) located in federal waters off the southern coast of Massachusetts in the Outer Continental Shelf (OCS) Lease Area OCS-A 0521 (Lease Area). The Project will deliver electricity to the regionally administered transmission system via export cables with sea-to-shore transitions in Falmouth, Massachusetts and Brayton Point in Somerset, Massachusetts, and onshore transmission system extending to the anticipated points of interconnection (POIs) in Massachusetts.

1.1 Assessment Objectives

The objective of this assessment is to identify the species of bats that may be exposed to effects (chance of harm or mortality) as a result of the Project construction, operation, or decommissioning activities. Although this assessment addresses all species that may be found in the Onshore and Offshore Project Areas, there are several bat species that are protected under state and federal laws, and risks to those species are therefore of particular interest.

In this assessment, AECOM identifies potential Impact-Producing Factors (IPFs), discusses the bat community characteristics and key factors that may influence the type and severity of effects posed by those IPFs, and provides qualitative discussion of the effects anticipated as a result of the Project development. AECOM also identifies several avoidance and minimization measures that may reduce the likelihood or severity of potential effects on bats.

1.2 Report Organization

This report is organized to include a general Project overview (Section 2.0), a description of the assessment approach (Section 3.0), a description of the environmental setting (Section 4.0), and a characterization of effects, including the effect of avoidance and minimization measures (Section 5.0). Conclusions are provided in Section 6.0 and references are listed in Section 7.0.

2.0 Project Description

2.1 Project Overview

The Mayflower Wind Project includes a Lease Area located in federal waters south of Martha's Vineyard and Nantucket (Figure 2-1). Wind turbine generators (WTGs) constructed within the Lease Area will deliver power via inter-array cables to the offshore substation platforms (OSPs). Submarine offshore export cables will be installed within offshore export cable corridors (ECCs) to carry the electricity from the OSPs within the Lease Area to the onshore transmission systems via two different ECCs. One ECC will make landfall in Falmouth, Massachusetts and the other will make landfall at Brayton Point, in Somerset, Massachusetts. The offshore export cables will make landfall via horizontal directional drilling (HDD). The proposed Falmouth ECC will extend from the Lease Area through Muskeget Channel into Nantucket Sound to three potential landing location(s) in Falmouth including Shore Street, Central Park, or Worcester Avenue. The proposed Brayton Point ECC will run north and west from the Lease Area through Rhode Island Sound to the Sakonnet River. It will then run north up the Sakonnet River, cross land at Aquidneck Island to Mount Hope Bay, and then north into Massachusetts state waters to Brayton Point. Landfall will be made via HDD at one of two potential landing locations in Somerset on the western side of Brayton Point from the Lee River (preferred) or the eastern side via the Taunton River (alternate).

In Falmouth, the underground onshore export cables will extend from the landfall location(s) to an onshore substation and will be installed within existing paved roadways and shoulder and within a municipal grassy median strip for the Worcester Avenue HDD transition vault (Figure 2-2). The new Falmouth onshore substation will step up the voltage to 345 kilovolts (kV) to enable connection to either an overhead transmission line (preferred) or an underground transmission route (alternate). The selected landfall location will determine the route of the underground onshore export cables between the landfall and the new onshore substation. The proposed Falmouth point of interconnection (POI) to the regional transmission system is an existing switching station (Falmouth Tap). Mayflower Wind anticipates that upgrades to Falmouth Tap will be undertaken by Eversource, as part of a larger reliability project, which is independent of the Mayflower Wind Project. The overhead transmission line will be designed, permitted, and built by Eversource to provide interconnection at Falmouth Tap. The alternate underground transmission route would be constructed within local roadway and/or shoulder extending from the onshore substation to the POI at Falmouth Tap.

As stated above, the Brayton Point ECC includes an overland portion where underground onshore export cables will be installed to cross the northern portion of Aquidneck Island (Figure 2-3). Three route options for the crossing of the island are under consideration, all route options include HDD for entry and exit on/off the island. At Brayton Point, the onshore underground export cables will traverse the site from the landing to the location of a new high voltage direct current (HVDC) converter station (converter station). Underground transmission cable(s) will be constructed from the converter station to the Brayton Point POI, the adjacent existing National Grid substation.

The Falmouth Onshore Project Area includes the landing(s), underground onshore export cables, onshore substation, alternate underground transmission route, and POI at the Falmouth Tap switching station. The Brayton Point Onshore Project Area includes the onshore export cable route options over Aquidneck Island, landing(s) at Aquidneck Island and Brayton Point, the underground onshore export cables, converter station, underground transmission route, and the POI at the National Grid substation. See Figure 2-2 and Figure 2-3 for the Falmouth Onshore Project Area and the Brayton Point Onshore Project Area respectively.

2.2 Specific Project Details

Each primary onshore Project component is briefly described below in Table 2-1. Additional details may be found in the Construction and Operations Plan (COP) Section 3 – Description of Proposed Activities. A diagram of a WTG is included as Figure 2-4.

Table 2-1. Key Project Details

Project Attribute	Description
Landfall Location(s)	Falmouth, MA Three locations under consideration: Worcester Avenue (preferred), Shore Street, and Central Park Brayton Point, Somerset, MA Two locations under consideration: the western (preferred) and eastern (alternate) shorelines of Brayton Point Aquidneck Island, RI Several locations under consideration for intermediate landfall across the island
Onshore Export Cables	Falmouth, MA High voltage alternating current (HVAC) (anticipated); Nominal underground onshore export cable voltage: 200 – 345 kV Up to 12 onshore export power cables and up to five communications cables Length: Up to 6.4 statute miles (mi) (10.3 kilometers [km]) Brayton Point, Somerset, MA HVDC; Nominal underground onshore export cable voltage: ±320 kV Up to 4 export power cables and up to 2 communication cables Length: Up to 3,940 feet (ft) (1,200 m) on Brayton Point Aquidneck Island, RI HVDC; Nominal underground onshore export cable voltage: ±320 kV Up to 4 onshore export power cables and up to 2 communication cables Up to 3 mi (4.8 km) across Aquidneck Island
Onshore Substation/HVDC Converter Station	Falmouth, MA Type: Step up 275-kV to 345-kV; Air-insulated substation (AIS) or gas-insulated substation (GIS) Location: Two locations under consideration: Lawrence Lynch (preferred), and Cape Cod Aggregates (alternate) Area: Up to 26 acres (10.5 hectares [ha]) Brayton Point, Somerset, MA Type: HVDC Converter Station Location: On the Brayton Point property area under consideration Area: Up to 7.5 acres (3.0 ha)
Transmission from Onshore Substation/Converter Station to POI	Falmouth, MA New, 345-kV overhead transmission line along existing utility right of way (ROW) (preferred) (to be designed, permitted, and built by Eversource) Up to 5.1 mi (8.2 km) in length New, 345-kV underground transmission route (alternate) Up to 2.1 mi (3.4 km) in length Brayton Point, Somerset, MA New 345-kV underground transmission route to National Grid substation HVAC; nominal underground transmission cable voltage: up to 345 kV Up to 2,788 ft (850 m) on Brayton Point property
Point of Interconnection	Falmouth, MA Falmouth Tap (new or upgraded switching station to be designed, permitted, and built by Eversource) Brayton Point, Somerset, MA Existing National Grid substation

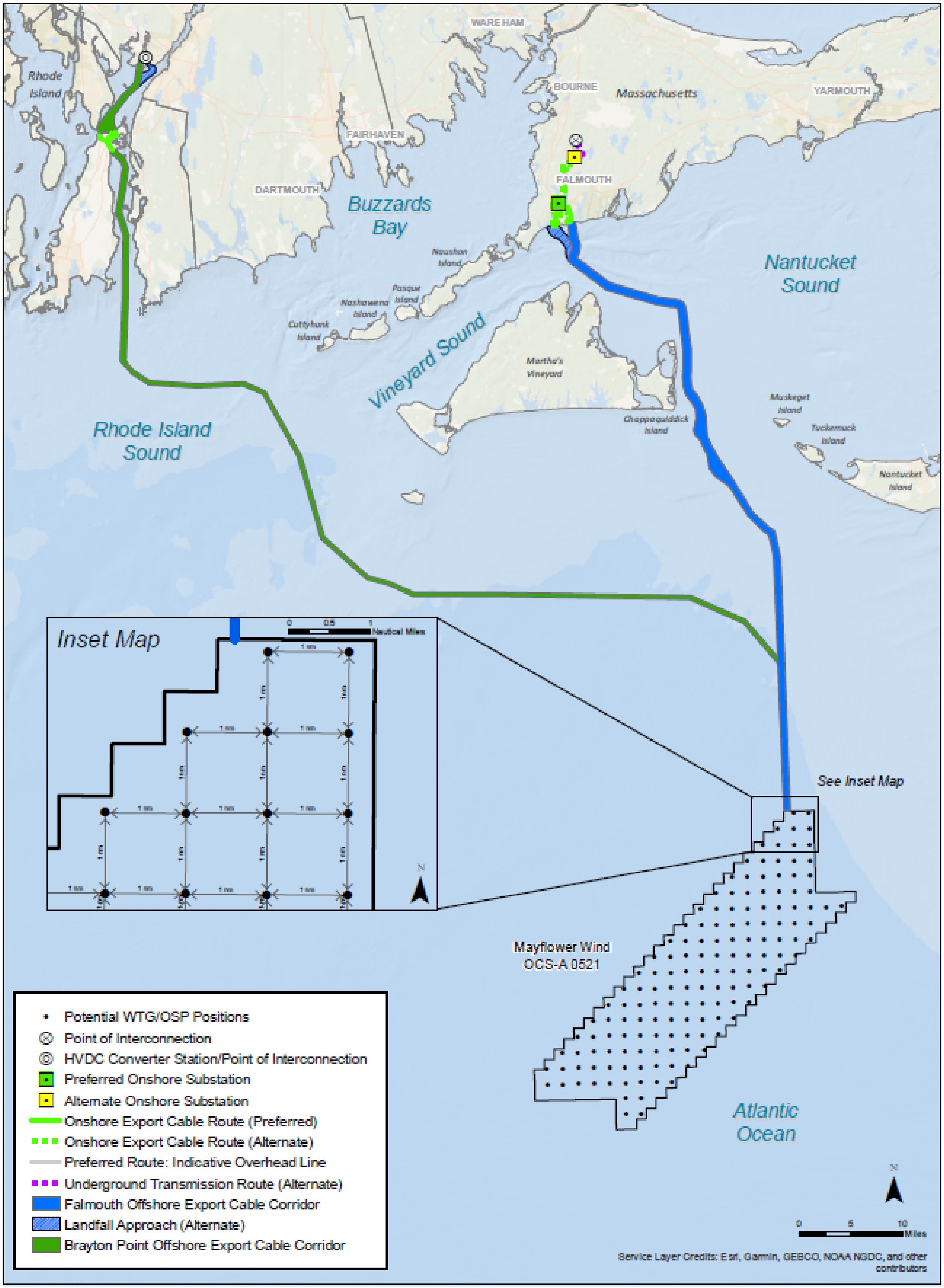


Figure 2-1. Location of Mayflower Wind Offshore Wind Renewable Energy Generation Project

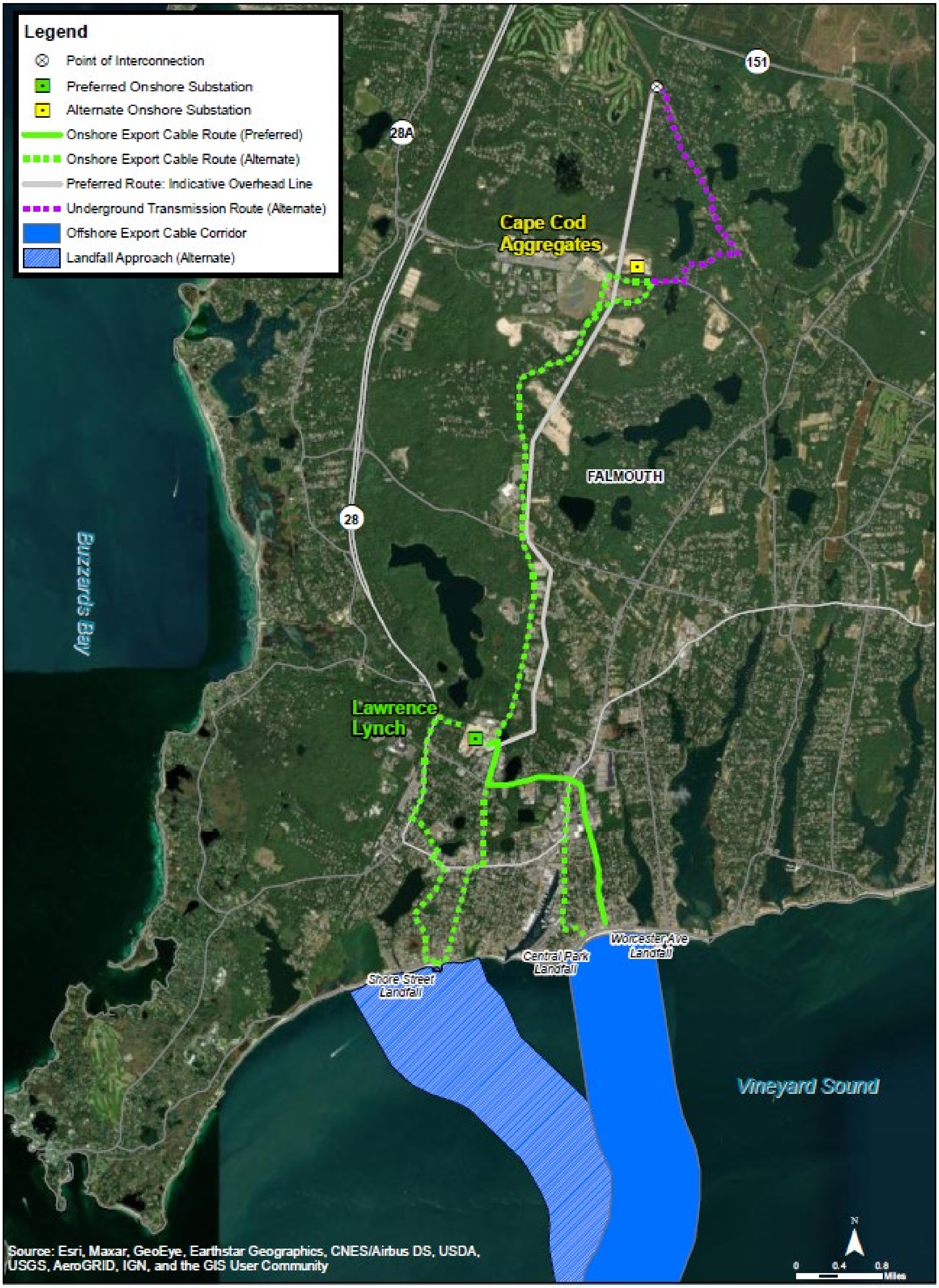


Figure 2-2. Location of Mayflower Wind Landfall and Onshore Project Elements - Falmouth

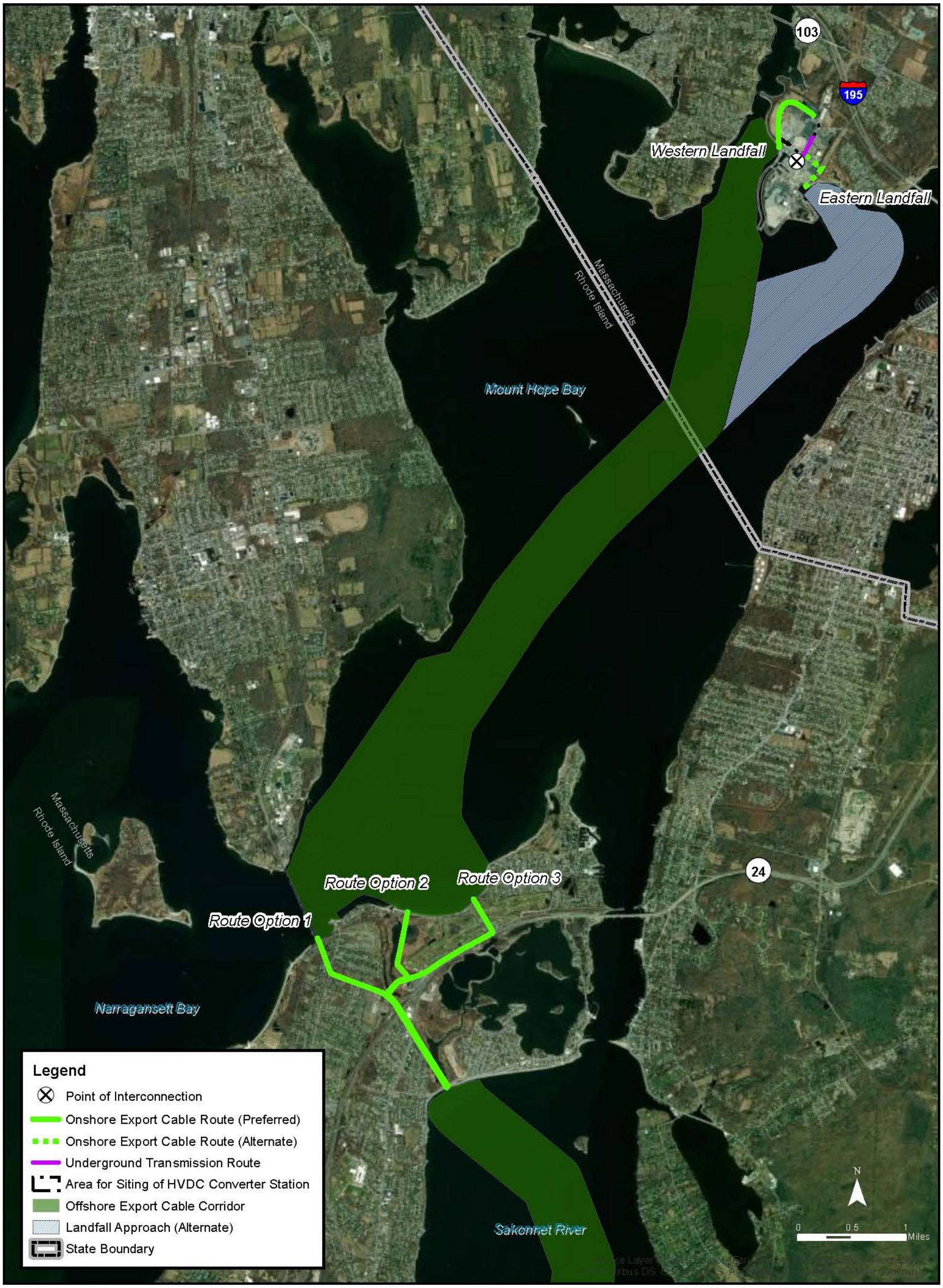


Figure 2-3. Location of Mayflower Wind Landfall and Onshore Project Elements – Brayton Point

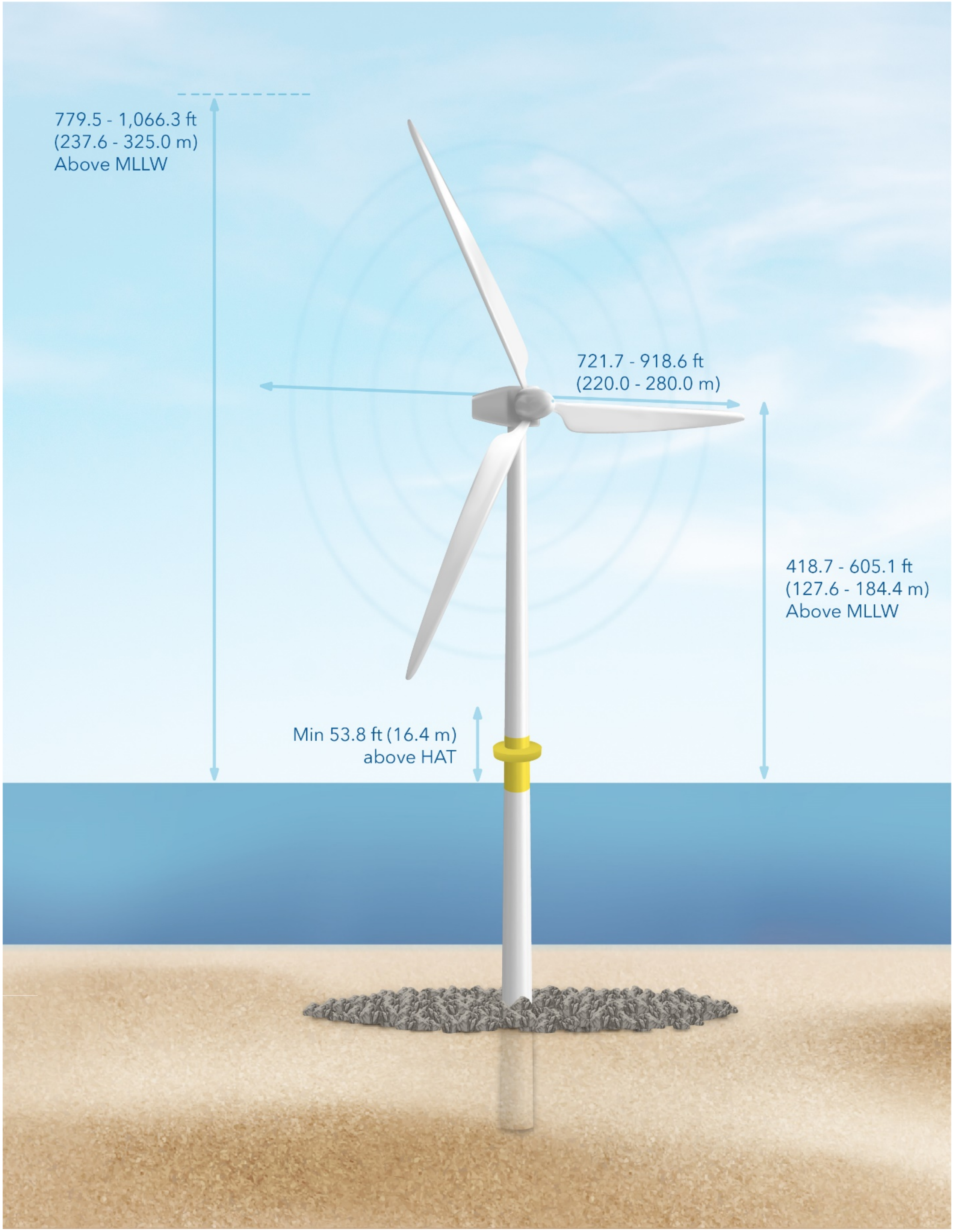


Figure 2-4. Indicative WTG Diagram

3.0 Assessment Approach

Interactions between bats and WTGs are the subject of a developing field of research, and much of what is known about bat-related mortality and risk associated with WTGs has been learned through scientific studies and post-construction mortality monitoring at onshore wind facilities. Comparatively little is known about bat foraging and migration activities in the offshore environment, including the Project's Lease Area, although recent studies in the Mid-Atlantic and OCS have established that bats are in fact using these areas for migration and foraging activities (Key Factor 1, Section 3.1.1). This Risk Assessment relies on desktop resources, including scientific research, nearby offshore acoustic survey results, and behavioral studies regarding bats' reactions to various conditions and stimuli that may be similar to those presented by various stages of the Project. This Risk Assessment considers the available information using a "weight of evidence" approach that prioritizes literature and data that are: 1) the most recent; 2) the best supported; and 3) the most clearly applicable to the activities and locations that pertain to the Project.

3.1 Key Risk Factors Considered

To analyze the type and degree of ecological risk posed by the IPFs listed in COP Section 3.4, AECOM considered a variety of factors that may contribute to or mitigate potential direct and indirect effects. These "key risk factors" include both external (weather, environmental conditions) and intrinsic (behavior, species abundance) considerations. Seven key risk factors are listed below and are considered in Sections 3.1.1 - 3.1.8 of this Risk Assessment.

- Key Risk Factor 1: Bat abundance and seasonal use;
- Key Risk Factor 2: Bat behavior;
- Key Risk Factor 3: Bat flight height;
- Key Risk Factor 4: Risk of collision;
- Key Risk Factor 5: Modification of foraging and roosting habitat;
- Key Risk Factor 6: Weather conditions;
- Key Risk Factor 7: Visibility and lighting; and
- Key Risk Factor 8: Noise sensitivity.

3.1.1 Key Risk Factor 1: Bat Abundance and Seasonal Use

There are many records, both historical and contemporary, of bats flying over marine environments (Hatch et al., 2013; Mackiewicz & Backus, 1956; Nichols, 1920; Peterson, 1970; Thompson et al., 2015; Zenon et al., 2011). Migratory species, particularly eastern red bats, appear to be the most common North American bat species observed offshore based on the available record. Migratory species have been known to occur on remote islands (for example, Hawaiian hoary bats), and eastern red bats are known to occur seasonally on the island of Bermuda, indicating that they are capable of travelling over 620 miles (1,000 km) over open water (Allen, 1923; Grady & Olson, 2006; Van Gelder & Wingate, 1961).

Acknowledging that bats at least occasionally use the marine environment for migration or foraging, there are several studies that may provide a baseline understanding of the presence, abundance, and seasonality of bats within the Project Area (including the OCS, State Waters, and coastal lands of Massachusetts) and the northeast. A summary of these studies is as follows:

- Pelletier et al. (2013) compared acoustic detection data from inland, coastal, and offshore survey locations to model acoustic activity in the Gulf of Maine. Acoustic results were analyzed to compare detection probability and activity level (intensity based on rate of file recording per unit of recording time). Researchers found that bat activity was observed at all sites, and that acoustic activity was highest at coastal sites. Migratory species were as likely to be detected offshore as they were at inland or coastal sites (though activity levels were lower), whereas cave-hibernating species were less likely to be detected offshore.

- Stantec Consulting Services, Inc. (Stantec) (2016a) conducted a long-term study of bat movements in the coastal, near-shore, and offshore environments of the northeast, mid-Atlantic, and Great Lakes from 2012-2014, building upon the data collected by Pelletier et al. (2013). This study is the largest of its kind and represents one of the most robust datasets of coastal bat movements available. Stantec found that bat activity was highly seasonal, with peak activity periods in the spring and fall migration periods. The fall had the greatest recorded bat activity levels, with eastern red bats and other migrants representing the most frequently observed species. Bat calls were detected from 3 - 80 miles (5 - 130 km) offshore, including several detections approximately 9 - 30 miles (14 - 49 km) southeast of Montauk and Block Island, west of the Lease Area. Montauk and Block Island are approximately 72 miles (115 km) and 59 miles (95 km) from the Lease Area, respectively.
- Smith and McWilliams (2012) used passive acoustic monitoring at six locations in Rhode Island National Wildlife Refuges (NWRs), including one site each at Sachuest Point NWR, Trustrom Pond NWR, Ninigret NWR, and Rhode Island NWR pond house, and two locations on Block Island NWR. The goal of their study was to compare the relative activity, species composition, and seasonal and nightly patterns of migrating bats at the six survey locations. The researchers found a high degree of seasonality to bat activity during peak periods, with most bat activity recorded prior to the end of the first week of October. They also found that bat activity was not consistent across nights, but that a large portion of each site's annual activity occurred on a small number of nights. Migratory species were the most commonly identified calls, and bat activity was greatest just after sunset. Atmospheric conditions (e.g., wind conditions, atmospheric pressure, temperature, humidity) also appeared to correlate to bat activity levels, with higher passage rates associated with conditions that typically correlate to approaching cold fronts.
- Tetra Tech and DeTect (2012) conducted passive acoustic surveys at four locations on Block Island and on two offshore buoys as part of their pre-construction surveys for Deepwater Wind's Block Island Wind Farm. They detected bat activity at all survey locations except at the furthest buoy, which was located approximately 15 nautical miles (27.8 km) east of Block Island. Bat activity followed a seasonal pattern, with most bat activity occurring in late spring or late summer/early fall. Hoary bats, silver-haired bats, and eastern red bats were identified to species, and several calls were identified as *Myotis* sp. A number of calls (29 percent) were high frequency but could not be confidently identified to genus or species (could be *Myotis* sp, *P. subflavus*, or *L. borealis*).
- Vessel-based surveys conducted during the construction phase near Block Island recorded bat calls in the Block Island Wind Farm lease area located approximately 59 nautical miles (95 km) west of the Offshore Project Area. Of the calls recorded, most were eastern red bats, followed by silver-haired bats (Stantec, 2016b, as cited in Stantec, 2018). Post-construction acoustic surveys at the Block Island Wind Farm in the Fall and Winter of 2017-2018 found that passage rates were highest in September, and that the majority of passing bats were eastern red bats or other long-distance migrants (Stantec, 2018).
- Dowling et al. (2017) conducted a manual and automated telemetry study of northern long-eared bats on Martha's Vineyard in 2015 and 2016. Researchers tagged a total of 36 bats in the two years of study, including 20 northern long-eared bats, five little brown bats, seven big brown bats, and four eastern red bats with coded very high frequency nanotags. Tagged bats were tracked manually to their daily roost sites and tracked automatically within the Motus wildlife tracking network by automated telemetry stations. The researchers did not detect any offshore movement of northern long-eared bats, but did detect offshore movement of other species, including little brown bats. These offshore detections were limited in range due to the limited range of detection for each tower in the Motus network (estimated at approximately 15 miles [25 km]).
- A number of mist netting, acoustic, and telemetry surveys at Camp Edwards Joint Base Cape Cod (JBCC) have confirmed the presence of northern long-eared bats, eastern small-footed bats, little brown bats, and tricolored bats on Cape Cod, among other more common species (Tetra Tech & Mead & Hunt, 2015; Tetra Tech, 2015; Tetra Tech, 2017; WEST, 2017). No hibernacula nor maternity roosts for northern long-eared bats are known to occur within 0.25 miles (0.4 km) of the Mayflower Wind Falmouth Onshore Project Area (NHESP, 2019).

The body of evidence provided by nearby studies in the OCS and coastal regions of the northeastern United States indicates that bats may be present within the Lease Area and export cable corridors and are likely to be present within the onshore transmission and onshore substation areas. Both migratory and cave-hibernating species are anticipated to be seasonally common within the onshore areas. Bats are expected to be less common and more seasonal in their occurrence as distance from shore increases, mostly occurring during migration periods. Within the Lease Area, the majority of passing bats are likely to be migratory species. In its response to the information request for the Project, the Natural Heritage and Endangered Species Program (NHESP) did not identify any priority habitats for bat species of concern.

3.1.2 Key Risk Factor 2: Bat Behavior

For the purposes of this Risk Assessment, the consideration of bat behavior is confined to those behaviors that may increase the likelihood of positive or negative interaction with Project facilities and activities in the Lease Area.

The manner in which migrating or foraging bats interact with novel objects such as vessels, WTGs, and buoys (attraction, repulsion) has obvious implications for the risks associated with collision (including turbine strikes and barotrauma) and caloric expenditure. Research on the interactions of bats with wind turbines and other tall, anthropogenic structures has demonstrated an overall pattern of attraction (Cryan & Barclay, 2009; Cryan et al., 2014; Jameson & Willis, 2014; Kunz et al., 2007; Smallwood & Bell, 2020). This pattern of attraction to novel anthropogenic structures has been observed in nearby offshore areas – during the installation of offshore turbines at Block Island Wind Farm, construction vessel crews observed multiple instances of bats found roosting on the vessels during daytime hours (Stantec, 2016b as cited by Stantec, 2018).

Bats could be attracted to tall structures for a variety of reasons. For example, if tall structures are mistaken for trees, bats may attempt to roost on them or forage near them (Cryan & Barclay, 2009). However, bat mortalities at wind farms tend to affect migratory species more than non-migrants, and mortalities are distributed bimodally (most occurring in spring and fall), rather than evenly throughout the year (Arnett et al., 2008). A recent study by Jameson and Willis (2014) suggests that migratory species may use tall, anthropogenic structures as social hubs, rather than foraging grounds, during periods of spring and fall migration. Further contributing to the risk of collision, a recent study by Smallwood and Bell (2020) suggests that bats may be more likely to interact with operational turbines than inoperable or curtailed turbines. Their study found that bats were not only more likely to be struck by blades or have their flight interrupted by active WTGs, but that bats were more likely to pass through the rotor-swept zone (RSZ) of active WTGs than inactive ones.

The best available literature suggests that there is a chance of bats interacting with offshore WTGs, vessels, and structures, due in part to the potential attraction of such features for bats, in particular for migratory species.

3.1.3 Key Risk Factor 3: Bat Flight Height

The flight height of bats relative to the RSZ has obvious implications for the risk of collision posed by WTGs. Unfortunately, very little information is available regarding the flight height of bats within the OCS or the Lease Area. Hatch et al. (2013) observed 17 eastern red bats flying over the ocean in the mid-Atlantic region, ranging from 10 - 26 miles (16 - 42 km) offshore. Flight heights were typically 330 – 660 ft (100 - 200 m) above sea level or greater. Other studies have shown bats to fly at lower than usual elevations when flying over water. For example, Ahlén et al. (2007, 2009), found that most bats flew at low altitudes over water, often less than 32.8 ft (10 m) above the water's surface, using radar and visual observation of migrating and foraging bats over the ocean. Rydell (1986) observed that bats foraging over the surface of a lake typically flew 7 – 16 ft (2 - 5 m) above the ground.

Bats may fly at low altitudes over water as a way of taking advantage of the aerodynamic ground effect, where the ground surface (or in this case, water) reduces the energy required to sustain flight by acting as an aerodynamic mirror. By flying within the ground effect, bats may be able to reduce aerodynamic power by nearly 30 percent (Johansson et al., 2018). Flying at low elevations may also allow bats to avoid the highest wind speeds during inclement weather, as the air encounters friction with the water's surface.

Bats may also fly at low altitudes over water for the purpose of echolocation and foraging. Insects may be more plentiful near the surface of the water when air temperatures cool and the surface of the water may allow bats to echolocate more easily. Evidence suggests that bats may take advantage of an “echo-acoustic ground effect” to more easily target insects over smooth surfaces like the surface of water (Zsebok et al., 2013).

In addition to normal flying behaviors, there is sufficient evidence from onshore and offshore facilities to suggest that bats may be attracted to WTGs and frequently interact with turbine blades in the RSZ (Ahlén et al., 2007; Arnett et al., 2008; Cryan et al., 2014; Cryan & Barclay, 2009).

3.1.4 Key Risk Factor 4: Risk of Collision

There is a growing body of evidence to indicate that bat migration and foraging over marine environments is a relatively common phenomenon, and that certain behaviors may increase the risk of collision with turbine blades. Studies at onshore wind facilities have found significant seasonal mortality risk to bats, particularly migratory species (Arnett et al., 2008). The primary cause of mortality at wind farms is the moving turbines, either through collision with moving blades or through barotrauma caused by rapid pressure changes at the tips and trailing edges of blades (Cryan & Barclay, 2009), though recent studies indicate barotrauma may be a less common occurrence than once thought (Rollins et al., 2012). The vast majority of bats found beneath operational turbines with observed injuries do not survive the rehabilitation process. However, it is not likely that the differential between offshore and onshore environments has a material effect on overall fatality rates.

3.1.5 Key Risk Factor 5: Modification of Foraging and Roosting Habitat

Construction of new, novel structures in the offshore environment could create new roosting habitats for migrating bats. Migrating bats have shown a willingness to roost on anthropogenic structures at sea, including vessels (Stantec, 2018; Thompson et al., 2015). Construction vessels and infrastructure associated with the turbine towers or the OSP(s) could potentially be appealing roosts to migrating bats.

The greatest potential for disruption of typical foraging and roosting habitats is in the onshore environment where bats typically roost and forage, because many bats are philopatric (tending to stay near or return to a particular area) (Lewis, 1995; Perry, 2011). If forced to find new roost trees or foraging grounds, bats may expend a greater amount of energy during vulnerable times of the year, such as upon return to summer maternity areas after winter hibernation or spring migrations, when bats may be expected to have lower than average fat reserves and high energetic demands for pregnancy. Some limited tree clearing may be necessary for the construction of the onshore Project components (i.e., the substation at the Lawrence Lynch site).

3.1.6 Key Risk Factor 6: Weather Conditions

Evidence suggests that weather conditions and patterns influence bat behavior and may affect migration patterns and flight height (Kunz et al., 2007; Smith & McWilliams, 2012; Smith & McWilliams, 2016). Some relationships between weather conditions and bat activity or mortality near WTGs are better understood than others. For example, mortality at onshore wind facilities has been shown to vary with temperature and windspeed (Arnett et al., 2008), and this relationship has been supported by the success of windspeed and temperature-dependent curtailment strategies at wind farms (Arnett et al., 2010; Hayes et al., 2019). Cold temperatures, excessive windspeed, and precipitation are all associated with lower overall bat activity and reduced mortality at wind farms (Arnett et al., 2008). In less extreme wind conditions, some studies have indicated an increase in migratory bat activity with small increases in overall windspeed, with a greater influence attributed to wind profit (wind speed relative to the expected direction of migratory flight) (Arnett et al., 2007; Smith & McWilliams, 2012; Smith & McWilliams, 2016).

Changes in weather, such as storm fronts, may also influence bat mortality. For example, bat fatalities at wind turbines occur more frequently with the passage of storm fronts (Arnett et al., 2008). However, the exact relationship between some indicators of front passage, such as humidity and barometric pressure, and bat activity are less clear. Some studies have indicated increased bat activity (measured by acoustic detection or capture rates using mist nets) associated with low or decreasing barometric pressure (Cryan & Brown, 2007;

Baerwald & Barclay, 2011; Dechmann et al., 2017), while others have suggested just the opposite (Bender & Hartman, 2015; Gonzalez & Bender, 2017; Smith & McWilliams, 2016). In their coastal New England study area, Smith and McWilliams (2012) noted that increased bat activity with favorable wind profit and increasing atmospheric pressure was correlated with the passage of cold weather fronts, indicating that migratory bats may have been traveling at least partly in response to indicators of changing seasonal conditions.

It is also unclear whether humidity plays a significant role in bat activity. Lacki (1984) found that little brown bats were more active during periods of high humidity, speculating that this was a result of higher ambient water vapor pressures producing lower vapor pressure deficits between the bats' respiratory tracts and the environment, resulting in less evaporative water loss. However, other studies which considered humidity among other weather parameters did not find humidity or changes in humidity to be strongly correlated with bat activity when controlled for other variables such as temperature and barometric pressure (Gonzalez & Bender, 2017; Smith & McWilliams, 2016).

3.1.7 Key Risk Factor 7: Visibility and Lighting

Various bat species react differently to light and some appear to be more willing than others to cross illuminated areas (Hale et al., 2015; Mathews et al., 2015; Spoelstra et al., 2017). Because the insects on which bats feed are attracted to light, some species of bats may seek out light sources in search of food. Fast-flying species (e.g., *Eptesicus* or *Lasiurus* spp.) appear to seek light sources more than slower-flying species (e.g., *Myotis* spp.) (Rydell, 1992; Rydell & Racey, 1995). For example, in residential areas, bats can often be seen foraging for insects near porch lights, stadiums, and pole lights. For other species, illuminated roadways and similar "light barriers" limit movement across the landscape as the bats, perhaps avoiding a perceived increase in predation risk, avoid those lit corridors (Hale et al., 2015).

Light of different wavelengths may affect bats differently and those effects may vary by species or season. For example, some studies have suggested that migratory species of bats were attracted to red light-emitting diode (LED) lights (Voigt et al., 2018) and green LED lights (Voigt et al., 2017), but not to warm white lights (Voight et al., 2018). However, this theory is contradicted by Spoelstra et al. (2017), who found that bat behavior was affected by white and green lights, but not red lights. Perhaps more relevant to the context of this Risk Assessment, a number of studies have demonstrated that aviation safety lights are not associated with a greater risk of mortality at onshore WTG locations (Arnett et al., 2008; Bennet & Hale, 2014; Horn et al., 2008).

Researchers have also found that migrating bats did not make more "feeding buzzes" (rapid echolocations across a broad frequency range associated with the taking of a prey item) in the presence of light, which may indicate that migrating bats are not attracted to light sources primarily as foraging grounds (Voight et al., 2017; Voight et al., 2018). Voight hypothesized that bats may be attracted to lights during migration because they are relying on vision more than echolocation or other environmental cues for orientation. This hypothesis finds support in other studies which demonstrated that non-migratory bat species seem to use polarized light at dusk to aid in orientation and navigation (Greif et al., 2014), whereas migratory bats do not (Lindecke et al, 2015).

3.1.8 Key Risk Factor 8: Noise Sensitivity

Construction, operations, and decommissioning will all result in some level of noise disturbance in the Offshore and Onshore Project Areas (COP Appendix U1, In-Air Acoustic Assessment Report). The degree of impact resulting from such disturbances is dependent on a variety of factors, including the amount of noise generated, the distance it travels, the degree to which bats are exposed to it, and the sensitivity of bats to anthropogenic noise. The distance that noise travels is dependent on many variables such as equipment type, vegetative cover, topography, and other barriers.

Another factor to consider when analyzing the effect of noise on roosting bats is the biology of their hearing. Noise ratings for construction equipment are typically provided in A-weighted decibels (dBA), which is based on the peak noise response of human hearing. The perceived noise level from similar equipment would likely be lower for the hearing range of bats, which is centered on higher frequency and faster-attenuating pitches. The little brown bat (*Myotis lucifugus*), for example, has a typical range of hearing from approximately 10 kilohertz (kHz) – 120 kHz (Grinnell, 1963), and their own echolocation calls are quite loud, often up to or exceeding 120 decibels (dB). While construction noises may certainly occupy a wide frequency range, most are not ultrasonic in nature. High frequency sounds also attenuate more quickly than low frequency sounds, and do not travel as far from their source.

Early literature on the subject seemed to indicate that some species of bats may seek roost sites away from noise sources. For example, Indiana bats, especially reproductive females, have been shown to typically roost farther from noisy, paved roads and highways than they do from quieter gravel ones (Gardner, 1991). However, factors other than noise may also contribute to this correlation – gravel roads may be narrower and present less risk of predation as an open space barrier for travel and foraging activities, may have fewer street lamps, may carry less risk of injury and death via collision with vehicles, or may have less surrounding human development. Gardner (1991) suggested that noise and exhaust from machinery may disturb colonies of roosting bats, though he noted that such disturbances would have to be severe to cause roost abandonment.

Subsequent studies generally seem to indicate that bats are very tolerant of anthropogenic noise, including persistent and sudden noises. Documented instances can be found of bats roosting in very noisy circumstances: near airports (FAA, 1992); near highways (Brack et al., 2004); regularly crossing major highways (3D/E, 1995); roosting under concrete road bridges and underpasses (Kiser et al., 2002); and roosting and foraging on active military bases where construction and training activities take place during the active season (3D/E, 1996). These instances seem to indicate that bats are either indifferent to many anthropogenic noises or, at the very least, adapt to them without major disruption.

4.0 Environmental Setting

4.1 Habitats within the Project Area

The following provides a description of potential habitat occurring within the Project Area.

4.1.1 Offshore Habitat

The Lease Area consists of open ocean, and post construction will contain WTGs and OSPs. The Lease Area falls within the migratory path of bats. The Lease Area contains no above water structures that could serve as roosts for bats.

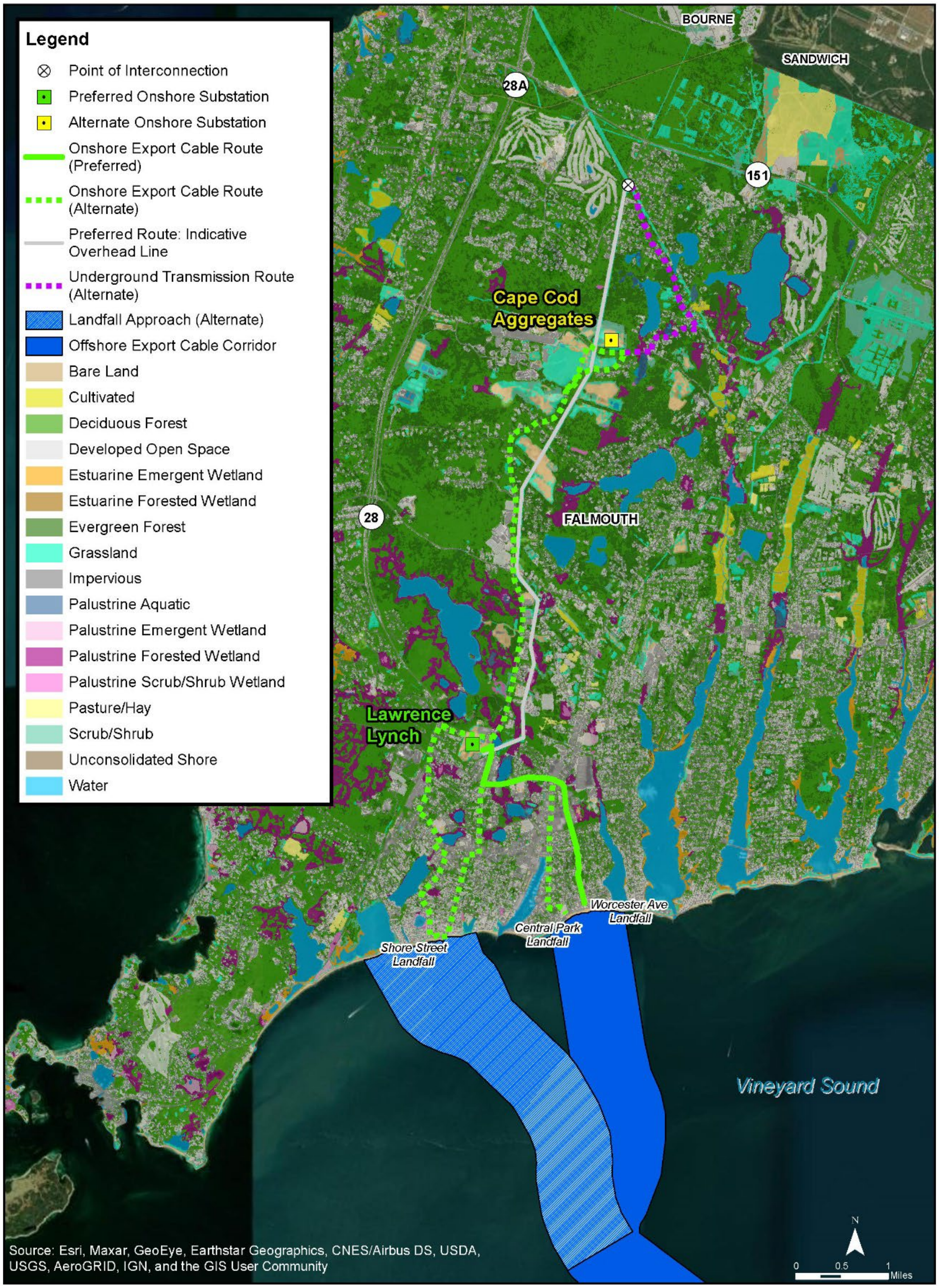
4.1.2 Terrestrial Natural Communities

The onshore portion of the Project will be tied into existing infrastructure, including existing roads and existing utility ROWs within the Town of Falmouth, MA (Falmouth Onshore Project Area) and the town of Somerset, MA and on Aquidneck Island, Portsmouth, Rhode Island (Brayton Point Onshore Project Area).

The natural environment in Falmouth is classified by the United States (U.S.) Environmental Protection Agency (EPA) as a Pine Barren (84) level III ecoregion, and further classified by the Massachusetts Division of Fisheries and Wildlife (DFW) as Cape Cod Coastal Lowlands and Islands Ecoregion (221Ab). This ecosystem is characterized by coastal deposits and outwash plains left by receding glaciers. The Falmouth Onshore Project Area is situated along the spine of the terminal moraine, or the point of maximum glacial advance, of the Wisconsin glaciation. The soil is predominantly sandy, acidic, and lacking nutrients. Vegetation common to this ecoregion includes short or stunted oaks and pines (Swain, 2020).

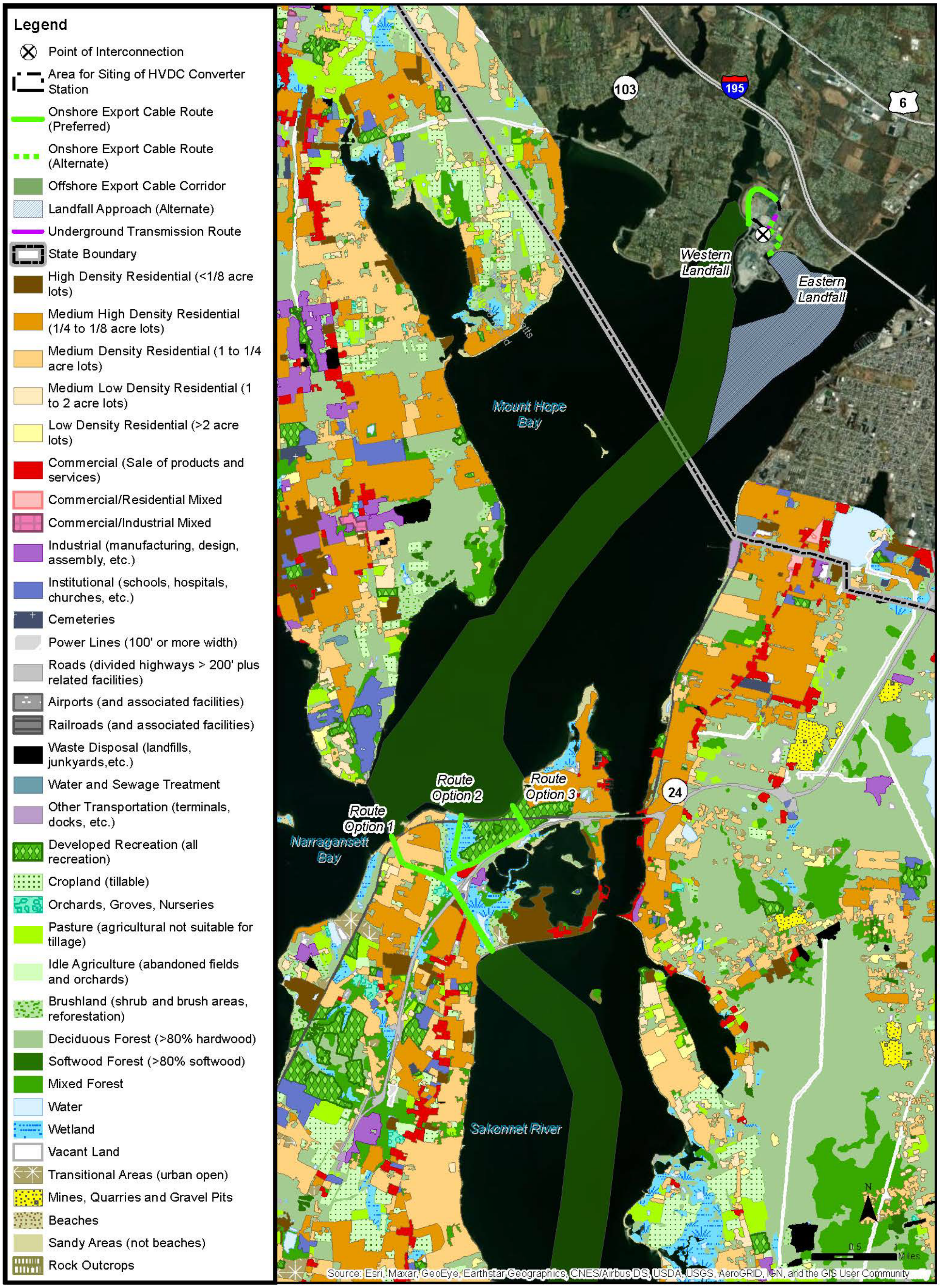
The Brayton Point Onshore Project Area is classified by the United States (U.S.) Environmental Protection Agency (EPA) as a Northeastern Coastal Zone (59) level III ecoregion, and the Brayton Point area is further classified by the Massachusetts DFW as Narragansett-Bristol Lowland and Islands Ecoregion (221Ac). Aquidneck Island is characterized as EPA level IV Narragansett/Bristol Lowland Ecoregion. This ecosystem is characterized by sedimentary rock (sandstone, graywacke, shale, conglomerate). The vegetation is generally varied, with oak-hickory and oak-pine forests due to coastal influences. Wetlands and cranberry bogs are abundant amongst the mixed forest.

Natural communities in the Falmouth and Brayton Point Onshore Project Areas were estimated using MassGIS (2018c), RIGIS (2021), and the NatureServe (2018) raster dataset, which were used to create Figure 4-1 and Figure 4-2, respectively. Table 4-1 and Table 4-2 provide the approximate percentage of natural communities within the Falmouth Onshore Project Area and Brayton Point Onshore Project Area, respectively. Field reviews of the Onshore Project Areas will be required to confirm the communities present as well as the relative proportions of these communities. For the purposes of this report, individual communities identified by NatureServe were grouped into more general descriptive categories. Onshore natural communities are described in detail within COP Appendix J, Terrestrial Vegetation and Wildlife Assessment.



Data Source: MassGIS, 2018c, NatureServe, 2018

Figure 4-1. Location and Extent of Natural Communities in the Falmouth Onshore Project Area and Surrounding Landscape



Data Source: RIGIS, 2021

Figure 4-2. Location and Extent of Natural Communities in the Brayton Point Onshore Project Area and Surrounding Landscape

Table 4-1. Natural Communities Within the Falmouth Onshore Project Area

Land Use / Natural Community	Acres	Hectares	Percentage of Total Land Area
Landfall Locations (40 ft [12-m] corridor)			
Worcester Avenue (Preferred)			
Bare Land	0.260	0.105	24.9
Coastal Beach	0.617	0.250	59.2
Impervious	0.100	0.041	9.6
Unconsolidated Shore	0.065	0.026	6.2
Total	**1.043**	**0.422**	**100.0**
Shore Street (Alternate)			
Bare Land	0.111	0.045	11.1
Impervious	0.876	0.029	80.3
Unconsolidated Shore	0.090	0.036	8.2
Water	0.014	0.006	1.3
Total	**1.043**	**0.422**	**100.0**
Central Park (Alternate)			
Deciduous Forest	0.007	0.003	0.2
Developed Open Space	3.760	1.522	85.5
Impervious	0.629	0.255	14.3
Total	**4.397**	**1.779**	**100.0**
Onshore Export Cable Routes (40-ft [12-m] corridor)			
Worcester Avenue Route (Preferred)			
Bare Land	0.503	0.204	2.5
Deciduous Forest	2.889	1.574	19.5
Developed Open Space	5.232	2.117	26.2
Evergreen Forest	0.158	0.064	0.8
Grassland	0.178	0.072	0.9
Impervious	9.698	3.924	48.6
Palustrine Aquatic Bed	0.007	0.003	0.0
Palustrine Forested Wetland	0.131	0.053	0.7
Palustrine Scrub/Shrub Wetland	0.083	0.033	0.4
Scrub/Shrub	0.062	0.025	0.3
Total	**19.941**	**8.070**	**100.0**

Land Use / Natural Community	Acres	Hectares	Percentage of Total Land Area
Shore Street Route Eastern Option (Alternate)			
Bare Land	0.137	0.055	0.8
Deciduous Forest	3.076	1.245	18.1
Developed Open Space	2.839	1.149	16.7
Evergreen Forest	0.221	0.089	1.3
Grassland	0.138	0.056	0.8
Impervious	10.533	4.263	62.0
Scrub/Shrub	0.043	0.017	0.3
Total	**16.987**	**6.874**	**100.0**
Shore Street Route Western Option (Alternate)			
Bare Land	0.029	0.012	0.1
Deciduous Forest	3.874	1.568	17.6
Developed Open Space	3.970	1.607	18.0
Evergreen Forest	0.131	0.053	0.6
Grassland	0.102	0.041	0.5
Impervious	13.613	5.509	61.7
Palustrine Emergent Wetland	0.016	0.006	0.1
Palustrine Forested Wetland	0.235	0.095	1.1
Scrub/Shrub	0.088	0.036	0.4
Total	**22.056**	**8.926**	**100.0**
Central Park Route (Alternate)			
Bare Land	0.067	0.027	0.6
Deciduous Forest	1.526	0.618	12.8
Developed Open Space	2.426	0.982	20.3
Evergreen Forest	0.060	0.024	0.5
Impervious	7.874	3.186	65.9
Total	**11.953**	**4.837**	**100.0**
Lawrence Lynch to Cape Cod Aggregates Route (Alternate)			
Bare Land	0.125	0.051	0.3
Deciduous Forest	9.348	3.783	24.9
Developed Open Space	4.135	1.673	11.0
Evergreen Forest	3.731	1.510	10.0
Grassland	0.217	0.088	0.6
Impervious	18.941	7.665	50.6
Palustrine Forested Wetland	0.792	0.320	2.1

Land Use / Natural Community	Acres	Hectares	Percentage of Total Land Area
Scrub/Shrub	0.177	0.072	0.5
Water	0.001	0.001	0.0
Total	**37.468**	**15.163**	**100.0**
Paper Road – Thomas B Landers Road Deviation (Alternate)			
Bare Land	1.150	0.465	16.4
Deciduous Forest	1.629	0.659	23.3
Developed Open Space	0.428	0.173	6.1
Evergreen Forest	0.196	0.079	2.8
Grassland	1.109	0.449	15.8
Impervious	2.267	0.918	32.4
Scrub/Shrub	0.223	0.090	3.2
Total	**7.001**	**2.833**	**100.0**
Onshore Substation Locations			
Lawrence Lynch (Preferred)			
Bare Land	18.788	7.603	76.3
Impervious	0.627	0.254	2.5
Deciduous Forest	2.693	1.090	10.9
Grassland	1.277	0.517	5.2
Water	0.842	0.341	3.4
Scrub/shrub	0.134	0.054	0.5
Developed Open Space	0.148	0.060	0.6
Palustrine Aquatic Bed	0.108	0.044	0.4
Total	**24.617**	**9.962**	**100.0**
Cape Cod Aggregates (Alternate)			
Bare Land	12.672	5.128	41.4
Deciduous Forest	1.185	0.480	3.9
Developed Open Space	0.069	0.028	0.2
Evergreen Forest	1.176	0.476	3.8
Grassland	7.946	3.216	26.0
Impervious	0.038	0.015	0.1
Scrub/Shrub	7.521	3.044	24.6
Total	**30.606**	**12.386**	**100.0**

Land Use / Natural Community	Acres	Hectares	Percentage of Total Land Area
Underground Transmission Route (alternate) from Cape Cod Aggregates to POI (100-ft [30-m] corridor)			
Bare Land	0.104	0.042	0.2
Deciduous Forest	12.951	5.241	25.3
Developed Open Space	6.048	2.447	11.8
Evergreen Forest	13.365	5.408	26.1
Grassland	4.123	1.669	8.1
Impervious	12.436	5.032	24.3
Palustrine Aquatic Bed	0.147	0.060	0.3
Palustrine Forested Wetland	2.002	0.810	3.9
Total	**51.175**	**20.710**	**100.0**
Point of Interconnection (Falmouth Switching Station)			
Bare Land	1.477	0.598	28.8
Deciduous Forest	0.021	0.009	0.4
Evergreen Forest	0.037	0.015	0.7
Grassland [see note 2]	2.822	1.142	55.0
Impervious	0.776	0.314	15.1
Total	**5.133**	**2.077**	**100.0**

Notes:

1 – A portion of the mapped polygon may contain facility structures.

2 – May include previously disturbed lands

Data source: MassGIS, 2018a; MassGIS, 2018b; MassGIS, 2018c, MassGIS, 2019; MassGIS, 2020

Table 4-2. Natural Communities Within the Brayton Point Onshore Project Area

Land Use / Natural Community	Acres	Hectares	Percentage of Total Land Area
Aquidneck Island Onshore Export Cables (40-ft [12-m] corridor)			
Route Option 1			
Beaches	0.042	0.017	0.3
Cultivated	0.988	0.400	7.1
Developed Open Space	9.835	3.980	70.8
Forested Area	1.498	0.606	10.8
Scrub/Shrub	0.569	0.230	4.1
Vacant Land	0.281	0.114	2.0
Wetland	0.682	0.276	4.9
Total	**13.895**	**5.623**	**100.0**
Route Option 2			
Beaches	0.141	0.057	1.0
Developed Open Space	4.788	1.937	34.0
Cultivated Land	0.017	0.007	0.1
Forested Area	1.429	0.578	10.2
Scrub/Shrub	0.019	0.008	0.1
Vacant Land	0.642	0.260	4.6
Wetland	7.042	2.850	50.0
Total	**14.079**	**5.697**	**100.0**
Route Option 3			
Beaches	0.040	0.016	0.2
Developed Open Space	11.127	4.503	60.9
Forested Area	1.399	0.566	7.7
Scrub/Shrub	0.064	0.026	0.3
Vacant Land	1.052	0.426	5.8
Water	0.017	0.007	0.1
Wetland	4.564	1.847	25.0
Total	**18.262**	**7.390**	**100.0**
Brayton Point Landfall Locations (40-ft [12-m] corridor)			
Western Landfall (Preferred)			
Impervious	1.300	0.526	66.0
Bare Land	0.006	0.002	0.3
Developed Open Space	0.531	0.215	26.9
Deciduous Forest	0.070	0.028	3.5
Water	0.065	0.026	3.3
Total	**1.971**	**0.798**	**100.0**

Land Use / Natural Community	Acres	Hectares	Percentage of Total Land Area
Eastern Landfall (Alternate)			
Bare Land	0.047	0.019	1.6
Deciduous Forest	0.053	0.022	1.8
Developed Open Space	0.513	0.208	17.3
Grassland	0.223	0.090	7.5
Impervious	2.118	0.857	71.5
Scrub/Shrub	0.104	0.042	3.5
Water	0.128	0.052	4.3
Total	**2.964**	**1.200**	**100.0**
Brayton Point Onshore Export Cable Routes (40-ft [12-m] corridor)			
Brayton Point (Preferred)			
Bare Land	0.005	0.002	0.3
Deciduous Forest	0.0001	0.00004	0.0
Developed Open Space	0.068	0.027	3.4
Impervious	1.924	0.779	95.5
Water	0.018	0.007	0.9
Total	**2.016**	**0.816**	**100.0**
Brayton Point (Alternate)			
Bare Land	0.003	0.001	0.2
Deciduous Forest	0.008	0.003	0.5
Developed Open Space	0.142	0.057	8.9
Grassland	0.116	0.047	7.2
Impervious	1.210	0.490	75.6
Scrub/Shrub	0.070	0.028	4.3
Water	0.051	0.021	3.2
Total	**1.600**	**0.647**	**100.0**
HVDC Converter Station			
Developed Open Space	12.436	5.033	27.9
Impervious	28.746	11.633	64.4
Scrub/Shrub	0.564	0.288	1.3
Water	2.899	1.173	6.5
Total	**44.644**	**18.067**	**100.0**
Underground Transmission Route (40-ft [12-m] corridor)			
Developed Open Space	0.007	0.003	1.0
Grassland	0.024	0.010	3.5
Impervious	0.556	0.255	81.6
Scrub/Shrub	0.095	0.038	13.9

Land Use / Natural Community	Acres	Hectares	Percentage of Total Land Area
Total	**0.682**	**0.276**	**100.0**

Notes:

Data sources: MassGIS, 2018a; MassGIS, 2018b; MassGIS, 2019; MassGIS, 2020; RIGIS, 1993; RIGIS, 2021

4.2 Bat Community Characterization

The bats of Massachusetts and Rhode Island can be generally categorized into two life-history strategies based on their winter behavior: 1) cave-hibernating species, which typically spend their winters hibernating in caves, underground mines, or man-made structures with similar conditions, and migrate regionally in a radial pattern to summer maternity areas; and 2) long distance, latitudinal migrants (i.e., migratory tree-roosting bats) which may travel hundreds or even thousands of miles between their summer and winter habitats. Massachusetts is home to eight regularly occurring species of bats, including three long-distance migrants and five cave-hibernating bats (Table 4-3). Regarding cave-hibernating species, caves and mines are key habitats for cave-hibernating bats and may be used as winter hibernacula and swarm locations in the fall months (e.g., when bats forage and mate prior to entering hibernation). Important features for cave hibernating species are underground caves, mines, or voids which have cool, stable temperatures, high humidity, minimal disturbance, and adequate airflow (Tuttle & Taylor, 1998). It should be noted that the preferred locations for the onshore substation and the converter station are not located near any such features, and there are no documented hibernacula nearby. Therefore, based on the information reviewed, the onshore substation and converter station locations are not expected to be important habitat for cave-hibernating bat species.

Table 4-3. Migrating and Cave-Hibernating Bat Species of Massachusetts and Rhode Island

Life-History Strategy	Species	Typical Reproduction Rates[2]
Long Distance Migrants	Eastern red bat (*Lasiurus borealis*)	3 pups/year
	Hoary bat (*Lasiurus borealis*)	2 pups/year
	Silver-haired bat (*Lasionycterus noctivagans*)	2 pups/year
Cave-hibernating	Big brown bat (*Eptesicus fuscus*)	2 pup/year
	Tri-colored bat (*Perimyotis subflavus*)[1]	2 pups/year
	Little brown bat (*Myotis lucifugus*)	1 pup/year
	Eastern small-footed bat (*Myotis leibii*)	1 pup /year
	Northern long-eared bat (*Myotis septentrionalis*)	1 pup/year

Notes:

[1]Some recent evidence may suggest a greater degree of latitudinal migration than previously thought (Fraser et al., 2012)

[2] Harvey et al., 2011

4.2.1 Federally Listed Bat Species

Two species of federally listed bats have been documented in Massachusetts, the Indiana bat (*Myotis sodalis*, federally endangered) and the northern long-eared bat (federally threatened). Indiana bats have historically been known to occur in the western, non-coastal portions of Massachusetts. However, the last known record of Indiana bats in Massachusetts was an individual banded in November 1936 at Nickwackett Cave in Brandon, Vermont and recaptured in October 1939 at the Chester Emery Mines in Hampden County, Massachusetts (Griffin, 1945). Indiana bats are no longer considered to be present in Massachusetts and, as such (Bat Conservation International, 2021), they are not considered among the bat species that may be affected by the Project. Northern long-eared bats are also known to occur in Rhode Island; Rhode Island is outside the range of Indiana bat.

The northern long-eared bat is native to the Commonwealth of Massachusetts and has been documented in the coastal regions as well as flying over coastal waters (Dowling et al., 2017; Tetra Tech, 2015; Tetra Tech 2017; WEST, 2017). The northern long-eared bat has been assigned a species-specific rule under Section 4(d) of the Endangered Species Act (ESA) which defines the conditions under which incidental take of the species is exempt from ESA prohibitions. Under the Section 4(d) rule, incidental take of this species is prohibited in the white-nose syndrome-affected portions of its range if it occurs within a hibernaculum or as a result of tree clearing within one-quarter mile (mi) (0.40 km) of hibernacula (year-round) or within 150 ft (46 m) of a maternity roost (June 1 – July 31) [50 code of federal regulations (CFR) 17.40(o)].

In January 2020, Judge Emmet Sullivan of the United States District Court for the District of Columbia ruled in *Center for Biological Diversity v. Everson*, No. 15-CV-477, 2020 WL 437289 (D.D.C. Jan. 28, 2020) that the United States Fish and Wildlife Service (USFWS) decision to list the northern long-eared bat as threatened, rather than endangered, was "arbitrary and capricious" in its reasoning. Judge Sullivan did not strike down the listing but remanded the listing determination back to the USFWS. The USFWS has appealed this decision as of the writing of this document. In March 2021, the federal court in D.C. ruled that the USFWS must determine whether the northern long-eared bat warrants listing as an endangered species by December 2022 (within 18 months of completing the Species Status Assessment for the bat).

Although they do not currently have a federally protected status, several other bat species have been petitioned for listing. In 2017, the USFWS issued its positive 90-day finding on the petition from the Center for Biological Diversity and Defenders of Wildlife that the tri-colored bat be listed as threatened or endangered and that critical habitat be designated under the ESA (82 Federal Register [FR] 60362-60366). According to the USFWS *National Listing Workplan* (May 2019 Version), the 12-month finding and potential listing for this species are anticipated to be completed in fiscal year 2021.

4.2.2 State-listed Bat Species

Massachusetts maintains a list of endangered, threatened, and special concern species listed under the Massachusetts Endangered Species Act (MESA) (321 Code of Massachusetts Regulations [CMR] 10.90). The definitions of each listing category can be found in Table 4-4, and a list of state-listed bat species with their designation categories is provided in Table 4-5.

Table 4-4. Species Listing Designations Under MESA [321 CMR 10.03(6)]

Designation	Definition
Endangered (E)	Species which are in danger of extinction throughout all or a significant portion of their range and species which are in danger of extirpation as documented by biological research and inventory.
Threatened (T)	Species which are likely to become an endangered species within the foreseeable future throughout all or a significant portion of their range, and any species declining or rare as determined by biological research and inventory and likely to become endangered in the foreseeable future.
Species of Special Concern (SC)	Species which have suffered a decline that could threaten the species if allowed to continue unchecked or that occurs in such small numbers or with such a restricted distribution or specialized habitat requirement that it could easily become threatened within Massachusetts.

Table 4-5. Massachusetts State-Listed Bat Species [321 10.90(4)]

Common Name	Scientific Name	State Status	Federal Status
Eastern small-footed bat	*Myotis leibii*	E	-
Little brown bat	*Myotis lucifugus*	E	-
Northern long-eared bat	*Myotis septentrionalis*	E	T
Indiana bat[1]	*Myotis sodalis*	E	E
Tri-colored bat	*Perimyotis subflavus*	E	-

Notes:

[1]Indiana bats are not likely present in Massachusetts and have not been known to occur in the coastal portion of the state.

Per Rhode Island General Law (RIGL) 20-37-2, the Rhode Island Department of Environmental Management (RIDEM) is responsible for approving lists of plant and animal species that are of conservation interest in

Rhode Island. Various state and federal regulations key off of those lists. A four-party collaboration consisting of RIDEM, University of Rhode Island, The Nature Conservancy, and the Rhode Island Natural History Survey assist RIDEM by gathering and reviewing data on species occurrences in the state and region and listing species of likely conservation interest in Rhode Island. Rhode Island does not currently list any bat species on its endangered and threatened species list. No Natural Heritage Areas are shown within the vicinity of the onshore export cable route options over Aquidneck Island (Rhode Island ArcGIS, 2021).

Rhode Island has a State and Tribal Wildlife Grants (SWG) program which was created by Congress in 2000 to fund actions to conserve declining fish and wildlife species before they become threatened or endangered. SWG completes a State Wildlife Action Plan (SWAP) every 10 years. These proactive plans assess the health of each state's wildlife and habitats, identify the threats they face, and outline actions needed to conserve them over the long term. Rhode Island currently lists all eight of its bat species as species of greatest conservation need on its 2015 SWAP (RIDEM, 2015), as listed below:

- Big brown bat (*Eptesicus fuscus*)
- Silver-haired bat (Lasionycteris noctivagans)
- Eastern red bat (*Lasiurus borealis*)
- Hoary bat (Lasiurus cinereus)
- Eastern small-footed bat (*Myotis leibii*)
- Little brown bat (*Myotis lucifugus*)
- Northern long-eared bat (Myotis septentrionalis)
- Tri-colored bat (Perimyotis subflavus)

5.0 Effects Characterization

5.1 Effects Characterization Approach

The following provides a description of the approach used to characterize effects of the Project on resources (receptors) within or in the vicinity of the Project. This approach used in this Report includes three primary steps:

1) Identification of IPFs;
2) Identification of potentially affected resources; and
3) Impact characterization.

5.1.1 Impact-Producing Factors

Bureau of Ocean Energy Management (BOEM) (2020), in its *Information Guidelines for a Renewable Energy Construction and Operations Plan (COP)*, identified seven potential IPFs that may affect biological resources. These were adapted to address the IPFs associated with the Project for this assessment and are summarized in Section 3.4 of the COP.

Based on these criteria an effect **intensity** is assigned (no/none, very low, low, medium, or high).

Table 5-1 below provides definitions of the criteria used to qualitatively assess the anticipated effect intensity with the effect being change to the resource brought about by the presence of a Project component or by the execution of a Project activity.

Based on that qualitative assessment and the application of professional judgment, each anticipated effect is assigned one of the intensity levels defined in Table 5-2.

Based on an assessment of the environment described in Section 4.0, the subject biological resources (i.e., bats and their habitat) are assigned a **sensitivity** "ranking" based on a qualitative assessment of the criteria presented in Table 5-3, whereby sensitivity is ranked as follows: Very Low, Low, Medium and High. The degree of sensitivity of the resource is, in part, based on the resource's resilience and its ability to naturally adapt to changes or recover from impact. This characterization is supported by the analysis of Key Risk Factors presented in Section 3.1.

5.1.2 Potentially Affected Resources

For this assessment, the potentially affected resources are bats and their habitat as described in Sections 4.1 and 4.2. Key risk factors that may affect the type and degree of ecological risk posed by IPFs are described in Section 3.1.

Table 5-1. Effect Criteria Qualitative Definitions

Effect Criteria	Definitions
Nature	• **Positive** – An effect that is considered to represent an improvement to the baseline or to introduce a new desirable factor. • **Negative** – An effect that is considered to represent an adverse change from the baseline, or to introduce a new undesirable factor.
Type	• **Direct** – An effect created as a direct result of the Project or Project activities. • **Indirect** – An effect which may be caused by the Project but will occur in the future or outside the direct area of Project influence.
Reversibility	• **Temporary** – Effects that are transient, intermittent or occasional in nature and/or largely reversible. • **Permanent** – Effects that occur during the development of the Project and cause a permanent change in the affected impact indicator or resource that endures substantially beyond the Project lifetime (irreversible).
Duration	• **Short-Term** – Effects that are predicted to last only for a limited period (less than four years) but will cease on completion of an activity, or as a result of mitigation measures and natural recovery. • **Medium-Term** – Effects that will occur over a period of four to 10 years. This will include impacts that may be intermittent or repeated rather than continuous if they occur over an extended time period. • **Long-Term** – Impacts that will occur over an extended period (more than 10 years). This will include impacts that may be intermittent or repeated rather than continuous if they occur over an extended time period.
Geographical Extent (Area)	• **Local** – Effects that alter or influence locally important resources or are restricted to a single (local) administrative area or local community (not widespread). • **Regional** – Effects that alter or influence regionally important environmental resources or are experienced at a regional scale as determined by administrative boundaries (fairly widespread). • **National** – Effects that alter or influence nationally important resources, affect an area that is nationally important/protected or macro-economic consequences (widespread).
Cumulative	• **Cumulative** –_Direct or indirect effects that could have a greater expression due to the proximity and timing of other activities in the Project Area. • **Synergistic** - Direct or indirect effects that could have a greater expression due to the additive or interactive nature of the effect in a particular place and within a particular time.

Effect criteria and definitions adapted from IISD (2016)

Table 5-2. IPF Intensity Levels and Defining Characteristics

IPF Intensity Level	Example Characteristics
High	• Negative effect is irreversible or permanent. • Long-term negative effects (more than 10 years) that are widespread (i.e., regional or national). • Effects that influence or alter nationally important resources. • Effects that change ambient conditions so as to cause (or reasonably may cause) death or injury with population level effects to non-protected species. • Changes to ambient conditions that may cause death or injury to a protected species and could influence overall species survival. • Cumulative or synergistic effects will occur, or may be reasonably expected to occur, and have population level effects on a protected species.
Medium	• Medium-term effects (five to 10 years) that are geographically widespread (national or regional). • Direct or indirect effects that are reversable, with recovery over a longer period of time. • Air pollution, water contamination, coastal pollution by slightly biodegradable products and/or hazardous substances having a chronic effect on human health after long-term exposure. • Ambient in-air sound level slightly higher than legal threshold. • Underwater sound level resulting in death or injury of individuals of a protected species, however no impact to the survival of the species.
Low	• Shorter-term effect (one to five years); effects that are local and reversible. • Level of air, water, and coastal pollution detectable, but below thresholds known to have a negative effect on human health or resident and migratory populations. • Acceptable in-air sound, light or electric and magnetic fields (EMF) below the established thresholds for effects on human health, native/resident and migratory animal populations, and/or plant populations. • Low-level, long-term effects to the landscape. • Effects causing only temporary behavioral shifts to a protected species.
Very Low	• Short-term effects (less than one year), local and reversible. • Waste effluents released into water, air and soil/ground at near-background concentrations. • Post-construction/operation levels (e.g., light, EMF, vegetation cover) similar to background levels or pre-construction conditions. • Little to no change in the ecosystems and/or landscape; no permanent change to ecosystems or landscapes. • No impact on protected species.
None	• Intensity is so immaterial that any resulting impact is scoped out of the impact assessment process.

Table 5-3. Biological Resource Sensitivity Ranking

Ranking	Resource Characteristics
High	• Numerous sensitive or protected fauna and/or flora where a high level of biodiversity can be observed; or is a protected ecosystem of regional, state, or federal importance. • An already vulnerable resource with very little capacity and means to adapt to or tolerate the changed conditions.
Medium	• A few species of sensitive or protected fauna and/or flora or a sensitive ecosystem or a locally protected ecosystem or habitat. • A protected species or habitat with limited capacity and means to adapt to change and tolerate changed conditions. Adaptation may take time and/or may only be partial.
Low	• Very few individuals of sensitive or protected fauna and/or flora or is an ecosystem which is not protected at local, state, or federal levels. • A resource with some capacity and means to adapt to change and maintain/improve current conditions. Adaptation may take time and/or may only be partial.
Very Low	• No sensitive or protected fauna and/or flora or is an ecosystem that is not sensitive or that is already impacted. • A resource with the capacity and means to adapt to change and tolerate the changed conditions.

5.2 Identification and Characterization of Effects

The following sections describe the potential for effects associated with planned Project activities (construction, operations and maintenance (O&M), and decommissioning). Potential for effects to bats and bat habitat are associated with aboveground construction, presence of structures during Project operations, and decommissioning. As such, the identification and characterization focus on above ground Project facilities and infrastructure. Offshore inter-array cables and export cables, as well as onshore export cables and the onshore underground transmission route (alternate) are not addressed.

Each of the above IPFs are discussed below, and the IPF intensity as well as resource sensitivity with and without mitigation are provided in Table 5-4 and Table 5-5.

5.2.1 Ground Disturbance

5.2.1.1 Construction and Decommissioning

Ground disturbance will occur for the construction of the onshore Project infrastructure. As indicated in Section 4.2, key habitats for cave-hibernating bats are not located near onshore Project infrastructure. Other than minimal potential tree clearing (addressed as displacement of bats and bat habitat in Section 5.2.3) such activities will include temporary disturbance of the ground surface, vegetation removal, grading, installation of temporary work pads, construction access roads and laydown areas. These temporary ground disturbances are not expected to have material effect on bats or bat habitat. The effects associated with ground disturbing activities will be temporary, short-term, and local. Therefore, the intensity of this IPF is **None** to **Very Low**.

Not all onshore infrastructure may be removed during decommissioning. To the extent that above ground infrastructure are removed during decommissioning the nature and IPF intensity would be comparable to that for construction. To the extent that Project components are decommissioned, the impacts associated with ground disturbance are likely to be similar in type and degree to those of construction.

5.2.1.2 Operations and Maintenance

Throughout Project operations, small amounts of routine ground disturbance are likely to occur as a result of maintenance activities, especially vegetation management near the onshore substation/HVDC converter station. The continued operation of the Project will also result in the permanent alteration of natural habitats that were disturbed during the construction phase.

5.2.2 Introduction of Sound / Change of Ambient Lighting

5.2.2.1 Construction and Decommissioning

Noise and light are two Project impacts which have the potential to affect bats beyond the physical footprint of the facilities. The exact distance at which either disturbance may be perceptible to bats will depend on the magnitude of the light or noise source, surrounding obstacles, or topography that may attenuate sound or occlude light sources, and the amount of background noise or light pollution in the area prior to and during the disturbance. As described in Sections 3.1.7 and 3.1.8, both noise and light may affect bat behavior.

Construction activities may introduce noise and light into the environment as a result of construction equipment, vehicle traffic (onshore), vessel traffic (offshore), and equipment and safety lighting. The overall noise and light disturbance of construction is anticipated to be minor and will be limited to the approximate construction area, though some amount of noise and light may be perceptible outside the physical workspace.

Noise and light introduction from construction activities are anticipated to be short-term and temporary in nature; the IPF intensity is **Very Low** for noise and **Low** for light. Bats that are exposed to such disturbances are likely have low sensitivity to such disturbances, with ample ability to adapt to or avoid such disruptions.

Not all onshore infrastructure may be removed during decommissioning. To the extent that above ground infrastructure is removed during decommissioning changes to ambient sound and light would be comparable to that for construction.

5.2.2.2 Operations and Maintenance

Small amounts of noise may be introduced into the surrounding environment from the rotating WTGs, OSPs, and onshore substation/ converter station. However, operational noise is expected to be significantly less than noise associated with construction, and bats are not likely to be sensitive to such disturbances.

The OSPs and WTGs will both require artificial lighting during operations, including both safety lighting (illumination of work areas) and aviation avoidance lighting on the offshore structures. The overall intensity of light introduction is expected to be low, as the lighting will be limited to aboveground facilities. Bats in the onshore environment may have some degree of exposure to lighting effects at the onshore substation/ converter station which could provide either a slight barrier effect or a potential foraging ground due to insects attracted by light, depending on the behavioral response of the species of bats present. Offshore lighting is anticipated to be a low-intensity effect due to the minimal amount of lighting required and the amount of distance between each light source (approximately 1 nautical mi [1.9 km]).

5.2.3 Displacement of Biological Resources

5.2.3.1 Construction and Decommissioning

Construction activities that may result in the destruction and disturbance of limited amounts of bat habitat are associated with certain onshore Project components. Key habitat features for cave-hibernating bats are not present near the onshore Project infrastructure locations, and therefore, destruction or disturbance to these features (caves, mines, voids) are not expected. Facility siting, including the selection of the substation/converter station locations, seeks to minimize effects on forested areas. Both the preferred onshore substation location and converter station location would not likely require any tree clearing. However, the potential for minimal tree clearing is included in this assessment. Refer to COP Appendix J – Terrestrial Vegetation and Wildlife Report for additional information regarding potential impacts to onshore habitats.

Mayflower Wind has not conducted any bat surveys at the onshore facilities. Depending on the amount and timing of tree clearing required, additional surveys may be necessary to provide information regarding species presence, habitat utilization, and the presence of roosts. Surveys on JBCC have identified the presence of several state- and federally listed species (Section 4.2), though no roosts have been identified within 0.25 miles (0.4 km) of the proposed Project footprint.

Given that Mayflower Wind's facilities follow previously disturbed areas, no new habitat fragmentation, open corridors, or significant new open spaces will be created. Provided that active roosts are not cleared during the summer maternity season, the sensitivity of bats to any minimal tree clearing is likely to be low, as roosts are ephemeral resources subject to regular loss or disturbance in nature. The period of disturbance to any bat habitat during construction will be short-term but will have permanent effects in the form of new aboveground structures and lost habitat in the form of any tree clearing required for construction of the onshore substation/converter station.

In addition to habitat disturbance addressed above, it is possible that construction activities may alter bat behavior by causing them to change roosts or alter their foraging or local migration patterns during the period of construction. The sensitivity of bats to these minor disturbances is likely to be very low. The intensity of this IPF is expected to be **Very Low** for WTG and OSP(s) and **Very Low** for onshore components.

Not all onshore infrastructure may be removed during decommissioning. Although there is some limited potential for individual bats occasionally to use onshore or offshore structures for temporary roosting habitat during migration periods, it is unlikely that bats will depend upon them as a resource or that the decommissioning of onshore or offshore structures will result in the displacement of bats from the Project Area.

5.2.3.2 Operations and Maintenance

Any habitat that was permanently altered during construction may also pose a risk of resource displacement. Bats that used those areas for foraging, roosting, or maternity sites will necessarily seek out alternative areas, resulting in their displacement.

5.2.4 Direct Injury or Death of Biological Resources

5.2.4.1 Construction and Decommissioning

Potential causes of injury or death during construction include tree trimming or removal (if required), collisions between bats and construction equipment, or disruption of bat activity which result in roost abandonment or significant energy expenditure during the migratory or pup-rearing time periods. Of these potential risks, the greatest risk to bats is tree trimming and clearing activities, which could result in crushing death or significant injury for bats whose roosts are destroyed while they are occupied. Such risks are greatest during the early summer period when pups are not yet volant. Activities that may result in injury or death would be short-term, temporary and localized, and the potential for such activities to occur is minimal. As such, the IPF intensity for onshore construction is **Very Low**. The amount of anticipated tree clearing is minimal, and the risk of injury or death can be mitigated or eliminated by adhering to a restricted time period for these activities (refer to Section 5.3.2). Offshore construction has an IPF intensity of **Very Low**.

Not all onshore infrastructure may be removed during decommissioning. Although some individual bats may occasionally roost on the Project's aboveground structures, it is unlikely that significant numbers will do so, and the overall disturbance of decommissioning activities would likely disrupt roosting bats before the structures were taken down. It is unlikely that decommissioning of these structures will result in meaningful impacts to bats through direct injury or death.

5.2.4.2 Operations and Maintenance

The most likely cause of direct injury or death during Project operations is collision with the WTGs. As discussed in Sections 3.1.1 and 3.1.4, bats are likely to be exposed to this hazard seasonally, mostly during the spring and fall migration periods. The intensity of the effect is likely to be high for individual bats that encounter WTG blades but, due to the relative infrequency of bat occurrence offshore, the intensity of the effect and sensitivity to this hazard are likely to be low for bat populations both overall and locally.

5.2.5 Produce Accidental Events

5.2.5.1 Construction and Decommissioning

During construction activities, there is some small chance of spills, unplanned releases of chemical contaminants or solid waste, or similar accidental events that could result in environmental harm, affecting bats. Any such events would likely be short-term, local, and temporary, and unlikely to result in significant harm to bats. Mayflower Wind has committed to prioritizing safety, health and the environment and has outlined their commitments to avoiding such accidental events in the COP. The IPF intensity is **Very Low**. Decommissioning related effects are likely to be similar to those for construction.

5.2.5.2 Operations and Maintenance

As with construction activities, operation and maintenance activities could potentially result in spills, unplanned releases of chemical contaminants or solid waste, or similar accidental events which could result in environmental harm, affecting bats. Any such events would likely be short-term, local, and temporary, and would be unlikely to result in significant harm to bats. Mayflower Wind has committed to prioritizing safety, health and the environment and has outlined their commitments to avoiding such accidental events in the COP. Mayflower Wind has developed an Oil Spill Response Plan (See COP Appendix AA) under which the Project will operate.

5.2.6 EMF Introduction

5.2.6.1 Construction and Decommissioning

No effects from EMF are anticipated to bats during construction or decommissioning.

5.2.6.2 Operations and Maintenance

The potential effects of electric and magnetic radiation on bats are unclear and are the subject of only a limited amount of research. Some studies have indicated a reduction of bat activity in the presence of EMF, using radar units as the source of the EMF (Nicholls & Racey, 2007; Nicholls & Racey, 2009). Researchers have theorized several mechanisms by which EMF may deter bats, including effects on insect prey species, thermal induction, and high-frequency interference with echolocation. Bat activity was reduced significantly in habitats exposed to an EMF strength of 2 volts/m or greater when compared to matched sites with no measurable EMF. However, the reduction in activity was not statistically significant at EMF strengths less than 2 volts/m within 1,300 ft (400 m) of the EMF source (Nicholls & Racey, 2007). Modeled EMF from the underground onshore export cables (COP Appendix P1 – Electric and Magnetic Field [EMF] Assessment for the Proposed Mayflower Wind Onshore Transmission System) shows di minimis amounts of EMF 100 ft (30.5 m) from the centerline at 3.28 ft (1 m) above ground surface, indicating very little EMF would affect bats. The EMF associated with the Falmouth Onshore Project Area is from alternating current electricity; Brayton Point is using direct current electricity, which has lower EMF emitted, and alternating electricity after the converter station for the interconnection to the POI. See COP Appendix P3 – HVDC EMF Assessment for more information on EMF effects from direct current electricity.

Onshore EMF is characterized as long-term, permanent, and localized, and the IPF intensity is **Very Low**.

5.3 Potential for Effects

Potential effects of the Project construction, O&M, and decommissioning were evaluated according to the methods described in Section 5.1.

5.3.1 Pre-mitigation Potential for Effects

The potential for effect was scored initially without consideration of potential measures to mitigate potential effects (Table 5-4 and Table 5-5). The construction and decommissioning IPF intensity levels are expected to be Very Low to Low for all IPFs. Similarly, pre-mitigation O&M IPF intensities are expected to be Low to Very Low for all IPFs. Resource sensitivities to IPFs associated with construction, O&M, and decommissioning are also characterized as very low to low.

5.3.2 Mitigation and Residual Effects

The following summarizes some of the key mitigation measures employed during siting, design, construction and operation to avoid, minimize and mitigate effects where practicable. Also refer to COP Section 16, Summary of Avoidance, Minimization, and Mitigation Measures of Potential Impacts for additional information.

5.3.2.1 Onshore

Mayflower Wind has minimized the Project's onshore effects to the greatest extent practicable by undertaking the following avoidance and minimization measures:

- Onshore Project infrastructure is not sited near key habitat locations for cave-hibernating species;
- Onshore export cables will be underground from the landfall location(s) to the onshore substation/ converter station;
- The onshore substation and converter station are proposed to be constructed in open areas where tree clearing is expected to be minimal;
- The alternate underground transmission route will be co-located with existing roadways and disturbed areas; and
- Mayflower Wind will coordinate as necessary with the USFWS, Massachusetts DFW, and RIDEM to determine appropriate mitigation measures.

By implementing these avoidance and minimization measures, in addition to the safety, health, and environmental protection measures described in Section 3.3.15 of the COP, Mayflower Wind is likely to have a very low impact on bats through onshore Project activities and facilities. Although the onshore transmission facilities and substation/converter station may result in some loss of habitat, adhering to seasonal restrictions is expected to avoid the risk of direct mortality or injury during construction.

5.3.2.2 Offshore

Mayflower Wind has committed to the following avoidance and minimization measures for the offshore Project components:

- Minimize vessel lighting to the extent practicable to reduce potential attraction or light barrier effects during construction, O&M, and decommissioning;
- Design WTG structures to minimize the potential for bat roosting places; and
- Develop a post-construction monitoring plan consistent with the COP.

By implementing the above measures in addition to the safety, health, and environmental protection measures described in COP Section 3.3.15, the risk of impact to bats is very low impact through offshore Project activities and facilities. Although some injury/mortality may occur with the WTGs, such occurrences are likely to be seasonal in distribution, few in number, and have no significant long-term impact on populations.

Table 5-4. Characterization of Potential Project Effects during Construction and Decommissioning

IPF	Related Activities	IPF Intensity Criteria	Pre-Mitigation Intensity Level	Resource Sensitivity Rank	Mitigation Type	Post-Mitigation Intensity Level
Sea bottom/ground disturbance	WTG, OSP	Short-term Temporary Local	None	None	NA	None
	OST	Short-term Temporary Local	None - Very Low	Low	Minimize onshore Project footprint	None
Introduce sound into the environment	WTG, OST, OSP	Short-term Temporary Local	Very low	Very Low	NA	Very Low
Change ambient lighting	WTG, OSP, OST	Short-term Temporary Local	Low	Very Low	Minimize vessel and construction lighting	Very Low
Resource displacement	WTG, OSP	Long-term Permanent Local	Very Low	Very Low	NA	Very Low
	OST	Long-term Permanent Local	Very Low	Low	Minimize tree clearing	None to Very Low
Direct injury or death	WTG, OSP	Short-term Temporary Local	Very Low	Low	Development of a Post-Construction Monitoring Plan, including bat fatality study.	Very Low
	OST	Short-term Temporary Local	Very Low	Low	Limit tree clearing Timing restrictions	None to Very Low
Produce accidental events	WTG, OSP, OST	Short-term Temporary Local	Very Low	Very Low	Implement Environmental Health and Safety Plan	None

Notes: WTG – wind turbine generators (including substructure, foundations and scour protection); OST – onshore transmission (including underground transmission, substation and switching station); OSP – offshore substation platform(s)

Table 5-5. Characterization of Potential Project Effects during Operations and Maintenance

IPF	Related Activities	IPF Intensity Criteria	Pre-Mitigation IPF Intensity Level	Resource Sensitivity Rank	Mitigation Type	Post-Mitigation IPF Intensity Level
Sea bottom/ground disturbance	WTG, OSP	Long-term Permanent Local	None	None	NA	None
	OST	Long-term Permanent Local	Very Low	Low	NA	None
Introduce sound into the environment	WTG, OSP, OST	Long-term Permanent Local	Very Low	Very Low	NA	Very Low
Change ambient lighting	WTG, OSP, OST	Long-term Permanent Local	Low	Low	Minimize lighting	Very Low
Change ambient electromagnetic fields (EMF)	WTG	Long-term Permanent Local	Very Low	Very Low	NA	Very Low
Resource displacement	WTG, OSP	Long-term Permanent Local	None	Very Low	NA	None
	OST	Long-term Permanent Local	None to Very Low	Low	Minimize tree clearing	None to Very Low
Direct injury or death	WTG, OSP	Long-term Permanent Local	Low	Low	Designs to reduce roosting Post-construction Monitoring	Low
	OST	Long-term Permanent Local	Very Low	None	Timing restrictions for tree clearing	None
Accidental events	WTG, OSP, OST	Short-term Temporary Local	None to Very Low	Very Low	Implement Environmental Health and Safety Plan	None

Notes: WTG –wind turbine generators (including substructure, foundations and scour protection); OSP – offshore substation platform(s); OST – onshore transmission (including underground and overhead transmission, substation, and switching station)

6.0 Conclusions

Overall, the Project is anticipated to result in only low or very low effects to bats. Onshore substation/converter station facilities represent the greatest construction risks to bats due to small amounts of unavoidable habitat conversion. The greatest O&M Project risks to bats are associated with WTG collisions during operation and are expected to mostly affect species that travel long distances for latitudinal migration – particularly eastern red bats, hoary bats, and silver-haired bats. Other species of bats may occur in the Lease Area in rare instances but are not likely to be regularly or seasonally present. Regardless of species, bat activity in the Lease Area is expected to be much lower than in the Onshore Project Areas and bats are mostly expected to be encountered in the Offshore Project Area during spring and fall migration.

As described in this Risk Assessment, bat activity and behavior are influenced by the presence of WTGs. Therefore, while this Risk Assessment is based on the “weight of evidence” and considers the potential attractive force of WTGs, post-construction monitoring will confirm if actual effects are consistent with the projected effect levels. Mayflower Wind will coordinate with the NHESP and RIDEM for the scope and implementation of pre- and/or post-construction monitoring as may be required to assess presence/absence in specific Project work locations, and/or as may be required as a condition of Mayflower Wind’s regulatory authorizations.

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