The latest revision date of Appendix S to the Empire Offshore Wind COP is May 2022. This appendix was not revised as part of the November 2023 submittal; therefore, the date on the Appendix S cover sheet remains as May 2022.

Empire Offshore Wind: Empire Wind Project (EW 1 and EW 2)
Construction and Operations Plan

APPENDIX S

Bat Impact Assessment for the Proposed Empire Offshore Wind: Empire Wind Project (EW 1 and EW 2)

Prepared for
equinor

TETRA TECH

MAY 2022

Bat Impact Assessment for the Proposed Empire Offshore Wind: Empire Wind Project (EW 1 and EW 2) in the New York Bight

– Lease Area OCS-A-0512 –

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Executive Summary

Empire Offshore Wind LLC (Empire) proposes to construct and operate an offshore wind farm in the Bureau of Ocean Energy Management Lease Area OCS-A-0512 (Lease Area) in the New York Bight. Empire proposes to develop the Lease Area in two wind farms, known as Empire Wind 1 (EW 1) and Empire Wind 2 (EW 2; collectively referred to hereafter as the Project). EW 1 and EW 2 will be electrically isolated and independent from each other. Each wind farm will, independently of one another, connect via offshore substations to separate Points of Interconnection (POIs) at onshore locations by way of export cable routes and onshore substations. In this respect, the Project includes up to two onshore locations in New York where the renewable electricity generated will be transmitted to the electric grid.

Empire initiated an assessment of the potential effects on bats from the onshore and offshore components of the Project. The goal of the assessment is to provide a detailed analysis of the bat species that may be exposed to the Project, and to describe potential impacts to those species that could result from construction, operations, and decommissioning of the Project. For each species group, impact-producing factors (e.g., ground disturbance and vegetation removal, lighted vessels, operating wind turbines) and associated potential effects (e.g., habitat modification, collision risk) were assessed. The northern long-eared bat (*Myotis septentrionalis*), listed under the Endangered Species Act (ESA), was assessed individually due its known potential to occur in the region.

Onshore, the primary potential impact of the Project to bats is habitat modification during construction. The majority of the proposed onshore export and interconnection cable route and Project infrastructure locations are located in already disturbed urban areas (e.g., roadways) with little to no bat habitat present; therefore, construction and operations of the onshore export and interconnection cables, onshore substations, and O&M Base are unlikely to affect bat habitat and local populations.

Offshore, the primary potential impacts of the Project to bats include collision with operating turbines and potential attraction to lighting of the components during construction and operations. Little activity by cave-hibernating bats (including northern long-eared bat and other state-listed species) is expected in the Lease Area because of its distance from shore; thus, population-level impacts to cave-hibernating bats are unlikely, and individual impacts to northern long-eared bats are unlikely. Migratory tree bats are expected to pass through the Lease Area during spring and fall migration and have been documented in the Lease Area. Construction is highly unlikely to impact individuals or populations because bats are not known to collide with stationary or slow-moving objects such as construction equipment and vessels. While migratory tree bats are documented to collide with terrestrial turbines, impact to populations is unlikely because low numbers of individuals are expected to be exposed to the Project during migration.

Table of Contents

List of Figures

List of Tables

List of Acronyms and Abbreviations

BOEM	Bureau of Ocean Energy Management
COP	Construction and Operations Plan
Empire	Empire Offshore Wind LLC
EW	Empire Wind
ft	feet
HAT	highest astronomical tide
km	kilometer
Lease Area	designated Renewable Energy Lease Area OCS-A 0512
m	meter
mi	miles
MLLW	Mean Lower Low Water
MW	megawatt
NEPA	National Environmental Policy Act
nm	nautical mile
NYSDEC	New York State Department of Environmental Conservation
SGCN	Species of Greatest Conservation Need
USFWS	United States Fish and Wildlife Service
WNS	white-nose syndrome

1 Introduction

1.1 Project Description

Empire Offshore Wind LLC (Empire) proposes to construct and operate an offshore wind farm located in the designated Renewable Energy Lease Area OCS-A 0512 (Lease Area). The Lease Area covers approximately 79,350 acres (32,112 hectares) and is located approximately 14 statute miles (mi) (12 nautical miles [nm], 22 kilometers [km]) south of Long Island, New York and 19.5 mi (16.9 nm, 31.4 km) east of Long Branch, New Jersey. The Project Overview is shown in (Figure 1-1).

Empire proposes to develop the Lease Area in two wind farms, known as Empire Wind 1 (EW 1) and Empire Wind 2 (EW 2; collectively referred to hereafter as the Project). Both EW 1 and EW 2 are covered in the Construction and Operations Plan (COP).

The Project consists of three major development components: the offshore wind farm/turbine array located within the Lease Area, the submarine export cable siting corridor, and the onshore construction corridor where the permanent onshore export and interconnection cables, onshore substations, and O&M Base[1] will be located (Figure 1-1). Each is described as follows:

<u>Offshore Wind Farm/Turbine Array</u>: The offshore wind farm/turbine array will be located within the Lease Area. This component includes the wind turbines, interarray cables, offshore substations, and portions of the submarine export cables. The maximum sized wind turbine in the PDE is based on models that are anticipated to be commercially available within the proposed development timescale of the Project. The make, model, and generating capacity of the wind turbine will be selected during the procurement process and is expected to be the most technologically advanced and efficient model available at that time (see Table 1-1 and Figure 1-2 for dimensions). The minimum spacing between the wind turbines will be five times the rotor diameter and typical spacing will be a minimum of approximately 0.65 nm (1.2 km).

<u>Submarine export cable siting corridor</u>: The submarine export cable siting corridor encompasses the submarine export cables from the offshore substations to the export cable landfall. The siting corridor includes the actual width of the corridor for cable installation and additional area that will be temporarily disturbed during installation activities.

[1] While the O&M Base will serve both EW 1 and EW 2, the base will be located at SBMT, adjacent to the EW 1 onshore substation, and will therefore be included within the EW 1 Onshore Study Area for the purposes of this analysis.

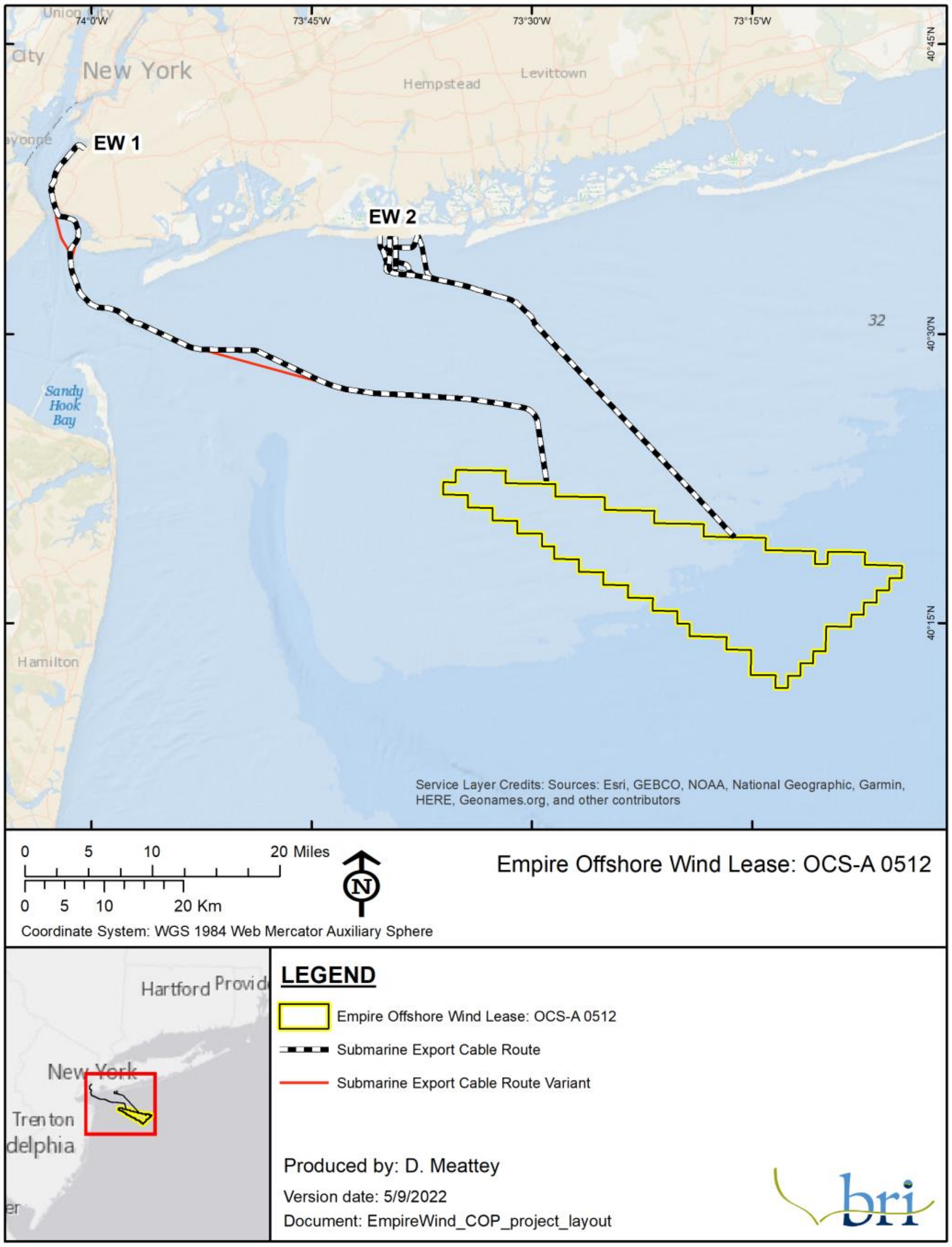

Figure 1-1. Overview of the Lease Area, including Submarine Export Cable Routes.

Table 1-1: Summary of wind turbine maximum PDE parameters

Parameter	EW 1	EW 2
Approximate Total Number	57	90
Hub Height above Highest Astronomical Tide (HAT)	525 ft (160 m)	
Upper Blade Tip above HAT	951 ft (290 m)	
Lower Blade Tip above HAT	85 ft (26 m)[1]	
Rotor Diameter	853 ft (260 m)	
[1] For this parameter, the minimum value represents the maximum PDE value.		

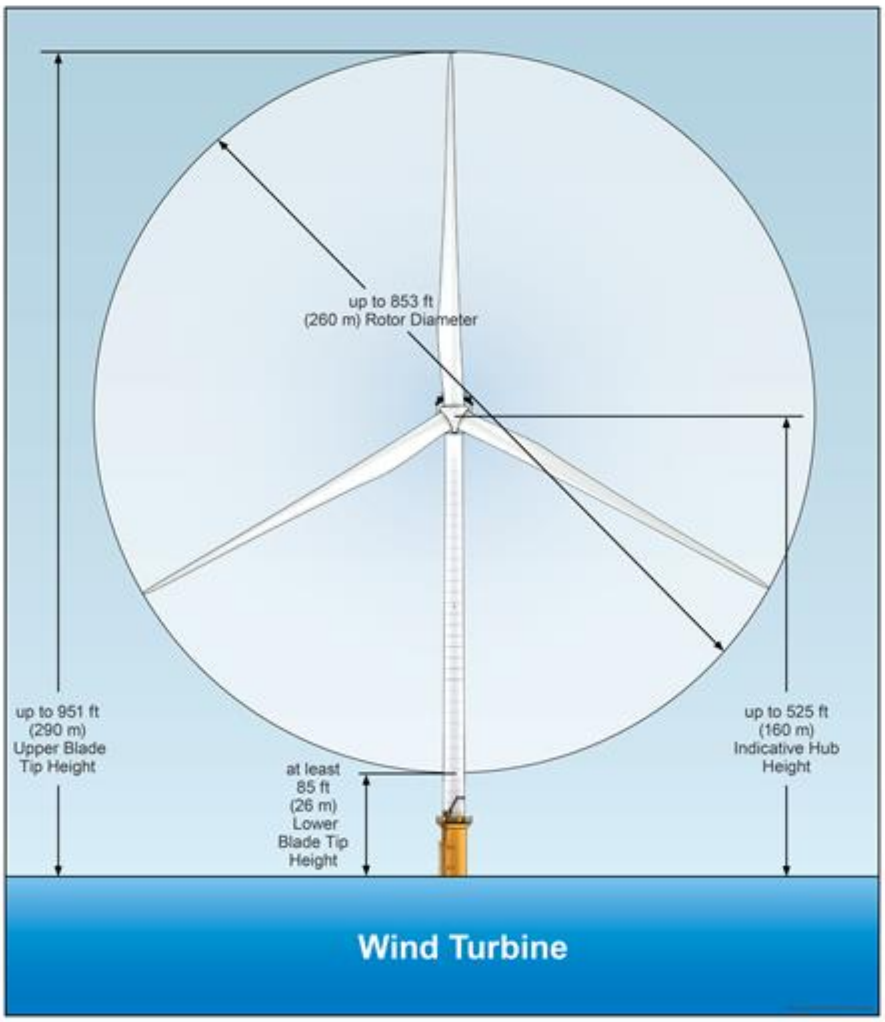

Figure 1-2: Representative Wind Turbine.

Permanent onshore electrical infrastructure: The onshore construction corridor, where the permanent onshore electrical infrastructure will be located, will contain onshore export cables, onshore substations, interconnection cables, O&M Base, and the Points of Interconnection. The onshore construction corridor includes the actual width of the corridor for cable infrastructure and additional area required for construction that will require temporary easements. Onshore construction activities will be focused on two locations: Brooklyn (EW 1) and Long Beach and Hempstead (EW 2) in New York. Proposed onshore export and interconnection cable routes (e.g., transmission lines) will be co-located with existing developed areas (e.g., roads, parking lots) and will be buried underground.

1.2 Regulatory Context

The Lease Area is administered by the Bureau of Ocean Energy Management (BOEM), and other federal agency approvals are required for the Project to proceed to construction and operations; therefore, an analysis under the National Environmental Policy Act (NEPA) is required. A Construction and Operations Plan (COP) was prepared to meet BOEM's requirements. This impact assessment was developed in part to meet the COP requirements for assessment of biological resources, provide information for NEPA review, and support agency consultations.

30 Code of Federal Regulations 585.626 requires the following information related to biological resources to be submitted with the COP:

- § 585.626: a description of the results of surveys of biological resources, including threatened and endangered species;
- § 585.627: a description of those resources that could be affected by the proposed project activities, Endangered Species Act-listed species, and sensitive habitats (i.e., maternity roosting habitat, hibernacula, and foraging areas).

Specifically, this risk assessment provides an overview of the bat community that has the potential to be affected by construction, operations or decommissioning of the Project and evaluates the likelihood of potential impacts to local or regional bat populations.

2 Methods

2.1 Study Area

For the purposes of this risk assessment, the Project is discussed from the perspective of the onshore and offshore portions of the project, each of which present different habitats and risk considerations to bats.

Offshore Study Area: The offshore portion of the Project includes the Lease Area where turbines and up to two offshore substations are proposed. The Project also includes interarray cables within the Lease Area and submarine export cables that extend to land; however, these are not expected to cause impacts to bats (Epsilon Associates Inc. 2018) because temporary underwater disturbance during construction and localized benthic changes present during operations would not affect bat foraging, and bats are not expected to collide with construction, maintenance or decommissioning vessels. For this reason, assessment of the Offshore Study Area focuses on the above water development, predominantly in the operations phase, planned within the Lease Area.

Onshore Study Area: The onshore portion of the Project includes onshore (above high tide line) components of the Project within up to three proposed cable corridors for the two wind farms being developed as part of the Project: one for the EW 1 interconnection cable corridor, located in Brooklyn, Kings County, NY, and up to two for the EW 2 onshore export and interconnection cable corridor located in Long Beach, Hempstead, and Oceanside, Nassau County, NY. The Study Area includes potential locations in Brooklyn (EW 1) and Long Beach and Hempstead (EW 2) in New York. Where multiple options are under consideration, all potential sites are included in the Study Area.

2.2 Impact Assessment Methods

The impact assessment was conducted using a weight-of-evidence approach by evaluating a) the likelihood bats will occur in the Study Areas (i.e., exposure), and b) the known vulnerability of bats to collisions with wind turbines (offshore) and habitat modification (onshore). The likely presence of bat species was categorized based on criteria presented in Table 2-1 using the best available data and information on geographic range and habitat requirements (Table 2-2). Literature was used to determine vulnerability for each species or group based upon behavior, habitat requirements, seasonality of use, and known impacts associated with construction, operations, and decommissioning of proposed Project infrastructure.

Table 2-1: Exposure risk was determined based upon available data, existing literature, and species accounts.

Exposure Level	Definition
Minimal	Not likely to be present, and little to no evidence of use of the offshore/onshore environment for breeding or wintering, and minor predicted use during migration.
Low	Little evidence of the use of the offshore/onshore environment and a low proportion of the population exposed.
Medium	Moderate evidence of the use of the offshore/onshore environment and a moderate proportion of the population is exposed.
High	Strong evidence of the use of the offshore/onshore environment, the environment is primary habitat, and a high proportion of the population is exposed.

Table 2-2: Bat data considered in this analysis

Study	Location	Dates	Methods	Key Findings
Offshore				
Tetra Tech Acoustic Surveys (Tetra Tech 2019)	Lease Area: offshore survey activities aboard a research vessel (RV Ocean Researcher) conducting geophysical and geotechnical surveys within the Lease Area	May through December 2018	1 acoustic bat detector operating on ship moving throughout the Offshore Study Area	Low detection rates limited to a small number of species. Seasonal increase in activity during fall migration. No confirmed *Myotis* calls documented; migratory tree bats accounted for 75 percent of total bat activity.
Mid-Atlantic Baseline Surveys (Hatch et al. 2013)	Mid-Atlantic Wind Energy Areas (Delaware, Maryland, Virginia)	2012	Seven high-definition video aerial surveys and Eight visual boat-based surveys of wildlife	Eleven eastern red bats were observed between 10.5 mi (16.9 km) and 25.9 mi (41.8 km) east of New Jersey in September 2012.
University of Maryland Center for Environmental Science Acoustic Surveys (Sjollema et al. 2014)	Massachusetts to North Carolina	Spring and fall seasons, 2009 and 2010; 86 nights	Acoustic bat detectors (Anabat II), deployed aboard 5 ships (research, fishing, and oceanic survey) operating during various time periods along the mid-Atlantic coast.	One hundred and sixty-six bat detections were recorded over 898 hours of recording time. Maximum detection distance from shore was 13.6 mi (21.9 km) and mean distance was 5.2 mi (8.4 km).
Rhode Island Acoustic Studies (Smith and McWilliams 2016)	Atlantic Coast of southern New England	Fall (range August-October) 2010-2012	Acoustic bat detectors deployed at 7 locations within the Rhode Island National Wildlife Refuge Complex in southern Rhode Island.	During 775 detector nights 47,611 bat detections were recorded. The most commonly identified calls belonged to eastern red bats and silver-haired bats.

Study	Location	Dates	Methods	Key Findings
Onshore				
Carl Herzog, NYSDEC, email communication, November 18, 2019	Long Island, NY (EW 2)	NA	NA	Northern long-eared bat maternity roosts and hibernacula reported on Long Island, primarily on the eastern end. Closest hibernaculum to EW 2 onshore area is approximately 75 mi (120 km) away. The nearest northern long-eared bat detection is approximately 19 mi (30 km) away.

3 Results

3.1 Overview of Bats in New York and New Jersey

There are nine species of bats present in the states of New York and New Jersey, six of which are year-round residents (Table 3-1). These species can be divided into two major groups based on their wintering strategy: cave-hibernating bats and migratory tree bats. Both groups of bats are nocturnal insectivores that use a variety of forested and open habitats for foraging during the summer (Barbour and Davis 1969). Cave-hibernating bats are generally not observed offshore at distances where turbines are proposed (Dowling and O'Dell 2018); in the fall, these bats migrate from summer habitat to winter hibernacula in the mid-Atlantic region (Maslo and Leu 2013). Migratory tree bats fly to southern parts of the U.S. to overwinter and are observed offshore during migration (Hatch et al. 2013).

Table 3-1. Bat species present in New York and New Jersey, their conservation status, and federal Endangered Species Act listing status (New York Department of Environmental Conservation [NYSDEC] 2019a).

Common Name	Scientific Name	Type	NY State Status	Federal Status	Exposure	
					Onshore	Offshore
Eastern small-footed bat	*Myotis leibii*	Cave-Hibernating Bat	SC		Low	Min-Low
Little brown bat	*Myotis lucifugus*	Cave-Hibernating Bat	SGCN		Low	Min-Low
Northern long-eared bat	*Myotis septentrionalis*	Cave-Hibernating Bat	T	T[1]	Low	Min-Low
Indiana bat[2]	*Myotis sodalis*	Cave-Hibernating Bat	E	E	Low	Min-Low
Tri-colored bat	*Perimyotis subflavus*	Cave-Hibernating Bat	SGCN		Low	Min-Low
Big brown bat	*Eptesicus fuscus*	Cave-Hibernating Bat			Low	Min-Low
Eastern red bat	*Lasiurus borealis*	Migratory Tree Bat			Low	Low
Hoary bat	*Lasiurus cinereus*	Migratory Tree Bat			Low	Low
Silver-haired bat	*Lasionycteris noctivigans*	Migratory Tree Bat			Low	Low

[1] A proposed rule to reclassify the northern long-eared bat as endangered was published on March 23, 2022. A final decision as to this proposal is expected in late 2022.
[2] Range does not indicate presence in the Project area.
"Type" refers to two major life history strategies among bats in eastern North America; cave-hibernating bats roost in large numbers in caves during the winter (year-round residents), while migratory tree bats do not aggregate in caves and are known to migrate considerable distances, including over ocean and large waterbodies. E=endangered; T=threatened; SC=special concern; SGCN=species of greatest conservation need.

Two federally listed bat species are present in New York and New Jersey: Indiana bat (*Myotis sodalis*) and northern long-eared bat. Only one of these species, the northern long-eared bat, is found in the vicinity of the proposed Project, with confirmed maternity roosts in the towns of Brookhaven, East Hampton, Riverhead, Southampton, and Southold on Long Island, New York (C. Herzog, NYSDEC, email communication, November 18, 2019). Historical and current records of the Indiana bat in New Jersey demonstrate its presence only in north and west-central New Jersey and a hibernacula at Hibernia Mine in Morris, County (Barbour and Davis 1969, USFWS NJFO 2018). In New York, there are eight known winter hibernacula containing Indiana bats in New York; these occur in Albany, Essex, Warren, Jefferson, Onondaga, and Ulster counties (New York Department of Environmental Conservation [NYSDEC] 2019b). The summer range of Indiana bats likely includes a wider area outside these New York counties, though the species range does not include Long Island, and the species has never been recorded on Long Island. Based on this information, northern long-eared bat is the only federally protected bat species likely to occur in or near the Project area, and this is limited to the Onshore Study Area. Despite severe population declines, northern long-eared bats have historically been known to occur across all New York state counties (with the exception of the five New York City counties: New York County [Manhattan], Kings County [Brooklyn], Bronx County [The Bronx], Richmond County [Staten Island], and Queens County [Queens]; NYSDEC 2019b); before the spread of white-nose syndrome, the species was known to occur across the state of New Jersey (BRI unpublished data; USFWS NJFO 2017).

Northern long-eared bats are an insectivorous species that hibernates in caves, mines, and other locations (possibly talus slopes) in winter and spends the remainder of the year in forested habitats. The species' range includes most of the eastern and mid-western United States and southern Canada. Due to impacts from the fungal disease known as white-nose syndrome (WNS), the species has declined by 90-100 percent in most locations where the disease has occurred. Declines are expected to continue as WNS spreads throughout the remainder of the species' range (USFWS 2016). As a result, northern long-eared bats were listed as threatened under the Endangered Species Act in 2015.

The northern long-eared bat is active throughout early spring to late fall (March–November; Menzel et al. 2002, Brooks and Ford 2005). At summer roosting locations, the northern long-eared bat forms maternity colonies (aggregations of females and juveniles) where females give birth to young in mid-June. These maternity colonies are moved every 2-14 days by the females carrying their pups; colonies can consist of 1-30 female bats with pups (Menzel et al. 2002). Juveniles are flightless until mid-July (Carter and Feldhamer 2005). Adult females and volant juveniles remain in maternity colonies until mid-August, at which time the colonies begin to break up and bats begin migrating to their hibernation sites (Menzel et al. 2002). Bats forage around the hibernation site and mating occurs prior to entering hibernation in a period known as the fall swarm (Broders and Forbes 2004, Brooks and Ford 2005). During breeding and in the summer, northern long-eared bats have small home ranges (less than 25 acres [10 hectares]; Silvis et al. 2016 in Dowling et al. 2017) and migratory movements can be up to 170 mi (275 km) (Griffin 1945 in Dowling et al. 2017).

3.2 Offshore

3.2.1 Exposure

While there is uncertainty on the specific movements of bats offshore, bats have been documented in the marine environment, particularly during migration (Grady and Olson 2006, Cryan and Brown 2007, Johnson et al. 2011, BOEM 2013, Hatch et al. 2013, Lagerveld et al. 2017, Dowling and O'Dell 2018). Bats have been observed to temporarily roost on structures on nearshore islands such as lighthouses (Dowling et al. 2017) and there is historical evidence of bats, particularly eastern red bats, migrating offshore in the Atlantic (Hatch et al. 2013). In a mid-Atlantic bat acoustic study conducted during the spring and fall of 2009 and 2010 (86 nights), the maximum distance that bats were detected from shore was 13.6 mi (21.9 km) and the mean distance was 5.2 mi (8.4 km; Sjollema et al. 2014). In Maine, bats were detected on islands up to 25.8 mi (41.6 km) from the mainland (Peterson et al. 2014). In the mid-Atlantic acoustic study, eastern red bats comprised 78 percent (166 bat detections during 898 monitoring hours) of all bat detections offshore and bat activity decreased as wind increased (Sjollema et al. 2014). In addition, eastern red bats were detected in the mid-Atlantic up to 27.3 mi (44 km) offshore by high resolution video aerial surveys (Hatch et al. 2013).

Several studies have also highlighted the relationship between bat activity and weather conditions. In general, bat activity has been found to occur primarily during nights with warmer temperatures and low wind speeds (Fiedler 2004, Reynolds 2006). Smith and McWilliams (2016) developed predictive models of regional nightly bat activity, using continuous acoustic monitoring at several locations in coastal Rhode Island. Bat activity was found to steadily decrease with decreasing temperatures, and departures from seasonally normal temperatures increasingly inhibited bat activity later in the season (September through October). Although Smith and McWilliams (2016) found no association with wind speed and activity of migratory bats (primarily red and silver-haired bats), they demonstrate a strong relationship with "wind profit," a variable indicating combinations of wind speeds and directions that would likely induce coastal flight paths.

<u>Cave-hibernating bats</u>: Cave-hibernating bats hibernate regionally in caves, mines, and other structures and feed primarily on insects in terrestrial and fresh-water habitats. These species generally exhibit lower activity in the offshore environment than the migratory tree bats (Sjollema et al. 2014), with movements primarily during the fall. In the mid-Atlantic, the maximum distance *Myotis* bats were detected off shore was 7.2 mi (11.5 km; Sjollema et al. 2014). A nanotag tracking study on Martha's Vineyard recorded little brown bat (n = 3) movements off the island in late August and early September, with one individual flying from Martha's Vineyard to Cape Cod (Dowling et al. 2017). Big brown bats (n = 2) were also detected migrating from the island later in the year (October–November; Dowling et al. 2017). These findings are supported by an acoustic study conducted on islands and buoys of the Gulf of Maine, which indicated the greatest percentage of activity in July–October (Peterson et al. 2014).

As shown by these studies, the use of coastline as a migratory pathway by cave-hibernating bats is likely limited to their fall migration period. Furthermore, acoustic studies indicate lower use of the offshore environment by cave-hibernating bats as compared to tree-roosting species (Lagerveld et al. 2017). In addition, cave-hibernating bats do not regularly feed on insects over the ocean. For these reasons, exposure to the Lease Area is considered "minimal" to "low" for cave-hibernating bats in general. Due to their listing status, northern-long-eared bats are discussed in greater depth below.

Northern long-eared bat: Northern long-eared bats are not expected in the Lease Area. This is further substantiated by a tracking study on Martha's Vineyard (n = 8; July–October 2016) where no offshore movements were recorded (Dowling et al. 2017) and by the 2018 acoustic data collected within the Lease Area (Tetra Tech 2019). Since research on the movements of these bats in the marine environment is limited, there remains uncertainty on if this species travels offshore. If northern long-eared bats were to migrate over water, movements would likely be in close proximity to the mainland. The related little brown bat has been documented to migrate from Martha's Vineyard to Cape Cod, and northern long-eared bats may likewise migrate to mainland hibernacula from these islands in August–September (Dowling et al. 2017). In addition, while in a different area, the Vineyard Wind 1 Biological Assessment concluded that "it is extremely unlikely northern long-eared bats would traverse offshore portions" of the project

(BOEM 2019). Given that there is little evidence of use of the offshore environment by northern long-eared bats, exposure is expected to be “minimal”.

<u>Migratory tree bats</u>: Tree bats migrate south to overwinter and have been documented in the offshore environment (Hatch et al. 2013). Eastern red bats have been detected migrating from Martha’s Vineyard late in the fall, and one bat was tracked as far south as Maryland (Dowling et al. 2017). These results are supported by historical observations of eastern red bats offshore as well as recent acoustic and survey results (Hatch et al. 2013, Peterson et al. 2014, Sjollema et al. 2014). While little local data are available, recent offshore acoustic surveys recorded bats within the Lease Area, with observations primarily comprised of eastern red bats and silver-haired bats, concentrated during fall migration (Tetra Tech 2019; Figure 3-1). Big brown bats were documented infrequently within the Lease Area, and hoary bats were also detected in the offshore environment, but closer to shore and not within the Lease Area. These data suggest that tree bats are most likely to pass through the Lease Area, comprised mainly of red and silver-haired bats during the migration period (late summer/early fall). Because bat movement offshore is generally limited to fall migration, spatiotemporal exposure is expected to be “low”.

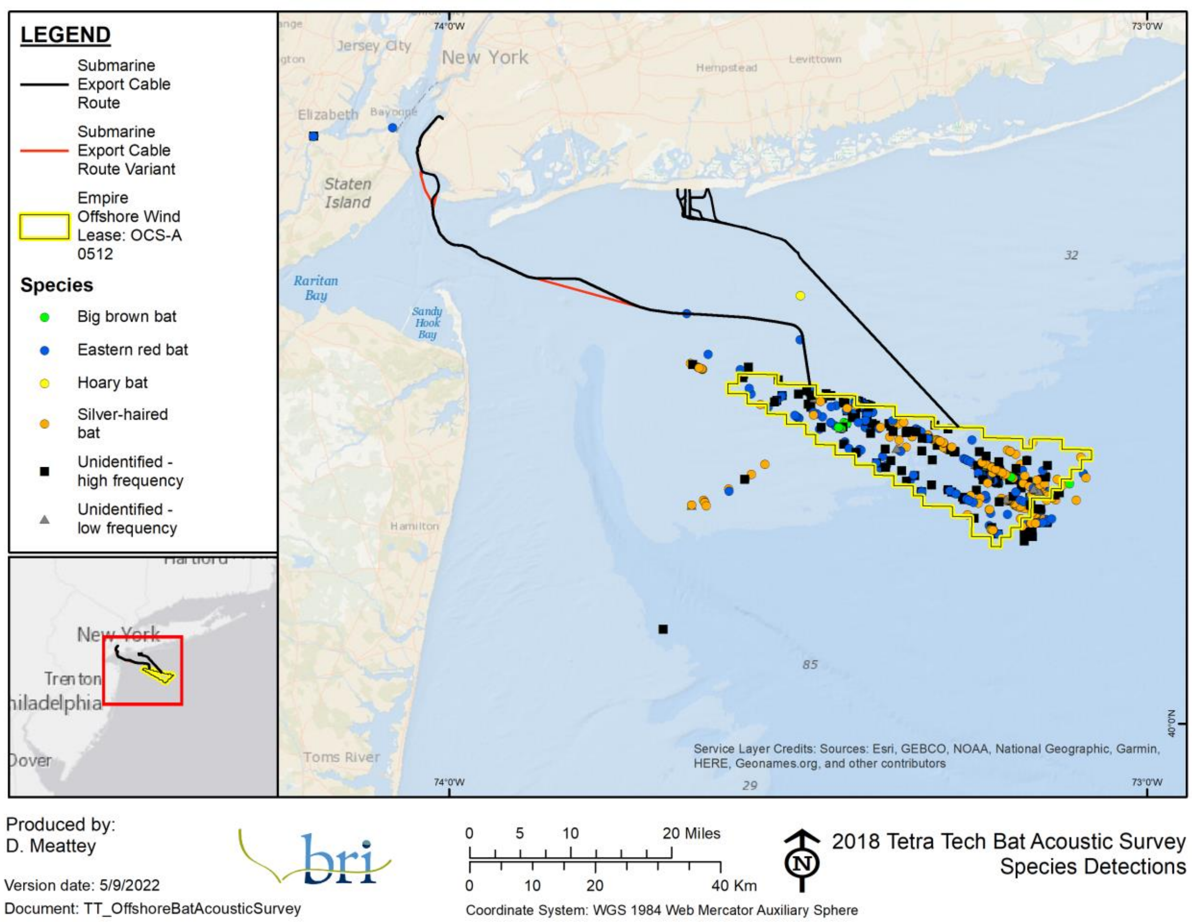

Figure 3-1. Bat occurrences in the Lease Area detected during offshore acoustic surveys conducted by Tetra Tech in 2018 (Tetra Tech 2019).

3.2.2 Impact Assessment

3.2.2.1 Impact-producing factors

Offshore, bats may be exposed to the following hazards: Project-related construction and maintenance vessels may attract bats as stopover structures or as potential foraging locations if lights attract aerial insects, and the wind turbines may provide similar attractants and also present collision risk. For the analysis below, the full range of wind turbine sizes that may be used by the Project are considered, and it is also assumed that foundation type will not significantly change the hazards during construction.

3.2.2.2 Construction

Bats may be attracted to the offshore construction areas, including lighted vessels as they are moving throughout the Project Area. Bats at onshore wind facilities have been documented showing higher attraction and more frequent approaches to turbines when the blades are not spinning (Cryan et al. 2014), so attraction may be stronger during the construction period prior to commissioning of turbines. Overall, stationary objects are not generally considered a collision risk for bats (BOEM 2012) because of their use of echolocation (Johnson and Arnett 2004, Horn et al. 2008) and as such, individual vulnerability to collision with construction equipment or offshore facility structures during construction is expected to be low. Furthermore, exposure to construction and installation infrastructure is temporary so population-level impacts are unlikely.

3.2.2.3 Operations and Maintenance

During migration bats may be attracted to the offshore Project area by lighted maintenance vessels, turbines, and substations. The primary potential impact of the operational component of the Project to bats is mortality or injury resulting from collision with wind turbines. Based on collision mortalities documented at terrestrial wind farms, all bats with potential to occur within the Lease Area are potentially vulnerable to collision. At terrestrial wind farms in the U.S., bat mortality has been documented (Cryan and Barclay 2009, Hayes 2013, Smallwood 2013, Martin et al. 2017, Pettit and O'Keefe 2017), predominantly impacting migratory tree-roosting bats (Kunz et al. 2007). The highest proportion of these fatalities tends to occur in late summer and early fall (Cryan 2008). In Europe, there is some evidence to suggest that bats forage over the surface of the ocean and increase their altitude when foraging around obstacles (i.e., lighthouses and wind turbines; Ahlén et al. 2009).

Bats are not expected to regularly forage in the Lease Area but may be present during migration (BOEM 2012). The exposure of cave-hibernating bats to the Lease Area is expected to be minimal to low and would only occur on rare occasions during migration. Therefore, population-level impacts to cave-hibernating bats are unlikely during operations of the Project, and risk to northern long-eared bats is negligible.

Migratory tree bats have the potential to pass through the Lease Area, but overall a small number of bats are expected in the Lease Area given its distance from shore (BOEM 2014). While there is evidence of bats visiting wind turbines close to shore (2.5–4.3 mi [4–7 km]) in the Baltic Sea (enclosed by land; Ahlén et al. 2009, Rydell and Wickman 2015) and bats are demonstrated to be vulnerable to collisions, the individual bats entering the Lease Area and vulnerable to collision are expected to occur in low numbers, except possibly during late summer/fall migration. Therefore, population-level impacts are unlikely given what appear to be high numbers of these species in the region relative to the low numbers likely to be affected by Project operations.

3.2.2.4 Decommissioning

Impacts during decommissioning are expected to be similar or less than those experienced during construction, as described above. It is important to note that advances in decommissioning methods/technologies are expected to occur throughout the operations phase of the Project. A full decommissioning plan will be approved by BOEM prior to any decommissioning activities, and potential impacts will be re-evaluated at that time. For these reasons, decommissioning of the offshore portion of the Project is unlikely to impact populations of bats (including northern long-eared bat).

3.3 Onshore

This section discusses the species of bats that may be exposed to construction and operations of the Project's onshore facilities (EW 1 [Figure 3-2] and EW 2 [Figure 3-3]), which include export cable landfall sites, onshore export and interconnection cables, onshore substations, and O&M Base. For proposed onshore export and interconnection cable routes, the transmission lines will be buried within existing developed areas (e.g., roads) that pass through residential and commercial areas wherever possible, thereby minimizing potential impacts to terrestrial bat habitat.

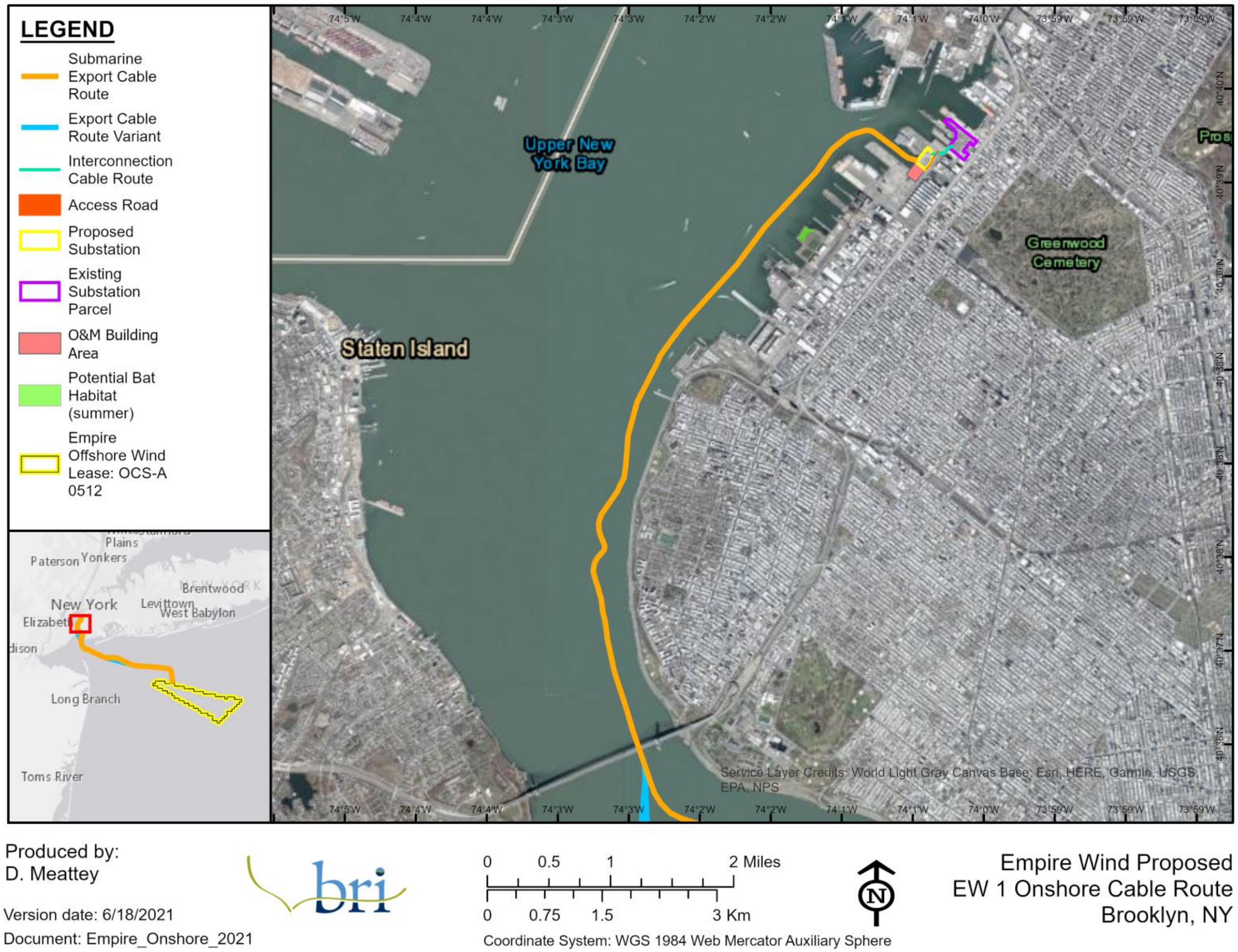

Figure 3-2. Overview of the proposed EW 1 interconnection cable route and potential summer bat habitat within the Onshore Study Area.

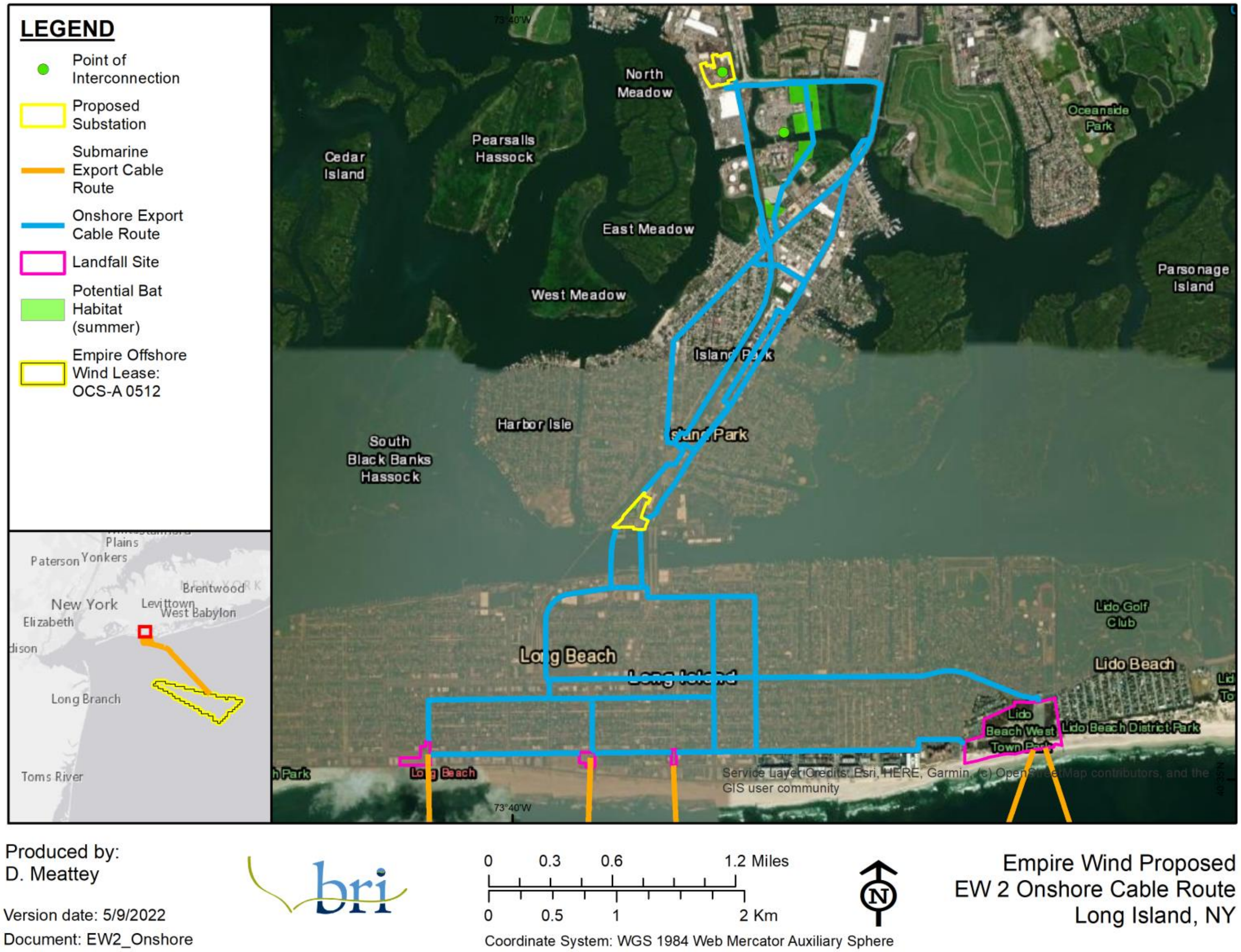

Figure 3-3: Overview of the proposed EW 2 onshore export and interconnection cable route and potential summer bat habitat within the Onshore Study Area.

3.3.1 Exposure

All bat species present in New York are nocturnal insectivores. Preferred foraging habitats vary among species. Foraging habitat selected may be linked to flight and echolocation capabilities, as well as preferred diet (Norberg and Rayner 1987). Small, maneuverable species like northern long-eared bats and little brown bats can forage in cluttered conditions such as the forest understory or small forest gaps. Larger, faster-flying bats, such as hoary bats, often forage above the forest canopy or in forest gaps (Taylor 2006). Some species, such as little brown bats and tri-colored bats, regularly forage over water sources. Big brown bats, eastern red bats, and hoary bats are also known to use waterways as foraging areas as well as travel corridors (Barbour and Davis 1969).

The EW 1 onshore substation site and O&M Base consist primarily of highly urbanized environments and existing infrastructure with little natural habitat areas. Since the EW 1 area is highly urbanized, it is not expected to provide bat habitat and will not be discussed further. The proposed onshore substation sites at EW 2 occur in a highly developed area bordered by commercial and residential developments. Given the level of disturbance and development already present at EW 2 Onshore Substation A and EW 2 Onshore Substation C, impacts to bat species would be temporary and permanent impacts to potential habitat for bat species are expected to be minimal to low because the small non-developed area that will be altered is located in an already urbanized area.

Forested habitats, such as areas adjacent to the proposed onshore substations at EW 2, can provide roosting areas for both migratory and non-migratory species. All bat species present in New York are known to utilize forested areas of varying types during summer for roosting and foraging. Some of these species roost solely in the foliage of trees, while others select dead and dying trees where they roost in peeling bark or inside crevices. Some species may select forest interior sites, while others prefer edge habitats (Barbour and Davis 1969).

Caves and mines provide key habitat for non-migratory bats. These locations serve as winter hibernacula, fall swarming locations, and summer roosting locations for some individuals. Hibernacula are documented in New York, but the numbers of individuals at the sites have declined dramatically because of WNS (Ingersoll et al. 2016, NJ Division of Fish and Wildlife 2017). Since 2011, WNS has substantially reduced *Myotis* bat populations in New York (NJ Division of Fish and Wildlife 2017). Maternity roosts, active detections (mist net captures and acoustic recordings), and hibernacula have been reported for northern long-eared bats in several areas of Long Island (particularly in the eastern portion) suggesting a year-round presence of northern long-eared bat (C. Herzog, NYSDEC, email communication, November 18, 2019). The nearest known hibernaculum to the EW 2 onshore export and interconnection cable corridor occurs approximately 75 mi (120 km) to the east, in the town of East Hampton. Though northern long-eared bat presence has been detected within approximately 19 mi (30 km) of the EW 2 onshore substation sites, no detections have been reported within the onshore export and interconnection cable corridors.

None of the bat species are likely to use the urbanized, developed areas within the onshore portions of the Project Area. However, there is some likelihood that they could utilize the treed areas for foraging and roosting and open water areas for foraging at EW 2 during the bat active period (generally April to October). Neither area of potentially suitable summer habitat would be reasonably considered optimal habitat given the lack of connectivity with contiguous forest and/or forested wetland habitats. Therefore, while both cave-hibernating and migratory tree bats may occur in areas around EW 2, bat exposure, including northern long-eared bat, is expected to be "low".

3.3.2 Impact Assessment

3.3.2.1 Impact-Producing Factors

Onshore, the primary hazard is temporary and/or permanent habitat modification (e.g., tree clearing, vegetation clearing, and soil disturbance) during construction. During operations, maintenance activities have the potential to cause temporary habitat modification (e.g., ground disturbance), but disturbance would generally be similar to or less than the construction of the onshore export and interconnection cables (e.g., impact smaller areas for short durations). Thus, the onshore operations are not expected to have any specific long-term hazards.

3.3.2.2 Construction and Installation

The primary potential effect to bats from the Project's onshore components is localized and minor habitat modification. The majority of the proposed onshore export and interconnection cable routes are located in already disturbed urban areas (e.g., roadways). If tree cutting along the route is required, it is not expected to cause loss of important habitat. Overall, habitat loss will be limited, and any potential effects will be indirect and unlikely to impact individual northern long-eared bats or population levels of non-listed species.

3.3.2.3 Operations and Maintenance

Trees removed in areas of development will not be regrown during the life of the project, and thus the habitat loss for roosting bats will be long-term. However, only a small area of habitat will be lost, which is a very small percentage of suitable habitat in the region. Other maintenance activities are not likely to further modify bat habitat. For these reasons, operations and maintenance are unlikely to impact to individual bats, including northern long-eared bat and state-listed species, or bat populations overall.

3.3.2.4 Decommissioning

Impacts during decommissioning are expected to be similar or less than those experienced during construction, as described above. It is important to note that advances in decommissioning methods/technologies are expected to occur throughout the operations phase of the Project. A full decommissioning plan will be approved by BOEM prior to any decommissioning activities, and potential impacts will be re-evaluated at that time. For these reasons, decommissioning of the onshore portion of the Project is expected to have negligible impacts to bat populations as well as individual northern long-eared bat and state-listed species.

3.4 Impact Avoidance and Minimization

New York State restricts tree clearing between March through November on Long Island, however, as the northern long-eared bat has not been documented at the EW 2 onshore substation sites, Empire intends to work with the applicable agencies to minimize this restriction, as appropriate. No tree clearing is anticipated to be required at the EW 1 onshore substation site, the EW 2 Onshore Substation A and/or EW 2 Onshore Substation C site, or the O&M Base.

4 Summary and Conclusions

Overall, the proposed Project is unlikely to impact bat populations. While some individual cave-hibernating bats may occur within the Lease Area during operations of the Project, and will be vulnerable to collision with operating turbines, the exposure of cave-hibernating bats (including northern long-eared bat and state-listed species) to operating turbines is expected to be minimal to low given their distance from shore. Small numbers of migratory tree bats are expected to occur in the Lease Area during construction and operations; however, this is reasonably expected to include low numbers of individuals given the Project's distance from shore, and tree bat activity will be concentrated during a small portion of the year (i.e., fall migration; August–October; BOEM 2012). Due to low exposure of bats to the Lease Area, the offshore components of the Project are unlikely to have population-level impacts for any species of bats. In addition, individual federally and state-listed bat species are unlikely to be affected.

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