EMPIRE OFFSHORE WIND:
EMPIRE WIND PROJECT (EW 1 and EW 2)

CONSTRUCTION AND OPERATIONS PLAN

VOLUME 2e: SOCIAL RESOURCES

Prepared for
equinor

Submitted to
Bureau of Ocean Energy Management

Prepared by
TETRA TECH

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Photo Credit: Jan Arne Wold/Equinor

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8. HUMAN RESOURCES AND THE BUILT ENVIRONMENT

This section describes the socioeconomic resources, including population, employment and other aspects of the economy, housing, land use and zoning, recreation and tourism, and environmental justice relevant to the development of the Project. Potential impacts to socioeconomic resources resulting from construction, operations, and decommissioning of the Project are discussed. Permits necessary for the improvement of port and construction/staging facilities will be the responsibility of the owners of these facilities. Empire expects such improvements will broadly support the offshore wind industry and will be governed by applicable environmental standards, which Empire will comply with in using the facilities. Proposed Project-specific measures adopted by Empire are also described, which are intended to avoid, minimize, and/or mitigate potential impacts to socioeconomic resources.

Other socioeconomic related uses discussed in separate sections include:

- Visual Effects to Historic and Architectural Properties (Section 6.3);
- Visual Resources (Section 7.0); and
- Economic Impacts of the Empire Wind Project (EW 1 and EW 2) (Appendix O).

8.1 Population, Economy, Employment, and Housing and Property Values

This section describes the population, economy, employment, and housing and property values observed in the Project Area.

Data Relied Upon and Studies Completed

For the purposes of this section, the Study Area includes the municipalities in which the onshore Project components (e.g., the onshore export cables, interconnection cables, the onshore substations, and O&M Base), ports, construction and staging areas, and operations and maintenance activities will be located and/or occur (see **Figure 8.1-1**, **Figure 8.1-2,** and **Table 8.1-1**)[1]. These sections rely upon the American Community Survey data provided through the U.S. Census Bureau.

8.1.1 Affected Environment

The affected environment is defined as the municipalities that have the potential to be directly and/or indirectly affected by the construction, operations, and decommissioning of the Project. For the purposes of this section, this includes the staging, construction, and O&M Base, the onshore export and interconnection cable routes, the onshore substations, and the POIs. Permits necessary for the improvement of port and construction/staging facilities will be the responsibility of the owners of these facilities. Empire expects such improvements will broadly support the offshore wind industry and will be governed by applicable environmental standards, which Empire will comply with in using the facilities.

[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.

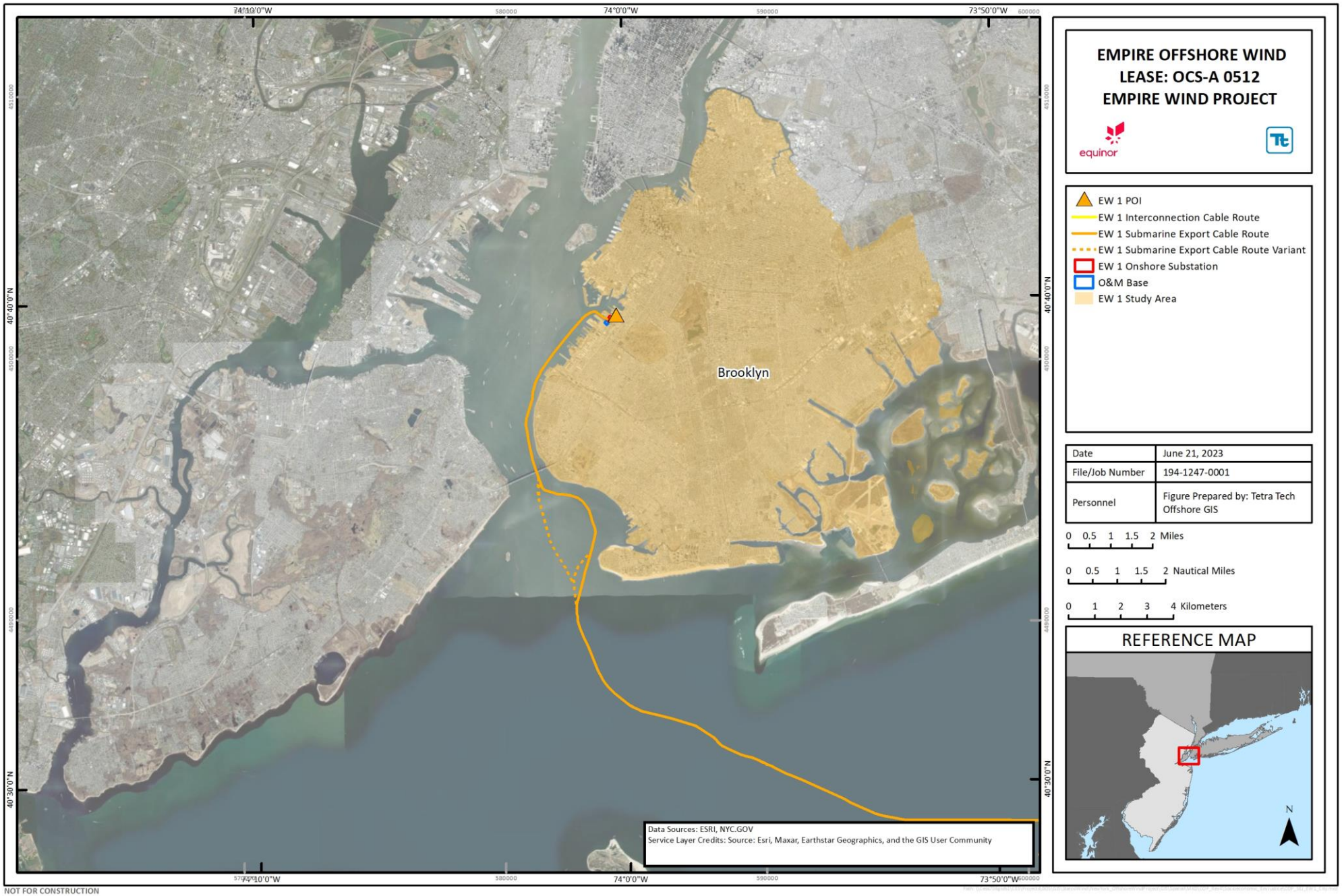

Figure 8.1-1 EW 1 Population, Economy, Employment, and Housing and Property Values Study Area

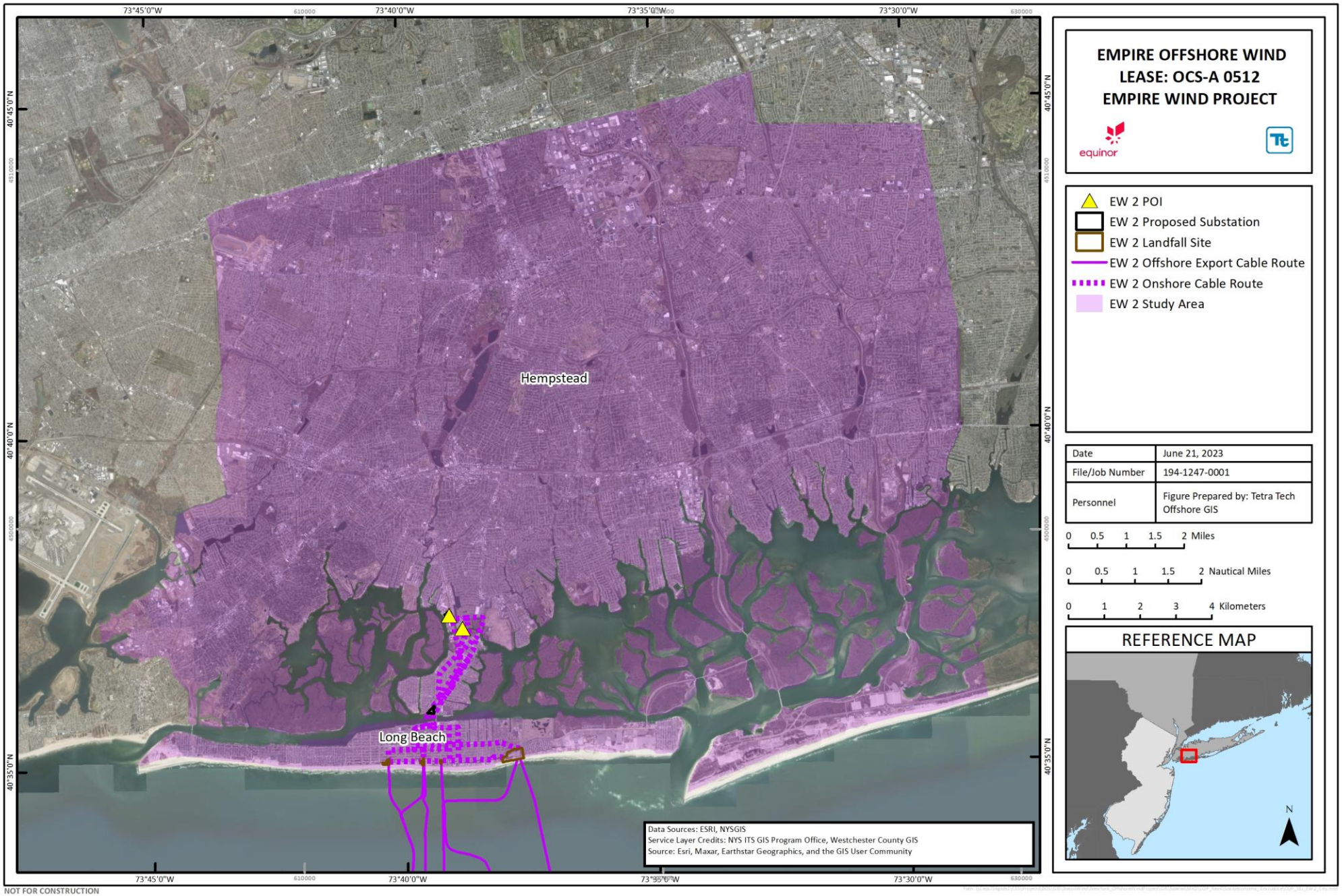

Figure 8.1-2 EW 2 Population, Economy, Employment, and Housing and Property Values Study Area

8.1.1.1 New York

The State of New York comprises 62 counties, 62 cities, 932 towns, and 551 villages. Project infrastructure and/or activities are proposed to be located within Kings County and Nassau County. Kings County, which is located on the southwestern end of Long Island, comprises only one city, Brooklyn (New York State, n.d.-a). Nassau County is located on the western portion of Long Island and contains two cities and three towns. Within the three towns, there are 64 incorporated villages and over 100 unincorporated areas (Nassau County, n.d.). In the State of New York, counties are divided into cities or towns, with the towns being major subdivisions that contain multiple incorporated villages. These incorporated villages are clearly defined areas with their own governing bodies (New York State, n.d. -a). For the purpose of this section, only the cities, towns, and incorporated villages are discussed.

The counties, towns, and villages in which the Project infrastructure and/or activities will occur and/or may potentially be affected are defined in **Table 8.1-1**.

Table 8.1-1 New York Counties, Towns, and Villages to be Affected by Project Infrastructure and/or Activities

	Project Infrastructure			
County/ Municipality	Onshore Route	Onshore Substation	Staging/ Construction Facilities a/	O&M Base
Kings County (Brooklyn)	X	X	X	X
Nassau County	X	X	X	
Hempstead	X	X	X	
Village of Island Park	X	X	X	
City of Long Beach	X		X	

Note:
a/ Empire is in the process of evaluating and selecting the staging/construction facilities to be utilized for the Project; therefore staging/construction facilities may also be located in counties/municipalities outside of those listed here.

Population, Economy, and Employment

While Kings County and Nassau County are only two of the 62 counties within the State of New York, they make up more than 20 percent of the state's population. As a result, both counties have a significantly higher population density than the state average, with Kings County being the most populous county in the state (New York State, n.d. -a). Nassau County has a higher per capita income and lower unemployment rate than the state average; per capita income in Kings County is slightly lower than the state average and unemployment is slightly higher. Overall, median income is lower than the state average. These population, economic, and employment conditions are summarized on a municipal level in **Table 8.1-2**.

Table 8.1-2 Existing New York Economic Conditions in the Study Area

County/ Municipality	Total Population (2019 5-year estimates)	Population Density (persons per square mile) (2019)	Per Capita Income	Median Non-Family Income	Civilian Labor Force	Unemployment Rate	Top 3 Industries a/
New York	**19,572,319**	**411.2**	**$39,326**	**$68,486**	**10,045,829**	**5.5%**	**E, P, R**
Kings County (Brooklyn)	2,589,974	35,369.1	$34,173	$43,219	1,307,649	6.2%	E, P, R
Nassau County	1,356,509	4,704.8	$51,422	$52,177	715,543	3.9%	E, P, F
Hempstead	767,417	6,406.1	$44,958	$50,416	408,113	4.2%	E, P, R
Village of Island Park	4,835	10,979.8	$40,304	$75,731	2,845	2.5%	E, A, F
City of Long Beach	33,507	15,022.6	$53,579	$65,242	19,432	4.4%	E, P, F

Note:
a/ E = Educational Services, and health care and social assistance; R = Retail trade; M = Manufacturing; P = Professional, scientific, and management, and administrative and waste management services; C = Construction; A = Arts, entertainment, and recreation, and accommodation and food services, F = Finance and insurance, and real estate and rental and leasing

Sources: U.S. Census Bureau QuickFacts New York 2018; American Community Survey 2019

Housing and Property Values

In total, the two affected counties contain more than 18 percent of all housing units in the state. Generally, the housing vacancy rate is lower than the state average, with the exception of the City of Long Beach. This is likely due to the higher seasonal, recreational, or occasional use of housing units. Median value and median rent are also higher than the state average.

In addition to housing units, there are also many other temporary housing options within these areas, including hotels, bed-and-breakfast facilities, campgrounds, and recreational vehicle sites. Housing conditions are summarized on a municipal level in **Table 8.1-3**.

Table 8.1-3 New York Housing Statistics in the Study Area

County/ Municipality	Total Housing Units	2015-2019 Vacant Housing Units	Median Value of Owner-Occupied Units	Median Rent
New York	**8,322,722**	**11.8%**	**$313,700**	**$1,280**
Kings County (Brooklyn)	1,044,493	8.2%	$706,000	$1,426
Nassau County	472,572	5.4%	$493,500	$1,772
Hempstead	256,561	4.8%	$455,700	$1,678
Village of Island Park	1,693	6.4%	$399,300	$1,689
City of Long Beach	15,969	12.2%	$508,800	$1,847

Source: American Community Survey 2019

8.1.2 Impacts Analysis for Construction, Operations, and Decommissioning

The potential impacts resulting from the construction, operations, and decommissioning of the Project are based on the maximum design scenario from the PDE (for a complete description of the construction, operations, and decommissioning activities that Empire anticipates for the Project, see **Section 3 Project Description**). For population, economy, employment, and housing and property values, the maximum design scenario is the full build-out of the wind farm, including installation of the onshore export and interconnection cables, the onshore substations, and the O&M Base, as described in **Table 8.1-4**. The parameters provided in **Table 8.1-4** represent the maximum potential impact from full build-out.

Table 8.1-4 Summary of Maximum Design Scenario Parameters for Population, Employment and Other Aspects of the Economy, and Housing and Property Values

Parameter	Maximum Design Scenario	Rationale
Construction		
Offshore construction	Based on full build-out of EW 1 and EW 2 (147 wind turbines and 2 offshore substations). EW 1: 57 wind turbines and 1 offshore substation. EW 2: 90 wind turbines and 1 offshore substation.	Representative of the maximum number of new workers who would utilize the resources in the Project Area.

Table 8.1-4 Summary of Maximum Design Scenario Parameters for Population, Employment and Other Aspects of the Economy, and Housing and Property Values (continued)

Parameter	Maximum Design Scenario	Rationale
Onshore components	Based on EW 1 and EW 2. Construction and installation of two export cables landfalls, onshore export and interconnection cables, onshore substations, and O&M Base.	Representative of the maximum onshore construction work, which has the potential to temporarily impact the resources in the Project Area.
Onshore construction, project-related personnel	Based on EW 1 and EW 2. Construction and installation of two export cables landfalls, onshore export and interconnection cables, onshore substations, and O&M Base.	Representative of the maximum number of Project-related personnel who would utilize the resources in the Project Area.
Onshore construction, duration	Based on EW 1 and EW 2. Construction and installation of two export cables landfalls, onshore export and interconnection cables, onshore substations, and O&M Base.	Representative of the maximum period required to install the onshore components, which has the potential to temporarily impact resources in the Project Area.
Staging and construction areas, including port facilities, work compounds and lay-down areas	Based on EW 1 and EW 2. Maximum number of work compounds and lay-down areas required. Ground disturbing activities are not anticipated. Independent activities to upgrade or modify staging, construction areas, and ports prior to Project use will be the responsibility of the facility owner.	Representative of the maximum area required to facilitate the offshore and onshore construction activities.
Operations and Maintenance		
Offshore structures	Based on full build-out of EW 1 and EW 2 (147 wind turbines and 2 offshore substations). EW 1: 57 wind turbines and 1 offshore substation. EW 2: 90 wind turbines and 1 offshore substation.	Representative of the presence of new fixed structures in an area that previously had none.
Onshore substations	Based on EW 1 and EW 2. EW 1: 4.8-ac (1.9-ha) area. EW 2: 6.4-ac (2.6-ha) area.	Representative of the presence of a new structure in an area where there was previously none.
O&M Base	4.5-ac (1.8-ha) area.	Representative of the presence of a new structure in an area where there was previously none.
Onshore O&M activities, project-related personnel	Based on EW 1 and EW 2.	Representative of the maximum number of workers who would utilize the resources in the Project Area.

8.1.2.1 Construction

During construction, the potential impact-producing factors for population, economy, employment, and housing and property values may include:

- Construction of the offshore components, including foundations, wind turbines, offshore substations, and submarine export and interarray cables;
- Staging activities and assembly of Project components at applicable facilities or areas;
- Construction of the onshore electrical systems, including splice bays (installation techniques include open cut trenching, HDD, and Direct Pipe); and
- Construction of new onshore substations and O&M Base.

The following impacts may occur as a consequence of the factors identified above:

- Short-term creation of additional construction jobs;
- Short-term increase in workforce;
- Short-term increase in the demand for permanent and/or rental housing;
- Short-term increase in the demand for public services;
- Short-term increase in the demand for construction material and general purchasing;
- Short-term increase in tax revenue and economic benefits; and
- Short-term change in property value due to construction activities.

Creation of additional construction jobs. The Project is expected to lead to the creation of additional jobs during the construction period; including construction laborers, crane operators, vessel crew, pile drivers, steel workers, and electricians. According to a 2017 NYSERDA report, approximately 3,500 manufacturing and installation jobs are anticipated to support New York wind farms (NYSERDA 2017). In addition, a 2018 report from E2 found that a 352-MW wind farm would directly generate 2,345 jobs in New York during the construction period (E2 2018). In an assessment completed by Empire, approximately 1,261 direct jobs are anticipated to be created during the construction phase of the Project for EW 1, with an additional 2,154 direct jobs for EW 2. In total, approximately 2,326 direct, indirect, and induced jobs are anticipated to be created during the construction phase of the Project for EW 1, with an additional 4,046 jobs for EW 2 (see **Appendix O Economic Impacts of the Empire Wind Project (EW 1 and EW 2)** for additional information). Most of these jobs are anticipated to be located within the Study Area, specifically along the onshore export and interconnection cable routes in Kings and Nassau counties in New York. New jobs are also likely to be located around the construction and staging areas.

Construction-related jobs would be temporary during the construction period for EW 1 and EW 2. However, the specific skills and experience gained would be applicable to other offshore windfarm projects as they enter the construction phase.

Increase in workforce. While a portion of the newly created jobs will likely be filled with the local workforce, it is anticipated that there will be a slight influx in workers relocating to the Study Area (see Creation of additional construction jobs for estimates provided by various agencies). This increase in workforce is likely to be the most pronounced along the onshore export and interconnection cable routes in Kings and Nassau Counties in New York. New jobs are also likely to be located around the construction and staging areas.

Increase in demand for permanent and/or rental housing. The increase in workforce will likely result in an increased demand for temporary housing for workers and their families. As a result, the demand for

temporary housing units is expected to increase, with a decrease in vacancy rate. The anticipated increase of workers relocating into the area is unlikely to be greater than the available number of temporary housing units and is not expected to create a shortage. This demand for housing also has the potential to increase property values in the Study Area (see Change in property values subsection).

Increase in the demand for public services. Construction activities and the influx of a non-local workforce will likely result in an increased demand for public services, including police and fire services. The Study Area contains numerous hospitals, fire departments, law enforcement personnel, and public schools, and is well-developed with sufficient capacity such that the Project will not impact the availability of public services. Therefore, the anticipated increase in demand for public services is unlikely to create a shortage for the general public. Additional detail on potential impacts to health and public safety is discussed in **Section 8.12 Public Health and Safety**.

Increase in the demand for construction material and general purchasing. Construction activities are expected to directly result in increased purchasing of construction and other materials in the Study Area, including general household purchasing for the temporary workforce.

Increase in tax revenue and economic benefits. The creation of jobs and the increased purchasing of construction materials is expected to lead to an increase in tax revenue to local communities. In an assessment completed by Empire, the EW 1 Project is expected to provide a total of $283.0 million in direct, indirect, and induced economic benefits, with an additional $24.9 million in state and local taxes (see **Appendix O** for additional information). Other studies and reports project similar economic benefits. According to the 2017 NYSERDA study, offshore wind would result in as much as a $6.3 billion of expenditure in New York (NYSERDA 2017). In addition, the 2018 E2 report showed that construction of a 352-MW project would generate over $737 million in economic benefits in New York (this includes direct, indirect, and induced values). The report also showed that for every $1 spent in building an offshore wind farm in New York, $1.72 would be generated into the state's economy. In 2019, NYSERDA issued a report on Phase 1 of its offshore wind solicitation in which NYSERDA selected EW 1 and another offshore wind project. The 2019 NYSERDA report states that the two offshore wind projects are expected to provide more than $3.2 billion in new economic activity in labor, supplies, development, and manufacturing in New York. The report also expects approximately $700 million of avoided health impact benefits from the two projects.

Change in property values. The onshore components of the Project are proposed to be located in existing ROWs and within previously developed areas designated for such uses, to the extent practicable. In addition, onshore construction activities are proposed to take place during the off-season, to avoid impacts with the local peak tourism seasons. Therefore, due to the temporary nature of the construction activities, property values are not anticipated to be negatively impacted during the construction phase. Offshore, as the presence of Project-related vessels is consistent with the existing vessel traffic in the New York Bight, property values are not anticipated to be negatively impacted.

8.1.2.2 Operations and Maintenance

During operations, the potential impact-producing factors to population, economy, employment, and housing and property values may include:

- Presence of new fixed structures offshore, including wind turbines and offshore substations;
- Operations and maintenance activities associated with the onshore export and interconnection cables and onshore substations; and
- Operations at the O&M Base.

The following impacts may occur as a consequence of the factors identified above.

- Long-term creation of additional operations and maintenance jobs;
- Long-term increase in workforce;
- Long-term increase in the demand for permanent and/or rental housing;
- Long-term increase in the demand for public services;
- Long-term increase in tax revenue and economic benefits; and
- Long-term potential for a change in property value due to operation and maintenance activities.

Creation of additional operations and maintenance jobs. The Project is expected to lead to the creation of jobs during operations. In an assessment completed by Empire, approximately 1,797 direct jobs are anticipated to be created during the lifetime of the Project for EW 1, with an additional 2,723 direct jobs for EW 2. In total, approximately 4,069 direct, indirect, and induced jobs are anticipated to be created during the lifetime of the Project for EW 1, with an additional 6,173 jobs for EW 2 (see **Appendix O** for additional information). Further, according to the 2017 NYSERDA report, approximately 2,000 operations and maintenance jobs are anticipated to support New York wind farms (NYSERDA 2017). In addition, a 2018 report from E2 found that a 352-MW wind farm would directly generate 75 jobs in New York in the operations phase (E2 2018). Furthermore, as with the construction phase, the specific skills and experience gained would be applicable to other offshore windfarm projects as they enter the operations phase. Most of these jobs are anticipated to be located within the Study Area, specifically in Brooklyn, Kings County, New York, at the proposed location for the O&M Base.

Increase in workforce. It is anticipated that there will be a slight influx of workers relocating to the Study Area (see Creation of additional operations and maintenance jobs for estimates provided by various agencies). This increase in workforce is likely to be the most pronounced in Brooklyn, Kings County, New York at the O&M Base.

Increase in demand for permanent and/or rental housing. The increase in workforce will likely result in an increased demand for permanent and/or rental housing for workers and their families. As a result, the demand for housing units is expected to increase, with a decrease in vacancy rate. However, this anticipated increase in relocated workers is unlikely to be greater than the available number of housing units and is not expected to create a shortage.

Increase in demand for public services. Operation activities and the slight increase in the Study Area workforce will likely result in a slightly increased demand for public services. The Study Area contains numerous hospitals, fire departments, law enforcement personnel, and public schools, and is well-developed with sufficient capacity such that the Project will not impact on the availability of public services. Therefore, this anticipated increase in demand for public services is very unlikely to create a shortage for the general public. Additional detail on potential impacts to health and public safety is discussed in **Section 8.12**.

Increase in tax revenue and economic benefits. The creation of jobs and operations activities are expected to lead to an increase in tax revenue to local communities. In an assessment completed by Empire, EW 1 is expected to provide a total of $493.8 million in direct, indirect, and induced economic benefits, with an additional $48.8 million in state and local taxes (see **Appendix O** for additional information). In the 2018 E2 report, operations of a 352-MW project would generate over $29 million in economic benefits in New York (this includes direct, indirect, and induced values) (E2 2018). Therefore, it is expected that the operation activities associated with the up to 2.4 GW total generating capacity of the Lease Area will result in a significant increase in tax revenue to local communities in New York. In 2019, NYSERDA issued a report on Phase 1 of

its offshore wind solicitation in which NYSERDA selected EW 1 and another offshore wind project. The 2019 NYSERDA report states that the two offshore wind projects are expected to provide more than $3.2 billion in new economic activity in labor, supplies, development, and manufacturing in New York. EW 1 is expected to bring $792.2 million in economic benefits. The report also expects approximately $700 million of avoided health impact benefits from the two projects.

Change in property values. As the onshore components of the Project are proposed to be located in existing ROWs and/or within previously developed areas designated for such uses, changes in property values are not anticipated during the operations phase.

While the offshore components will be partially visible from New York and New Jersey, a 2017 study completed by the Sage Policy Group found that there is little evidence of a negative impact to property values when an offshore wind farm is located more than 4 mi (6.4 km) from the coast (US Wind 2018). Similar results were found in a 2018 Jensen et al. study, which showed that there was no impact on property values when the offshore wind farm was located 5.6 mi (9 km) offshore (Jensen et al. 2018). Hoen et al. found that there was no significant relationship between wind turbines and property values (2013). Additional information on the visibility of the offshore components of the Project can be found in **Appendix AA Visual Impact Assessment**.

8.1.2.3 Decommissioning

During decommissioning, the potential impact-producing factors to population, employment and other aspects of the economy, housing, and public service resources are expected to be similar to those experienced during construction, as described in Section 8.1.2.1. 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 additional information on the decommissioning activities that Empire anticipates for the Project, please see **Section 3**.

8.1.3 Summary of Avoidance, Minimization, and Mitigation Measures

In order to mitigate the potential impact-producing factors associated with population, economy, employment, and housing and property values described in Section 8.1.2, Empire is proposing to implement the following avoidance, minimization, and mitigation measures.

8.1.3.1 Construction

During construction, Empire will commit to the following avoidance, minimization, and mitigation measures to mitigate the impacts described in Section 8.1.2.1:

- Installation of onshore components within existing ROWs and within previously developed areas designated for such uses, to the extent practicable.

8.1.3.2 Operations and Maintenance

As onshore Project-related activities during the operations and maintenance phase are anticipated to be limited, avoidance, minimization, and mitigation measures are not expected to be necessary. Should additional onshore Project-related activities occur, measures proposed to be implemented are expected to be similar to those experienced during construction.

8.1.3.3 Decommissioning

Avoidance, minimization, and mitigation measures proposed to be implemented during decommissioning are expected to be similar to those experienced during construction, as described in Section 8.1.3.1. A full decommissioning plan will be approved by BOEM prior to any decommissioning activities, and avoidance, minimization, and mitigation measures will be proposed at that time.

8.1.4 References

Table 8.1-5 Data Sources

Source	Includes	Available at	Metadata Link
NJGIN	Town Boundary	https://opendata.arcgis.com/datasets/3d5d1db8a1b34b418c331f4ce1fd0fef_2.zip?outSR=%7B%22latestWkid%22%3A3424%2C%22wkid%22%3A102711%7D	https://www.arcgis.com/sharing/rest/content/items/3d5d1db8a1b34b418c331f4ce1fd0fef/info/metadata/metadata.xml?format=default&output=html
NYGIS	Town Boundary	http://gis.ny.gov/gisdata/fileserver/?DSID=927&file=NYS_Civil_Boundaries.shp.zip	http://gis.ny.gov/gisdata/metadata/nysgis.NYS_Civil_Boundaries_GDB.pdf

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NYSERDA. 2019. Launching New York's Offshore Wind Industry: Phase 1 Report. NYSERDA Report 19-41. Available online at https://www.nyserda.ny.gov/-/media/Files/Programs/offshore-wind/osw-phase-1-procurement-report.pdf. Accessed September 24, 2020.

U.S. Census Bureau. 2018. "QuickFacts New York." Available online at: https://www.census.gov/quickfacts/NY. Accessed April 12, 2019.

U.S. Wind. 2018. Visual Impact of Wind Farms: What You Need to Know. March 3, 2018. Available online at: http://www.uswindinc.com/visual-impact-wind-farms-need-know/. Accessed October 16, 2018.

8.2 Land Use and Zoning

This section describes land uses and zoning in the Project Area.

Data Relied Upon and Studies Completed

For the purposes of this section, the Study Area includes the onshore components, including the onshore export and interconnection cable routes, the onshore substations, POIs, and the O&M Base, and a 0.25-mile buffer around them (see **Figure 8.2-1** and **Figure 8.2-2**)[2]. This section relied upon the land use and zoning data taken directly from the municipalities.

8.2.1 Affected Environment

The affected environment is defined as the onshore areas that have the potential to be directly affected by the construction, operation, and decommissioning of the Project. Permits necessary for the improvement of port and construction/staging facilities will be the responsibility of the owners of these facilities. Empire expects such improvements will broadly support the offshore wind industry and will be governed by applicable environmental standards, which Empire will comply with in using the facilities.

8.2.1.1 EW 1

The existing land use surrounding the EW 1 interconnection cable route and onshore substation and the O&M Base is predominantly developed (industrial and commercial, with some high density residential; see **Figure 8.2-3**). Bush Terminal Park is the closest area near/adjacent to the onshore export and interconnection cable route designated as recreational. D'Emic Playground is also within the Study Area.

Zoning maps were obtained from New York City's Zoning and Land Use Map. These maps depict the zoning districts along the EW 1 onshore export and interconnection cable route and onshore substation parcel. The Project area zoning is manufacturing (M3-1) with other manufacturing zones adjacent (M1-2; see **Figure 8.2-4**; NYC Department of City Planning 2019).

- M1 districts are designated for areas with light industries. Examples of M1 districts range from the Garment District in Manhattan and Port Morris in the Bronx with multistory lofts, to parts of Red Hook or College Point with one- or two-story warehouses characterized by loading bays. M1 districts are often buffers between M2 or M3 districts and adjacent residential or commercial districts. M1 districts typically include light industrial uses, such as woodworking shops, repair shops, and wholesale service and storage facilities. Nearly all industrial uses are allowed in M1 districts if they meet the stringent M1 performance standards. Offices, hotels and most retail uses are also permitted. Certain community facilities, such as hospitals, are allowed in M1 districts only by special permit, but houses of worship are allowed as-of-right (i.e., complies with all applicable zoning regulations and does not require any discretionary action by the City Planning Commission or Board of Standards and Appeals).

[2] 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.

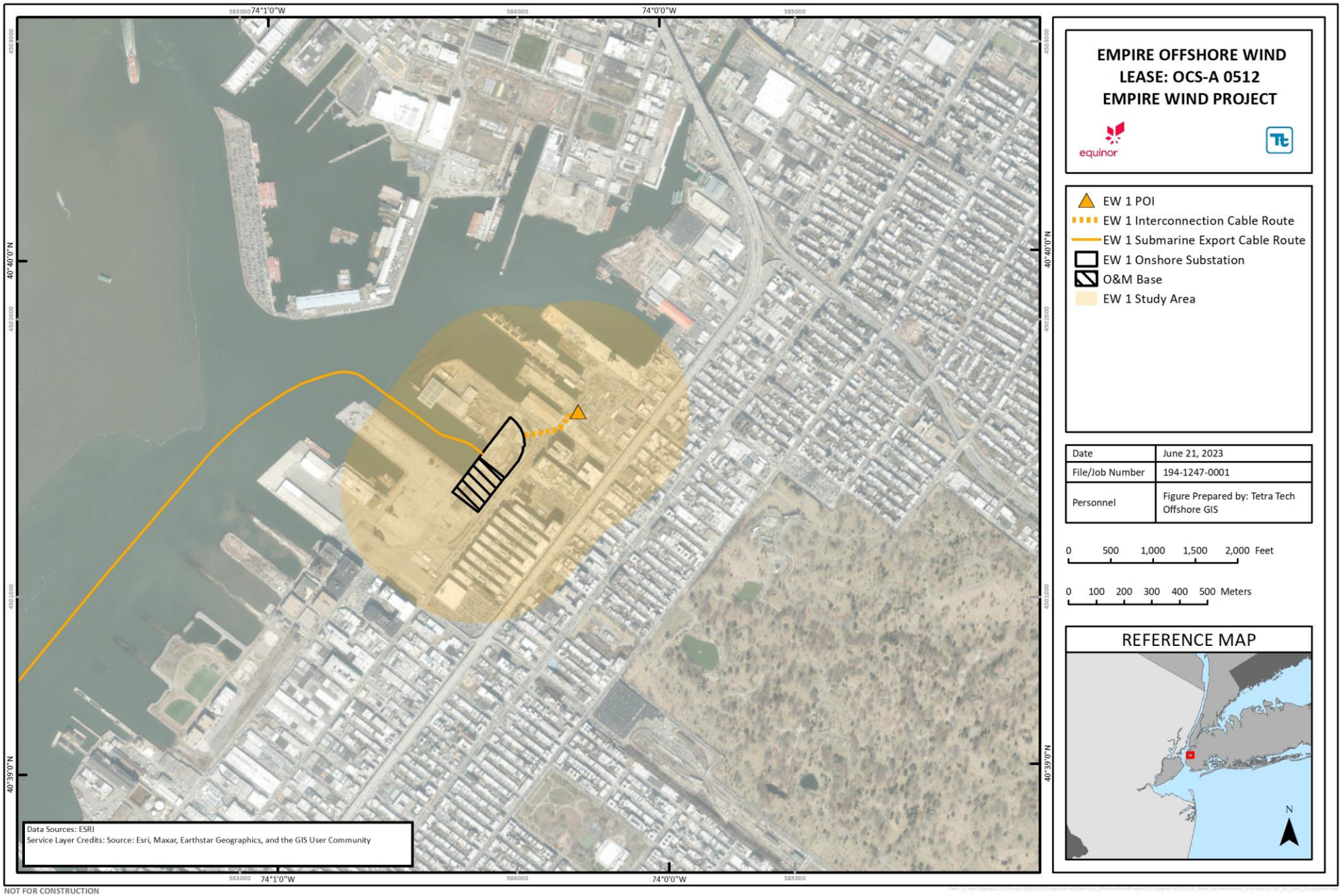

Figure 8.2-1 EW 1 Land Use and Zoning Study Area

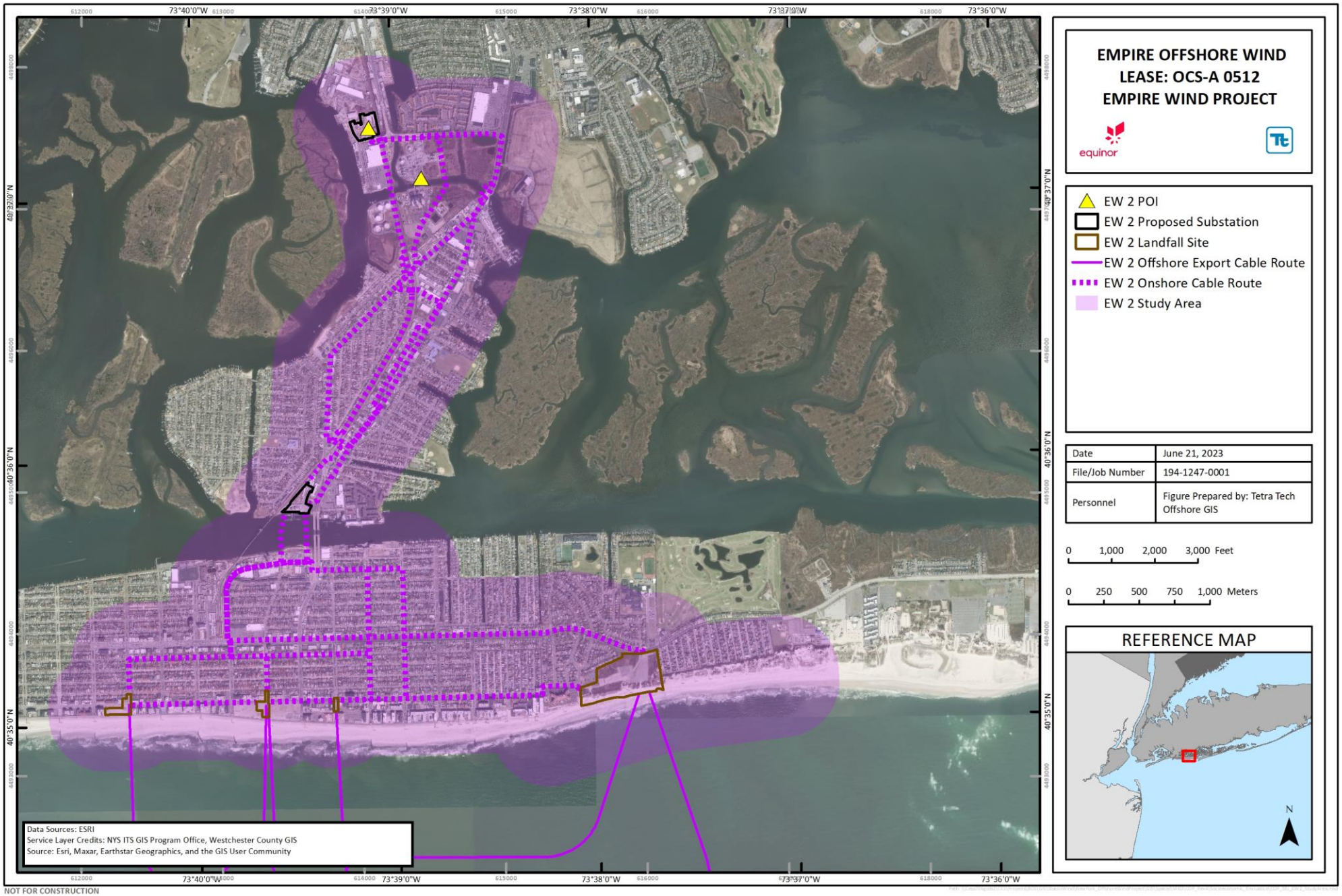

Figure 8.2-2 EW 2 Land Use and Zoning Study Area

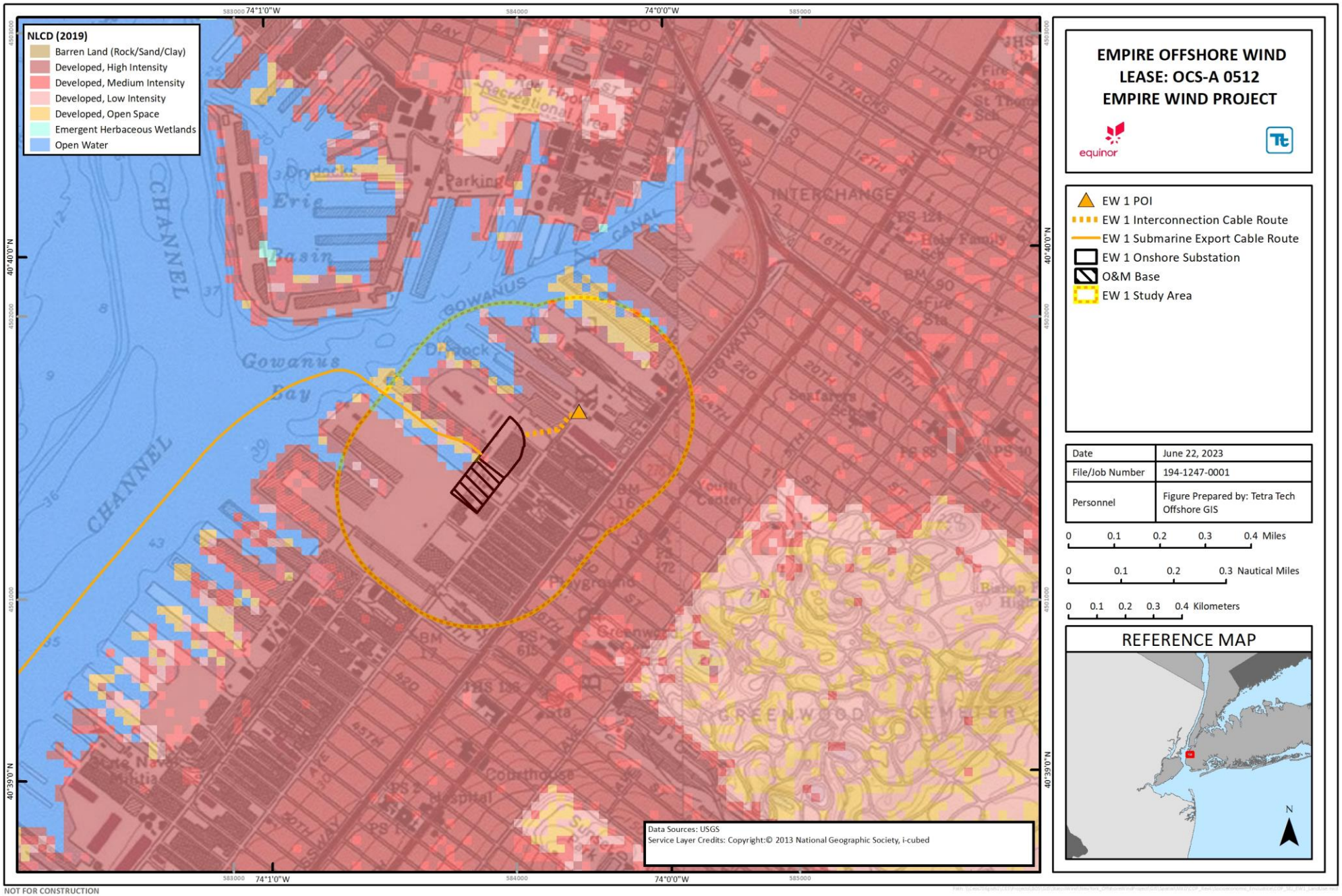

Figure 8.2-3 Land Use in the EW 1 Study Area

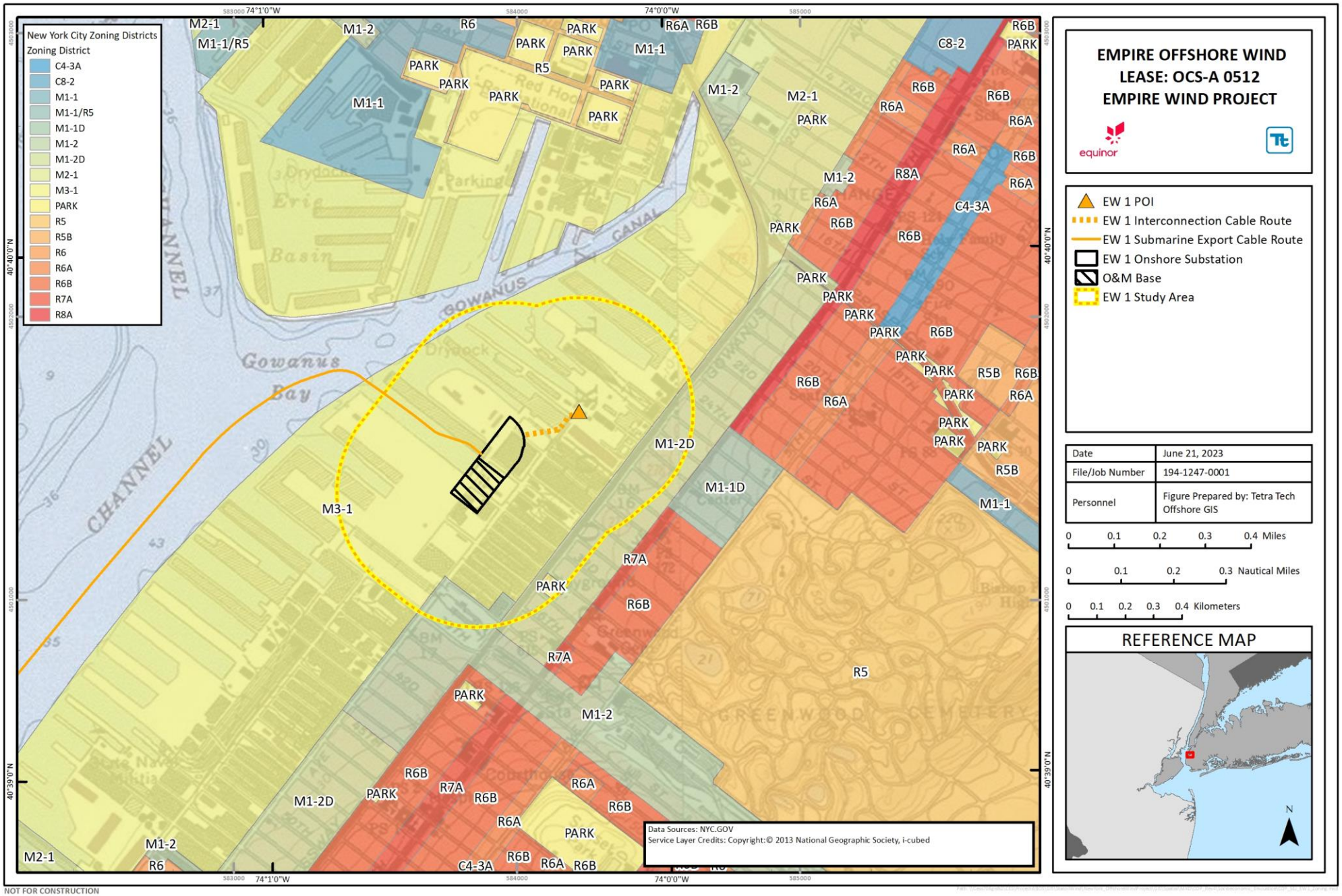

Figure 8.2-4 Zoning in the EW 1 Study Area

- M3 districts are designated for areas with heavy industries that generate noise, traffic or pollutants. Like M2 districts, M3 districts are usually located near the waterfront and buffered from residential areas. Typical uses include power plants, solid waste transfer facilities and recycling plants, and fuel supply depots. Even in M3 districts, uses with potential nuisance effects are required to conform to minimum performance standards.

8.2.1.2 EW 2

The existing land use within the EW 2 Study Area is predominantly characterized by medium- and high-intensity developed land (**Figure 8.2-5**; MRLC 2021). The EW 2 Landfall A, EW 2 Landfall B, and EW 2 Landfall E are sited within these developments, while EW 2 Landfall C is sited within low intensity and open-space developments (Lido Beach West Town Park and Lido Beach Town Park, respectively). All proposed onshore export and interconnection cable route segments (including Long Beach [LB] A through G and Variant, Island Park [IP] A through H)are located within medium and high intensity developments. The EW 2 Onshore Substation A and EW 2 Onshore Substation C sites also fall within these medium and high intensity developments. Empire intends to coordinate with appropriate local and municipal agencies, officials, and stakeholders to minimize impacts to industrial, commercial, and community service infrastructure.

In the City of Long Beach, the medium- and high-intensity developments in the EW 2 Study Area are largely residential, with light commercial, industrial, and community service uses (Rauch Foundation 2020). Multi- family units and condos/co-ops line the southern shoreline along Boardwalk. Central Long Beach and the northern shoreline are populated by single and two- to three-family homes. Community services (e.g., city government offices, public transportation, health care, and recreational centers) are interspersed among these residences, while industrial sites line the northern shoreline between the Long Island Rail Road and Long Beach Boulevard. Commercial activity, including offices, retail, dining and hospitality, and entertainment, are concentrated around Park Avenue and Long Beach Boulevard. The closest areas designated as recreational areas include the Long Beach Park, Sherman Brown Park, Long Beach Tennis Center, Island Park Junior High School Baseball Fields, and Francis X. Hegarty Elm School Playground.

In addition, EW 2 Landfall A EW 2 Landfall B, and EW 2 Landfall E are proposed to cross through the proposed Bayside Re-Development, a potential project listed in the City of Long Beach's comprehensive plan, "Creating Resilience: A Planning Initiative," which was updated in January 2018 (City of Long Beach 2018). The City's Plan is an update to the City's 2007 Comprehensive Plan, focusing on addressing resiliency measures post-Superstorm Sandy and a more sustainable economy post-economic downturn. The shoreline, which is part of the redevelopment plan, would include programming of pedestrian and bike paths, as well as active recreation and passive recreation, including a kayak launch and new open space areas along the Bayfront. This additional open space would also assist in stormwater management in the area of the new redevelopment, as well as the existing North Park neighborhood. Any development proposed by Empire would consider these plans in order to support co-existence.

In Lido Beach, land use in the EW 2 Study Area is more evenly distributed between single family residences, community services (e.g., public schools), and recreational open space (e.g., town parks and golf clubs) (Rauch Foundation 2020). While the EW 2 Landfall C is proposed to be located within areas of recreational open space, both Lido Beach West Town Park and Lido Beach Town Park would be restored to pre-construction conditions following the completion of landfall activities.

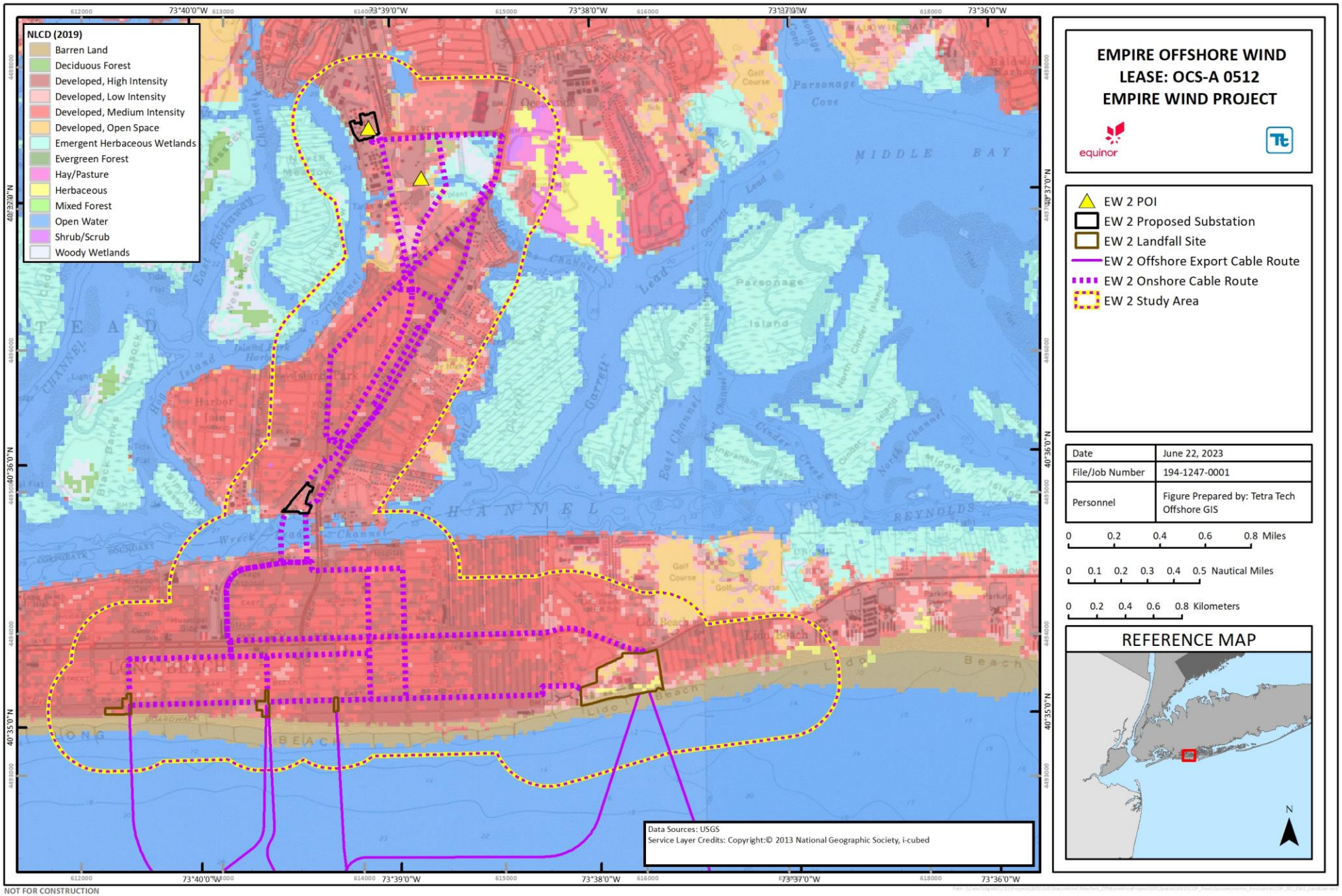

Figure 8.2-5 Land Use in the EW 2 Study Area

In Island Park, industrial and commercial uses line the Long Island Rail Road, while community services (e.g., public libraries and religious centers) and commercial uses line Long Beach Road (Rauch Foundation 2020). The remainder of Island Park is single and two- to three-family residences. The EW 2 Onshore Substation C site occurs in a highly developed area bordered by commercial and residential developments

In Oceanside, the EW 2 Onshore Substation A site is situated on a parcel that is currently used as a recycling facility and does not contain any existing structures that would need to be removed prior to construction. The onshore substation site is located on an undeveloped portion of the parcel characterized by deciduous forest.

Zoning in Nassau County, New York is defined by predominant land use categories. Such categories within the EW 2 Study Area include Business, Commercial, Community Services, Industrial, Recreational, and Residential (**Figure 8.2-6**) (Rauch Foundation 2020).

8.2.2 Impacts Analysis for Construction, Operations, and Decommissioning

The potential impacts resulting from the construction, operations, and decommissioning of the Project are based on the maximum design scenario from the PDE (for a complete description of the construction, operations, and decommissioning activities that Empire anticipates for the Project, see **Section 3**). For land use and zoning, the maximum design scenario is the maximum number of construction corridors for the onshore export and interconnection cables and onshore substations and the O&M Base, as described in **Table 8.2-1**. The parameters provided in **Table 8.2-1** represent the maximum potential impact from the full build-out of the Project. This design concept incorporates two export cable routes to EW 1 and EW 2, the associated onshore substations, and the O&M Base.

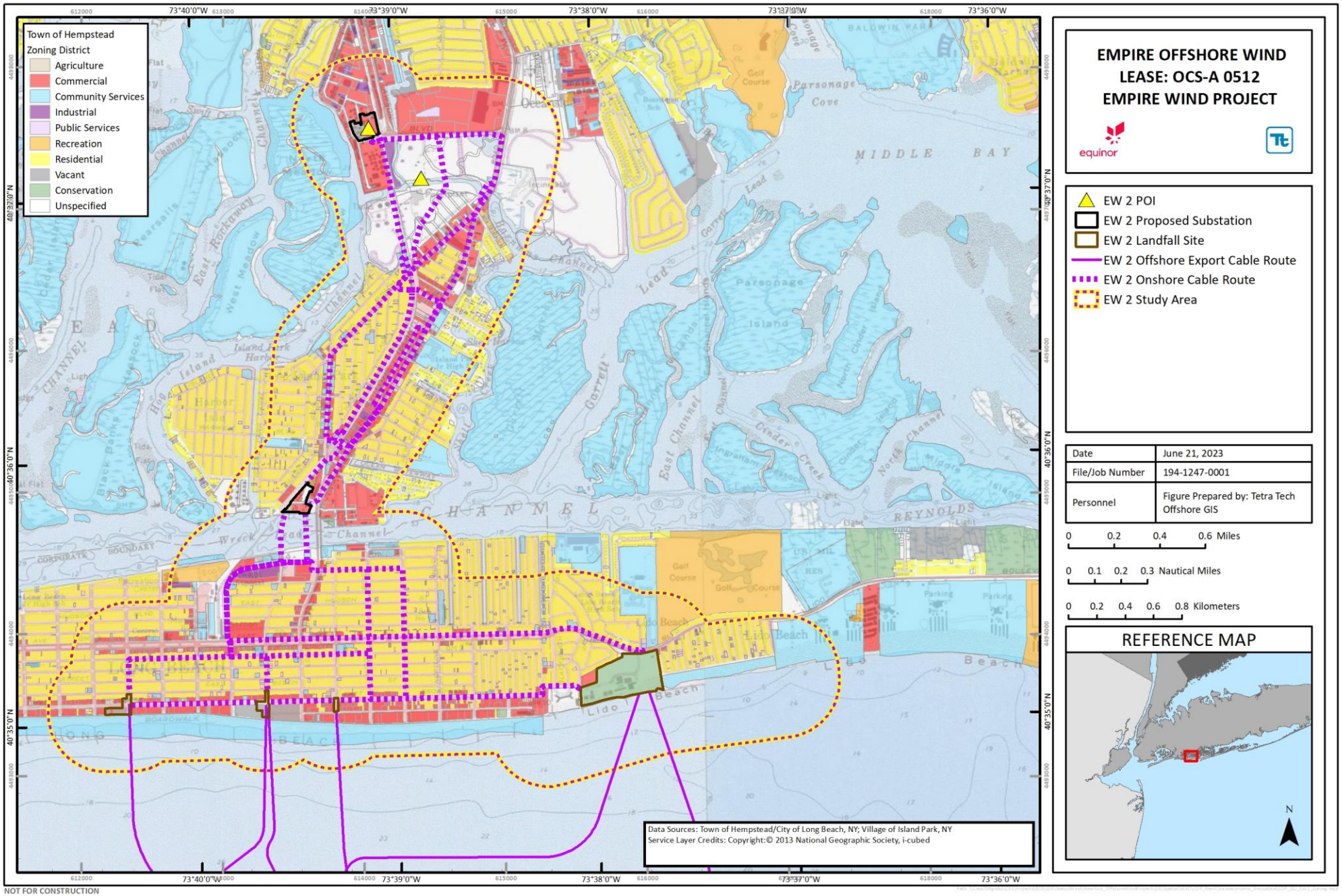

Figure 8.2-6 Zoning in the EW 2 Study Area

Table 8.2-1 Summary of Maximum Design Scenario Parameters for Land Use and Zoning

Parameter	Maximum Design Scenario	Rationale
Construction		
Export cable landfall	Based on EW 1 and EW 2. EW 1: HDD in a 200-ft by 200-ft (61-m by 61-m) area. EW 2: HDD or Direct Pipe installation in a 260-ft by 680-ft (79-m by 207-m) area.	Representative of the maximum area to be utilized to facilitate the export cable landfall.
Onshore export and interconnection cables	Based on EW 1 and EW 2. EW 1: 0.2 mi (0.4 km). EW 2: 5.6 mi (9.1 km).	Representative of the maximum length of onshore export and interconnection cables to be installed.
Onshore substations	Based on EW 1 and EW 2. EW 1: 10.8-ac (4.4-ha) area. EW 2: 6.4-ac (2.6-ha) area.	Representative of the maximum area to be utilized to facilitate the construction of the onshore substation(s).
O&M Base	6.5-ac (2.6-ha) area.	Representative of the maximum area to be utilized to facilitate the construction of the O&M Base.
Work compounds and lay-down areas, including port facilities and construction and staging areas	Based on EW 1 and EW 2. Maximum number of work compounds and lay-down areas required. Ground disturbing activities are not anticipated. Independent activities to upgrade or modify staging, construction areas, and ports prior to Project use will be the responsibility of the facility owner.	Representative of the maximum area required to facilitate the offshore and onshore construction activities.

8.2.2.1 Construction

During construction, the potential impact-producing factors to existing land uses may include:

- Construction of an onshore cable system, including splice bays (installation techniques include open cut trenching, HDD, or Direct Pipe);
- Staging activities and assembly of Project components at applicable facilities or areas; and
- Construction of new onshore substations and O&M Base.

The following impacts may occur as a consequence of factors identified above:

- Short-term increase in construction vehicle traffic and activity; and
- Short-term implementation of safety zones.

Increase in construction vehicle traffic and activity. An increase in Project-related construction, support, and workforce vehicle traffic along the onshore export and interconnection cable routes, onshore substation sites, O&M Base, ports, and construction and staging areas is anticipated during construction. As the Project utilizes existing roads, ROWs, and infrastructure, new impacts resulting from construction activities will be minimized to the extent practicable, and is anticipated to be similar in nature to other utilities installations or road improvement works carried out in these locations. This increase in vehicle traffic and activity is expected to be temporary and localized to the active construction sites. Therefore, the increased traffic will be consistent with the existing uses. To further minimize potential construction effects, adjacent landowners will be provided

timely information regarding the planned construction activities and schedule, and work will also be coordinated with New York State Department of Transportation, and its local counterparts. Areas temporarily disturbed during installation of the onshore export and interconnection cable route will be restored in-kind, as applicable. Activities at staging and construction facilities will be consistent with the established and permitted uses of these facilities, and Empire will comply with applicable permitting standards to limit impacts from Project-related activities. Empire proposes to implement the following measures to avoid, minimize, and mitigate impacts:

- The addition of security measures to monitor, and proper marking of, active construction sites;
- The development of a Traffic Management Plan, to be developed in coordination with, and approved by, the affected local municipalities; and
- Regular updates to the local community through social media, public notices, and/or other appropriate communications tools.

Implementation of safety zones. Safety zones will also be implemented around all construction activities. To ensure the safety of the public during onshore construction activities, construction staging areas will be set up, which the public will not be allowed to enter. As the Project utilizes existing roads, ROWs, and infrastructure, new impacts resulting from construction activities will be minimized to the extent practicable. Existing land uses may be restricted by the application of these safety zones; however, these restrictions will only be temporary. Empire proposes to implement the following measures to avoid, minimize, and mitigate impacts:

- The addition of security measures to monitor, and proper marking of, active construction sites;
- The development of a Traffic Management Plan, to be developed in coordination with, and approved by, the affected local municipalities; and
- Regular updates to the local community through social media, public notices, and/or other appropriate communications tools.

8.2.2.2 Operations and Maintenance

During operations, the potential impact-producing factors to land use and zoning may include:

- Operations and maintenance activities associated with the onshore export and interconnection cables and onshore substations; and
- Operations at the O&M Base.

The following impacts may occur as a consequence of the factors identified above.

- Long-term change in land use.

Long-term change in land use. During operations, no significant impacts are anticipated to land use and zoning as the Project will utilize existing roads, ROWs, and infrastructure, to the extent practicable, and is largely consistent with the existing land use and zoning of the area. With the exception of the onshore substation, some minor features of the export and interconnection cables (e.g., link boxes, cable bridge at Barnums Channel), and the O&M Base, the Project will be entirely underground. As such, the existing landscape will be preserved, is not anticipated to present any excessive conflict with present or future planned uses within the Project Area, and will have at most a minimal impact on any future planned uses. This includes the City of Long Beach's Comprehensive Plan and the proposed Bayside Re-Development. Empire will coordinate with appropriate City of Long Beach municipal agencies and officials, in consideration of the City's Comprehensive Plan.

EW 2 Onshore Substation C could represent some long-term change in land use from commercial and recreational to industrial land uses and may result in some restriction of public access to the waterfront compared to its existing condition. Based on the relatively small area of land use change at the EW 2 Onshore Substation C site, this is not expected to have a significant effect on land uses in the vicinity or region in general. Empire will evaluate minimizing impacts to public access in the EW 2 Onshore Substation design, as feasible. Should the Project require local zoning and land use variances and authorizations, Empire will obtain these, as necessary, prior to construction.

8.2.2.3 Decommissioning

Impacts to land uses during decommissioning are expected to be similar to those experienced during construction, as described in Section 8.2.2.1. Zoning is expected to remain consistent with existing zoning during decommissioning. 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 additional information on the decommissioning activities that Empire anticipates for the Project, please see **Section 3**.

8.2.3 Summary of Avoidance, Minimization, and Mitigation Measures

In order to mitigate the potential impact-producing factors described in Section 8.2.2, the Project is proposing to implement the following avoidance, minimization, and mitigation measures.

8.2.3.1 Construction

During construction, Empire will commit to the following avoidance, minimization, and mitigation measures to mitigate the impacts described in Section 8.2.2.1:

- Installation of onshore components within existing ROWs and within previously developed areas designated for such uses, to the extent practicable;
- The development of a Traffic Management Plan, to be developed in coordination with, and approved by, the affected local municipalities, as applicable;
- The addition of security measures to monitor, and proper marking of, active construction sites, as deemed necessary; and
- Regular updates to the local community through social media and public notices and/or other appropriate communications tools.

8.2.3.2 Operations and Maintenance

During operations, Empire will commit to the following avoidance, minimization, and mitigation measures to mitigate the impacts described in Section 8.2.2.2:

- Coordination with appropriate local and municipal agencies, officials, and stakeholders, in consideration of future land development plans;
- The onshore components will be properly marked; and
- The onshore Project Area will be restored to conditions consistent with approvals from local authorities and/or property owners.

In addition, during operations, Empire will consider the following avoidance, minimization, and mitigation measures to mitigate the impacts described in Section 8.2.2.2:

- Empire will evaluate minimizing impacts to public access in the EW 2 Onshore Substation design, as feasible.

8.2.3.3 Decommissioning

Avoidance, minimization, and mitigation measures proposed to be implemented during decommissioning are expected to be similar to those implemented during construction, as described in Section 8.2.2.1 and Section 8.2.2.2. A full decommissioning plan will be approved by BOEM prior to any decommissioning activities, and avoidance, minimization, and mitigation measures for decommissioning activities will be proposed at that time.

8.2.4 References

Table 8.2-2 Data Sources

Source	Includes	Available at+63	Metadata Link
NYC.GOV	Zoning Districts	https://www1.nyc.gov/site/planning/data-maps/open-data/dwn-gis-zoning.page	https://www1.nyc.gov/assets/planning/download/pdf/data-maps/open-data/nyzd_metadata.pdf?r=1219
NYGIS	Town Boundary	http://gis.ny.gov/gisdata/fileserver/?DSID=927&file=NYS_Civil_Boundaries.shp.zip	http://gis.ny.gov/gisdata/metadata/nysgis.NYS_Civil_Boundaries_GDB.pdf
Town of Hempstead/ City of Long Beach	Zoning Districts	https://www.longbeachtownship.com/images/zoning_map_10-05-11.pdf	N/A
USGS	Land Use	https://www.usgs.gov/core-science-systems/science-analytics-and-synthesis/gap/science/land-cover-data-download?qt-science_center_objects=0#qt-science_center_objects	N/A
Village of Island Park	Zoning Districts	http://www.kpsearch.com/DF/Villageofislandpark-n/images/Finished%20PDF/Island_Park_Zoning.pdf	N/A

City of Long Beach. 2018. Creating Resilience: A Planning Initiative. Comprehensive Plan. Available online at: https://www.longbeachny.gov/vertical/sites/%7BC3C1054A-3D3A-41B3-8896-814D00B86D2A%7D/uploads/Draft_Comp_Plan_012318_rev.pdf. Accessed February 2, 2021.

MRLC (Multi-Resolution Land Characteristics Consortium). 2021. "National Land Cover Database 2016 CONUS Land Cover." Available online at: https://www.mrlc.gov/viewer/. Accessed February 2, 2021.

New York City Department of City Planning. 2019. "Zoning Districts and Tools Overview." Available online at: http://www.neptunetownship.org/departments/land-use. Accessed December 19, 2019.

+Rauch Foundation. 2020. "Long Island Index Map." Available online at: https://www.rauchfoundation.org/thought-leadership/interactive-maps/. Accessed February 2, 2021.

8.3 Recreation and Tourism

This section describes the socioeconomic impact of recreation and tourism in the Project Area. Recreation and tourism activities, areas, and locations are discussed in:

- Section 8.2 Land Use and Zoning;
- Section 8.8 Commercial and Recreational Fishing; and
- Section 8.11 Other Coastal and Marine Uses.

Data Relied Upon and Studies Completed

For the purposes of this section, the Study Area includes the coastal areas that may be directly and/or indirectly impacted by the offshore components, including the foundations, wind turbines, and offshore substations; the onshore components, including the onshore export and interconnection cable routes, the onshore substations, and the O&M Base; and the staging and construction areas associated with the construction, operations and decommissioning of the Project (see **Figure 8.3-1**). These sections relied upon recreation and tourism data and analyses compiled by state economic authorities in New York and New Jersey.

8.3.1 Affected Environment

The affected environment is defined as the coastal areas that have the potential to be directly affected by the construction, operation and decommissioning of the Project. Permits necessary for the improvement of port and construction/staging facilities will be the responsibility of the owners of these facilities. Empire expects such improvements will broadly support the offshore wind industry and will be governed by applicable environmental standards, which Empire will comply with in using the facilities. For the purposes of this section, the recreation and tourism sector is defined by the following criteria:

1. Frequently sells to travelers;
2. Most of its sales come from travelers; and
3. Receives the largest proportion of travelers' spending.

Based on these criteria, the recreation and tourism sector typically consists of the following five principal industries, as identified by the U.S. Department of Commerce (NYS Department of Labor 2017):

1. Food services;
2. Lodging;
3. Transportation;
4. Retail and gasoline service stations; and
5. Recreation.

Recreation and tourism play a major role in New York and New Jersey's environment and economy. Visitors from all over the world travel to the area to partake in a variety of onshore and marine recreational activities. Marine recreational activities include wildlife viewing tours, scuba diving, and recreational fishing and boating. Popular onshore recreational activities include beach going, surfing, golfing, and scenic viewing. In 2017, New York State reported that tourists directly spent $67.6 billion in the state, a record high (Empire State Development, n.d.). In New Jersey, visitors directly spent over $45 million in the state (Tourism Economics 2019).

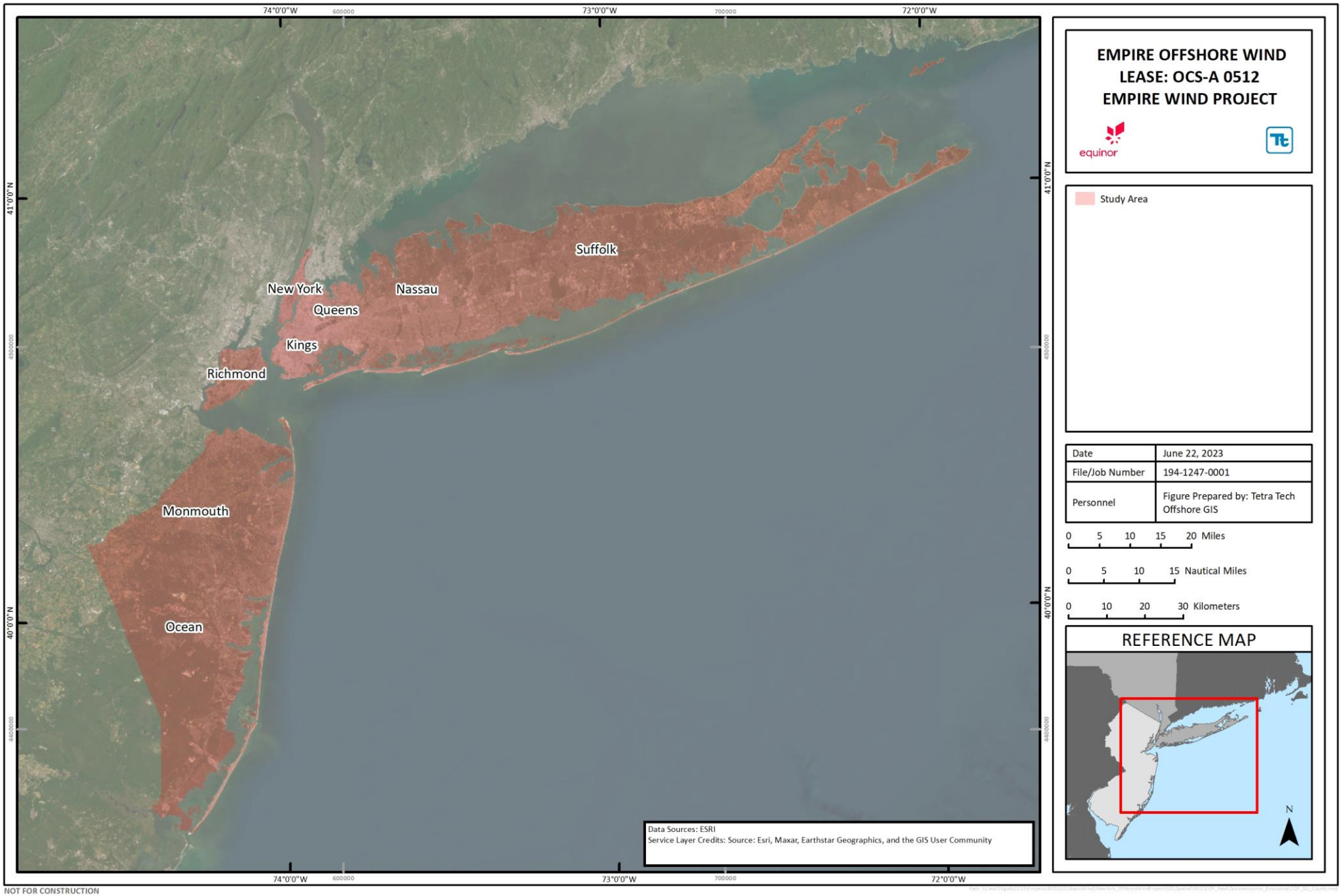

Figure 8.3-1 Recreation and Tourism Study Area

8.3.1.1 New York

In 2018, New York State experienced record high numbers within the recreation and tourism sector, with 252.7 million visitors generating over $114.8 billion dollars total for the local economy. As a result, recreation and tourism was the third-largest employer in New York State (Empire State Development, n.d.).

New York has always been one of the top tourism destinations in the world, with recreation and tourism divided into 11 economic and geographically diverse regions in the state (Empire State Development, n.d.). The industry is mainly centered around the New York City region, which accounted for 65 percent of traveler spending in 2017. The Long Island region, the second largest tourism region, accounted for 9 percent of traveler spending in 2017. These two regions have also experienced the highest growth in traveler spending, with an increase of 4.4 percent and 4.0 percent respectively over the last three years (Tourism Economics 2018). As a result, the tourism industry is a key component and driver of these local economies.

Traveler spending was approximately evenly split across the five principal industries, with lodging consisting of 29 percent of total spending, followed by food services with 24 percent, transport with 19 percent, retail and gasoline service stations at 18 percent, and recreation at 10 percent (Tourism Economics 2018). **Table 8.3-1** shows the number of jobs, total wages, and the average annual wage resulting from tourism and recreation in the New York regions with the greatest potential to be affected by Project infrastructure and/or activities (NYS Department of Labor 2017).

Table 8.3-1 Economic Value of the New York Tourism and Recreation Sector in the Study Area

Region	Employment	Total Wages (millions)	Annual Average Wage
New York City (incl. Kings, Queens, New York, and Richmond Counties)	221,000	$12,529.8	$56,700
Long Island (Nassau and Suffolk Counties)	41,700	$1,441.9	$34,600

Source: NYS Department of Labor 2017

Indirect and induced impacts from tourism and recreation in New York State is also significant. Indirect impacts are those that result from the direct spending of a recreation and tourism industry. Induced impacts are those that result from the spending of an income generated from recreation and tourism back into the local economy. In 2017, both indirect and induced impacts accounted for over $20 million in expenditures each (Tourism Economics 2018).

8.3.1.2 New Jersey

In 2018, the recreation and tourism sector in the State of New Jersey continued to experience steady growth for the ninth straight year, with over 110 million visitors generating over $74 billion dollars total into the local economy, $5.0 billion of which went directly to state and local taxes. As a result, recreation and tourism was the seventh-largest employer in the state of New Jersey (Tourism Economics 2019).

Recreation and tourism in the state is divided into six economic and geographically diverse regions. New Jersey's 130 miles of coastline are a main contributor to the state's tourism revenue and are directly dependent on recreational use of the ocean and shore in the Study Area (New Jersey Department of State, Division of Travel and Tourism, n.d.). As a result, the tourism industry is a key component and driver of these local economies.

Traveler spending was approximately evenly split across the five principal industries, with lodging consisting of 27 percent of total spending, followed by food services with 26 percent, retail at 18 percent, transport with 17 percent, and recreation at 12 percent (Tourism Economics 2019). **Table 8.3-2** shows the number of establishments, jobs, and total wages resulting from tourism and recreation in the New Jersey counties with the greatest potential to be affected by Project infrastructure and/or activities.

Table 8.3-2 Economic Value of the New Jersey Tourism and Recreation Sector in the Study Area

County	Establishments	Employment	Total Wages (millions)
Monmouth County	1,254	16,051	$308
Ocean County	1,061	12,673	$238

Source: National Ocean Economics Program 2015

Indirect and induced impacts from tourism and recreation in the State of New Jersey is also significant. Indirect impacts are those that result from the direct spending of a recreation and tourism industry. Induced impacts are those that result from the spending of an income generated from recreation and tourism back into the local economy. In 2017, indirect impacts accounted for over $8 million, while induced impacts accounted for over $11 million in expenditures (Tourism Economics 2019).

8.3.2 Impacts Analysis for Construction, Operations, and Decommissioning

The potential impacts to tourism and recreation resulting from the construction, operations, and decommissioning of the Project are based on the maximum design scenario from the PDE (for a complete description of the construction, operations, and decommissioning activities that Empire anticipates for the Project, see **Section 3**). For recreation and tourism, the maximum design scenario is the presence of new fixed structures offshore (i.e., wind turbines and offshore substations) and onshore (e.g., onshore substations and O&M Base), as described in **Table 8.3-3**. This design concept incorporates the full build-out of offshore and onshore structures, including two onshore substations, with two export cable routes to EW 1 and EW 2, and the O&M Base.

Table 8.3-3 Summary of Maximum Design Scenario Parameters for Recreation and Tourism

Parameter	Maximum Design Scenario	Rationale
Construction		
Offshore structures	Based on full build-out of EW 1 and EW 2 (147 wind turbines and 2 offshore substations). EW 1: 57 wind turbines and 1 offshore substation. EW 2: 90 wind turbines and 1 offshore substation.	Representative of the maximum number of structures for EW 1 and EW 2.
Export cable landfall installation	Trenching and cofferdams.	Representative of the maximum disturbance associated with export cable landfall installation, which would potentially impact the enjoyment of nearshore resources.

Table 8.3-3 Summary of Maximum Design Scenario Parameters for Recreation and Tourism (continued)

Parameter	Maximum Design Scenario	Rationale
Safety zones for Project-related vessels and structures	Based on full build-out of EW 1 and EW 2, which corresponds to the maximum number of structures (147 wind turbines and 2 offshore substations) and maximum number of associated vessels and safety zones. 1,640 ft (500 m) around relevant structures, activities, and vessels.	Representative of the maximum cumulative area and duration, which has the potential to impact recreation and tourism users who will be restricted from entering marine areas.
Offshore construction duration	Based on full build-out of EW 1 and EW 2, which corresponds to the maximum number of structures (147 wind turbines and 2 offshore substations) and maximum period of cumulative duration for installation.	Representative of the maximum period required to install the offshore components, which has the potential to impact resources in, access to, or enjoyment of the Project Area.
Onshore construction duration	Based on EW 1 and EW 2. Construction and installation of two export cables landfalls, onshore export and interconnection cables, onshore substations, and O&M Base.	Representative of the maximum period required to install the onshore components, which has the potential to temporarily impact resources in the Project Area.
Onshore safety zones	Based on EW 1 and EW 2. The implementation of appropriate safety zones and traffic restrictions.	Representative of the maximum area in which local traffic would be restricted from entering.
Project-related vehicles	Based on EW 1 and EW 2. The maximum associated Project-related vehicles.	Representative of the maximum number of vehicles, which would result in an increase to local traffic and reduce available parking.
Staging and construction areas, including port facilities, work compounds, and lay-down areas	Based on EW 1 and EW 2. Maximum number of work compounds and lay-down areas required. Ground disturbing activities are not anticipated. Independent activities to upgrade or modify staging, construction areas, and ports prior to Project use will be the responsibility of the facility owner.	Representative of the maximum area required to facilitate the offshore and onshore construction activities, which has the potential to temporarily impact resources in the Project Area.
Operations		
Offshore structures	Based on full build-out of EW 1 and EW 2 (147 wind turbines and two offshore substations). EW 1: 57 wind turbines and one offshore substation. EW 2: 90 wind turbines and one offshore substation.	Representative of the presence of new fixed structures in an area that previously had none.

Table 8.3-3 Summary of Maximum Design Scenario Parameters for Recreation and Tourism (continued)

Parameter	Maximum Design Scenario	Rationale
Project-related vessels Collision risk	Based on a full build-out of EW 1 and EW 2 (147 wind turbines, 2 offshore substations, submarine export cable routes, and associated interarray cables). Based on maximum number of vessels and movements for servicing and inspections.	Representative of the maximum predicted Project-related vessels for collision risk.
Onshore O&M activities	Based on EW 1 and EW 2. Longest operational duration, with the maximum amount of Project-related activities expected per year.	Representative of the maximum amount of activities from the Project during the O&M phase, which would have the potential to impact local traffic patterns and available parking in the Project Area.
Onshore substations	Based on EW 1 and EW 2. EW 1: 4.8-ac (1.9-ha) area. EW 2: 6.4-ac (2.6-ha) area.	Representative of the presence of a new structure in an area where there was previously none.
O&M Base	4.5-ac (1.8-ha) area.	Representative of the presence of a new structure in an area where there was previously none.

8.3.2.1 Construction

During construction, the potential impact-producing factors to recreation and tourism may include:

- Construction of the offshore components, including the foundations, wind turbines, offshore substations, submarine export cables, and interarray cables;
- Staging activities and assembly of Project components at applicable facilities or areas;
- Construction of onshore electrical system, including duct banks and splice bays (installation techniques include open cut trenching, HDD, and Direct Pipe for cable crossings and/or landfall); and
- Construction of new onshore substations and O&M Base.

The following impacts may occur as a consequence of factors identified above:

- Short-term increase in construction vessel (offshore) traffic;
- Short-term increase in construction vehicle (onshore) traffic;
- Short-term increase in demand for rental housing; and
- Short-term displacement of recreation and tourism visitors.

Increase in construction vessel (offshore) traffic. An increase in Project-related construction and support vessel traffic transiting to, from, and within the Lease Area, ports, temporary mooring area, and submarine export cable routes is anticipated during construction. Project-related vessels are expected to travel in the existing traffic patterns and within the TSS lanes as much as possible to minimize impacts to the other marine users, and to be consistent with other waterway usage. Potential impacts from an increase in Project-related

vessel traffic to commercial and recreational vessel traffic are further discussed in **Section 8.7 Marine Transportation and Navigation** and **Appendix DD Navigation Safety Risk Assessment**). As described further in **Section 8.7**, the change in vessel numbers transiting to/from the Lease Area against baseline levels is anticipated to be insignificant, and is unlikely to be noticed or felt by other recreation and tourism users during construction.

Empire will provide regular updates of construction activity and potentially closed areas to the local marine community and other applicable stakeholders through the Project website, social media, and/or other appropriate communications tools.

Increase in construction (onshore) traffic. An increase in Project-related construction, support, and workforce vehicle traffic along the onshore export and interconnection cable routes, onshore substation sites, O&M Base, ports, and staging and construction areas is anticipated during construction. Due to the relatively small number of crew expected, the potential impact of construction vehicle traffic on recreation and tourism during construction activities is anticipated to be minimal. Activities at staging and construction facilities will be consistent with the established and permitted uses of these facilities, and Empire will comply with applicable permitting standards to limit impacts from Project-related activities. Empire proposes to implement the following measures to avoid, minimize, and mitigate impacts:

- Regular updates to the local community through the issuance of Local Notices to Mariners (LNMs), social media, public notices, and/or other appropriate communications tools; and
- The development of a Traffic Management Plan, to be developed in coordination with, and approved by, the affected local municipalities, as applicable.

Temporary increase in demand for rental housing. The construction workforce that does not live locally will require rental or temporary accommodations. This increased demand could compete with the tourism rental market. However, the anticipated increase in relocated workers is unlikely to be greater than the available number of temporary housing units, and is not expected to create a shortage in the Study Area.

Displacement of recreation and tourism users. During construction activities, safety zones will be implemented around all active sites, both offshore, and to a lesser extent, onshore. To ensure the safety of the public during onshore construction activities, construction staging areas will be set up, in which the public will not be allowed to enter. Offshore, to ensure the safety of local mariners, the work crew, and all equipment, Empire proposes to utilize 1,640-ft (500-m) safety zones around relevant structures, activities, and vessels in a dynamic approach, as previously defined for the Block Island Wind Farm (81 FR 31862). Should USCG Safety Zone authorities not extend beyond 12 nm (22 km) at the time of construction, Empire will utilize a combination of safety vessels, LNMs, and International Regulations for Preventing Collisions (COLREGS) to promote both awareness of these activities and the safety of the construction equipment and personnel. Areas will be marked and lit in accordance with USCG requirements and monitored by a security boat that will be available to assist local mariners. The locations of the safety zones will be posted in LNMs, as well as on the Project website. Vessels will not be permitted to enter the safety zone without express consent from Empire. Recreation and tourism users will likely be restricted by the application of these safety zones; however, these restrictions will only be short-term and localized. Empire proposes to implement the following measures to avoid, minimize, and mitigate impacts:

- The addition of security vessels monitoring, and proper marking of, active construction sites; and
- Regular updates to the local community through the issuance of LNMs, social media, public notices, and/or other appropriate communications tools.

8.3.2.2 Operations and Maintenance

During operations, the potential impact-producing factors to recreation and tourism uses may include:

- The presence of fixed structures (e.g., wind turbines and offshore substations);
- Operations and maintenance activities associated with the onshore export and interconnection cables and onshore substations;
- Operations and maintenance activities associated with the offshore components of the Project; and
- Operations at the O&M Base.

The following impacts may occur as a consequence of the factors identified above:

- Long-term modification of existing uses;
- Long-term change in demand for rental properties; and
- Long-term presence of new fixed structures (e.g., wind turbines and offshore substations) into the Lease Area.

Modified existing uses and the presence of new fixed structures. The onshore facilities will be located within existing roads, ROWs, and infrastructure sites that have been cleared, previously disturbed, zoned for the proposed use, and are not currently used for recreation or tourism, to the extent practicable. Therefore, no impacts to recreation and tourism uses onshore are expected as a result of the Project operations. Offshore, the operation of the wind farm will create a new permanent navigational pattern within the Lease Area (see **Section 8.7** and **Appendix DD** for a discussion of navigation safety); however, users will not be excluded from using the area and existing uses will be able to continue. The presence of new fixed structures within the Lease Area also has the potential to attract new marine users. It is possible that the wind farm could become a tourist attraction, creating a new use. This was observed with the Block Island Wind Farm, which has seen an increase in tourism through the renting of vessel charter services and the creation of new businesses to support the new visitor demand (Brookins 2017). Lilley et al. also found that recreation and tourism users have an interest in paying for a boat tour to see the offshore wind farm (2010). This was also observed within the Block Island Wind Farm, with local vessel owners using their vessels full-time to take tourists to view the project (Brunetti 2018). No changes to existing uses are expected along the submarine export cable routes. In addition, the presence of Project-related vessels in close proximity to the operational wind farm will provide a positive beneficial impact through the provision of immediate emergency assistance in the event of an emergency situation. Furthermore, a 2008 study on the potential impacts of offshore wind turbines in New Jersey also predicts that any impacts on tourism would be short-lived, with little to no impact for wind farms located further offshore (such as this Project; NJ BPU 2008). Empire proposes to implement the following measures to avoid, minimize, and mitigate impacts:

- The wind turbines and offshore substations will be properly marked in accordance with USCG guidance, including the Private Aids to Navigation (PATON) requirements (see **Section 3** for additional details on the proposed marking and lighting measures); and
- Vessels will not be restricted from entering the operational wind farms areas, and as a result these structures may attract local charters for sightseeing and recreational fishing.

Change in demand for rental properties. Negative impacts to vacation rental property values due to decreased demand as a result of the Project are not anticipated during the operations phase (see also **Section 8.1 Population, Economy, Employment and Housing and Property Values**). The onshore components of the Project are sited in existing ROWs and within previously developed areas designated for such uses, to

the extent practicable. While the offshore components will be partially visible from New York and New Jersey, a 2017 study found that there was minimal effect on vacation rental values associated with offshore wind farms when located more than eight miles from shore (Lutzeyer et al. 2017). Further, a 2019 study on the effect of the Block Island Wind Farm found that the presence of the wind farm resulted in a significant increase in nightly reservations, occupancy rates and monthly revenues for Airbnb rental properties in Block Island during the peak tourism months of July and August (although no effect was seen in other months) (Harris and Lang 2019). This study points out that initial demand could be higher and decrease over the life of the project as the novelty wears off. Therefore, it is possible that there would be an increase in demand for rental properties, at least for a period of time, once the Project is constructed.

8.3.2.3 Decommissioning

Impacts during decommissioning are expected to be similar or less than those experienced during construction, as described in Section 8.3.2.1. 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 reevaluated at that time. For additional information on the decommissioning activities that Empire anticipates for the Project, please see **Section 3**.

8.3.3 Summary of Avoidance, Minimization, and Mitigation Measures

In order to mitigate the potential impact-producing factors described in Section 8.3.2, the Project is proposing to implement the following avoidance, minimization, and mitigation measures.

8.3.3.1 Construction

During construction, Empire will commit to the following avoidance, minimization, and mitigation measures to mitigate the impacts described in Section 8.3.2.1:

- The addition of security vessels monitoring, and proper marking of, active construction sites;
- The development of a Traffic Management Plan, to be developed in coordination with, and approved by, the affected local municipalities; and
- Regular updates to the local community through the issuance of LNMs, social media, public notices, and/or other appropriate communications tools.

8.3.3.2 Operations and Maintenance

During operations, Empire will commit to the following avoidance, minimization, and mitigation measures to mitigate the impacts described in Section 8.3.2.1:

- The wind turbines and offshore substations will be properly marked in accordance with USCG guidance, including the PATON requirements (see **Section 3** for additional details on the proposed marking and lighting measures); and
- Vessels will not be restricted from entering the operational wind farms areas, and as a result, these structures may attract local charters for sightseeing and recreational fishing.

8.3.3.3 Decommissioning

Avoidance, minimization, and mitigation measures proposed to be implemented during decommissioning are expected to be similar to those implemented during construction and operations, as described in Section 8.3.3.1 and Section 8.3.3.2. A full decommissioning plan will be approved by BOEM prior to any decommissioning

activities, and avoidance, minimization, and mitigation measures for decommissioning activities will be proposed at that time.

8.3.4 References

Table 8.3-4 Data Sources

Source	Includes	Available at	Metadata Link
NYGIS	Town Boundary	http://gis.ny.gov/gisdata/fileserver/?DSID=927&file=NYS_Civil_Boundaries.shp.zip	http://gis.ny.gov/gisdata/metadata/nysgis.NYS_Civil_Boundaries_GDB.pdf

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Brunetti, Michelle. 2018. "Nations First Wind Farm Creates Fishing, Tourism Hot Spot." *The Press of Atlantic City*. February 17. Available online at: https://www.pressofatlanticcity.com/news/breaking/nation-s-first-wind-farm-creates-fishing-tourism-hot-spot/article_8f9ba597-0675-5afe-a08c-6bee92d6b918.html. Accessed July 15, 2019.

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Lilley, M.B., J. Firestone and W. Kempton. 2010. "The Effect of Wind Power Installations on Coastal Tourism." *Energies.* 3. https://www.mdpi.com/1996-1073/3/1/1.

Lutzeyer, Sanja, Daniel Phaneuf, and Laura Taylor. 2017. "The Amenity Costs of Offshore Windfarms: Evidence from a Choice Experiment." NC State University. August. Available online at: https://cenrep.ncsu.edu/cenrep/wp-content/uploads/2016/03/WP-2017-017.pdf.

National Ocean Economics Program. 2015. Market Data: Ocean Economy Data. Available online at: http://www.oceaneconomics.org/Market/ocean/oceanEcon.asp?IC=N&dataSource=E.

New Jersey Department of State, Division of Travel and Tourism. n.d. "Beaches in New Jersey". Available online at: https://www.visitnj.org/nj/beaches. Accessed April 12, 2021.

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8.4 Environmental Justice

As defined by the EPA, Environmental Justice is "the fair treatment and meaningful involvement of all people, regardless of race, color, national origin, or income with respect to the development, implementation and enforcement of environmental laws, regulations and policies." Environmental Justice is based on the principles of fair treatment and meaningful involvement. Fair treatment means "no group of people should bear a disproportionate share of the negative environmental consequences resulting from industrial, governmental and commercial operations or policies". Meaningful involvement means that "people have an opportunity to participate in decisions about activities that may affect their environment and/or health", that the public's concerns will be considered and have an opportunity to influence the regulatory agency's decision, and that those who may be affected will be sought out and encourage to be involved (EPA 2018a).

The principles of Environmental Justice are enforced through Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, which requires federal agencies to take appropriate steps to identify and address disproportionately high and adverse health or environmental effects of federal actions on minority and low-income populations.

In response to Executive Order 12898, the Council on Environmental Quality (CEQ) developed guidelines to assist federal agencies in remaining in compliance with Environmental Justice during the NEPA process. The guidelines include six principles, which should be utilized when conducting an environmental justice analysis (EPA 2018b).

- Consider the composition of the affected area to determine whether low-income, minority or tribal populations are present and whether there may be disproportionately high and adverse human health or environmental effects on these populations;
- Consider relevant public health and industry data concerning the potential for multiple exposures or cumulative exposure to human health or environmental hazards in the affected population, as well as historical patterns of exposure to environmental hazards;
- Recognize the interrelated cultural, social, occupational, historical, or economic factors that may amplify the natural and physical environmental effects of the proposed action;
- Develop effective public participation strategies;
- Assure meaningful community representation in the process, beginning at the earliest possible time; and
- Seek tribal representation in the process.

According to the CEQ guidance document, minorities are those groups that include American Indian or Alaskan Native; Asian or Pacific Island; Black, not of Hispanic origin; or Hispanic. Minority populations are defined where either (a) the minority population of the affected area exceeds 50 percent or (b) the minority population of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis. The CEQ guidance also directs low-income populations to be identified based on the annual statistical poverty thresholds from the Census Bureau. For the purpose of analysis in this section, low-income populations are defined as those individuals with reported income below the poverty level.

Data Relied Upon and Studies Completed

For the purposes of this section, the Study Area includes the municipalities in which the onshore Project components (e.g., the onshore export cables, interconnection cables, the onshore substations, and the O&M Base), construction and staging areas, and operations and maintenance activities will be located and/or occur

(see **Figure 8.4-1** and **Figure 8.4-2**)[3]. This section relied upon the American Community Survey data provided by the U.S. Census Bureau.

8.4.1 Affected Environment

The affected environment is defined as the municipalities that have the potential to be directly and/or indirectly affected by the construction, operation, and decommissioning of the Project. Permits necessary for the improvement of port and construction/staging facilities will be the responsibility of the owners of these facilities. Empire expects such improvements will broadly support the offshore wind industry and will be governed by applicable environmental standards, which Empire will comply with in using the facilities.

Within the Study Area, Brooklyn, Kings County is considered an environmental justice community by the EPA, as its minority population exceeds 50 percent. The remaining communities within the Study Area do not contain minority populations that exceed 50 percent, nor are poverty levels significantly higher than New York State. Therefore, they are not considered environmental justice communities as defined by the EPA. **Table 8.4-1** summarizes the percentage of state and county populations that would be considered minority or low-income for the purposes of analysis in this COP (American Community Survey 2019).

Table 8.4-1 Income and Minority Population Levels

County/Municipality	Total Population	Population with Income Below Poverty Level	Minority Hispanic or Latino	Minority not Hispanic or Latino	Total Minority
New York	19,572,319	14.1%	19.0%	25.4%	44.4%
Kings County (Brooklyn)	2,589,974	20.0%	19.0%	44.6%	63.6%
Nassau County	1,356,509	5.6%	16.9%	23.1%	40.0%
Hempstead	767,417	6.0%	20.9%	25.1%	46.0%
Village of Island Park	4,835	2.6%	41.6%	3.4%	45.0%
Lido Beach	3,024	2.5%	4.0%	2.8%	6.8%
City of Long Beach	33,507	6.7%	13.9%	12.9%	26.8%

Source: American Community Survey 2019

[3] 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.

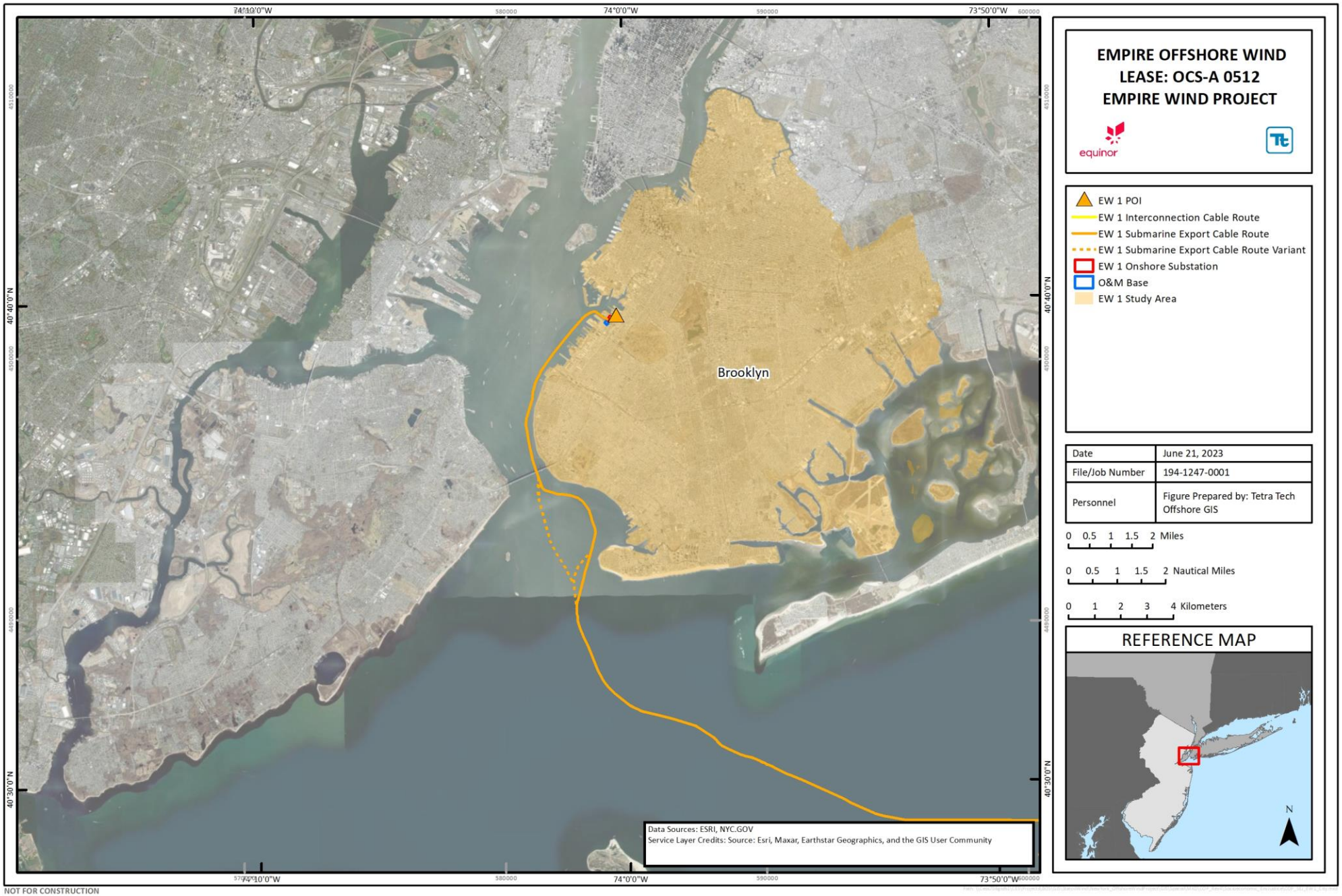

Figure 8.4-1 EW 1 Environmental Justice Study Area

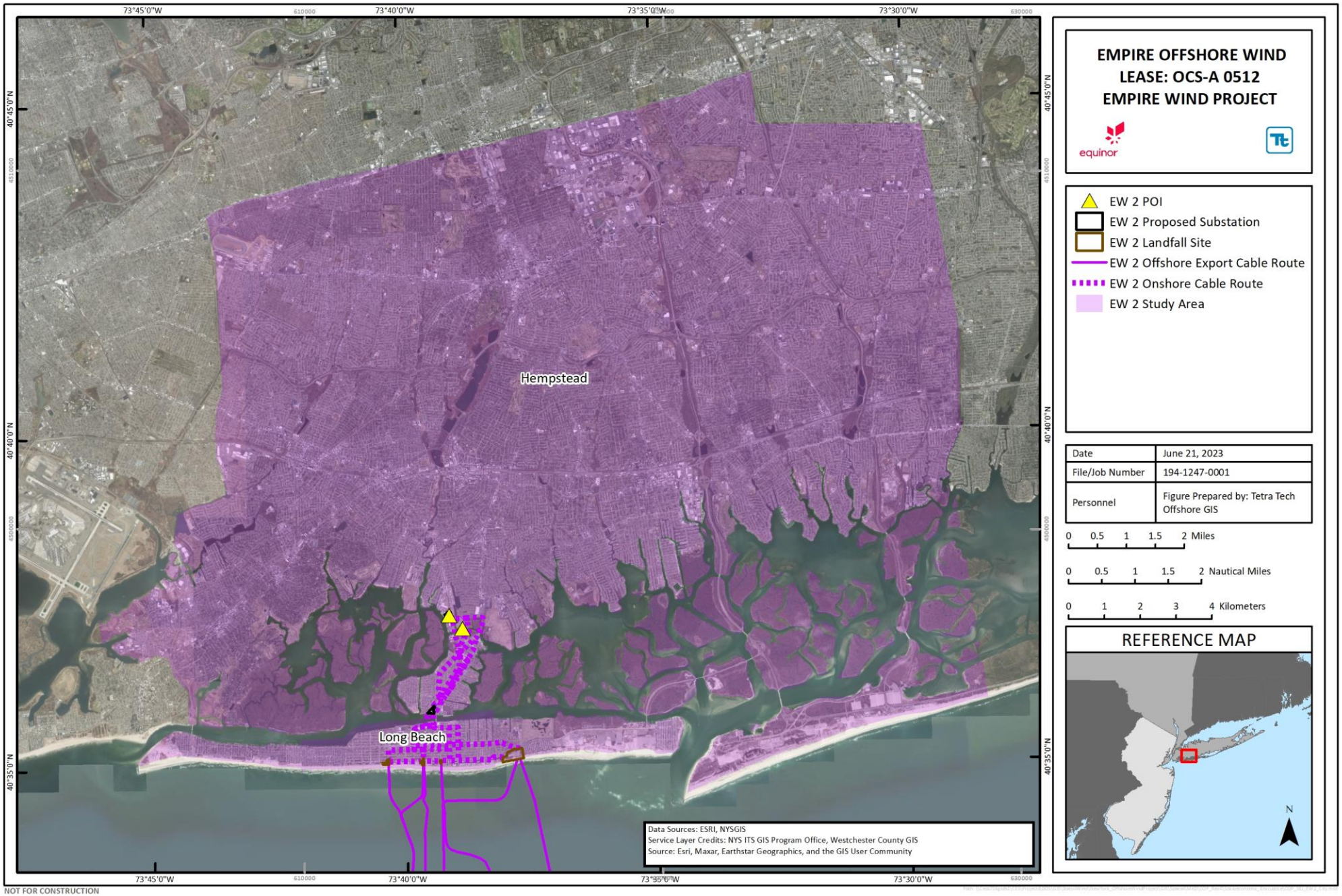

Figure 8.4-2 EW 2 Environmental Justice Study Area

8.4.1.1 New York State Environmental Justice Policy

The NYSDEC is responsible for implementing and incorporating the state's environmental justice policy, detailed in CP-29 Environmental Justice and Permitting (CP-29), as part of their environmental review process and the NYSDEC application of the State Environmental Quality Review Act. CP-29 is also incorporated into portions of the NYSDEC's enforcement program, grants program, and public participation provisions.

As detailed in CP-29, the NYSDEC is responsible for:

- Identifying potential environmental justice areas;
- Providing information on the policy to applicants with projects in these areas;
- Enhancing public participation requirements for projects in these areas;
- Establishing requirements for projects with significant environmental impacts in these areas; and
- Providing alternative dispute resolution opportunities to assist in resolving issues of concern within the community in these areas.

A potential environmental justice area in New York is defined as a minority or low-income community. A minority community is defined as an area having a minority population equal to or greater than 51.1 percent of the population in urban areas or 33.8 percent in rural areas. A low-income community is defined as an area having a low-income population equal to or greater than 23.59 percent of the total population. Within the Study Area, there are potential environmental justice areas, as identified by the NYSDEC (see **Figure 8.4-3** and **Figure 8.4-4**). These include the community surrounding the EW 1 interconnection cable route, onshore substation, and O&M Base, and two communities along the EW 2 onshore export and interconnection cable route, one located in Long Beach, New York, west of the LIRR, and the other in Island Park, south of Barnums Channel.

In accordance with CP-29, when a project is located within a potential environmental justice area, the applicant must provide a Public Participation Plan, which requires active public participation throughout the application process, and a completed full environmental assessment form. A full environmental justice analysis is also required for those projects that require an environmental impact statement (EIS); however, a NYSDEC environmental review is not required for projects that require a certificate through the Article VII process, as CP-29 does not apply. Empire has been and will continue to implement a significant outreach plan, in both the EW 1 and EW 2 Study Areas.

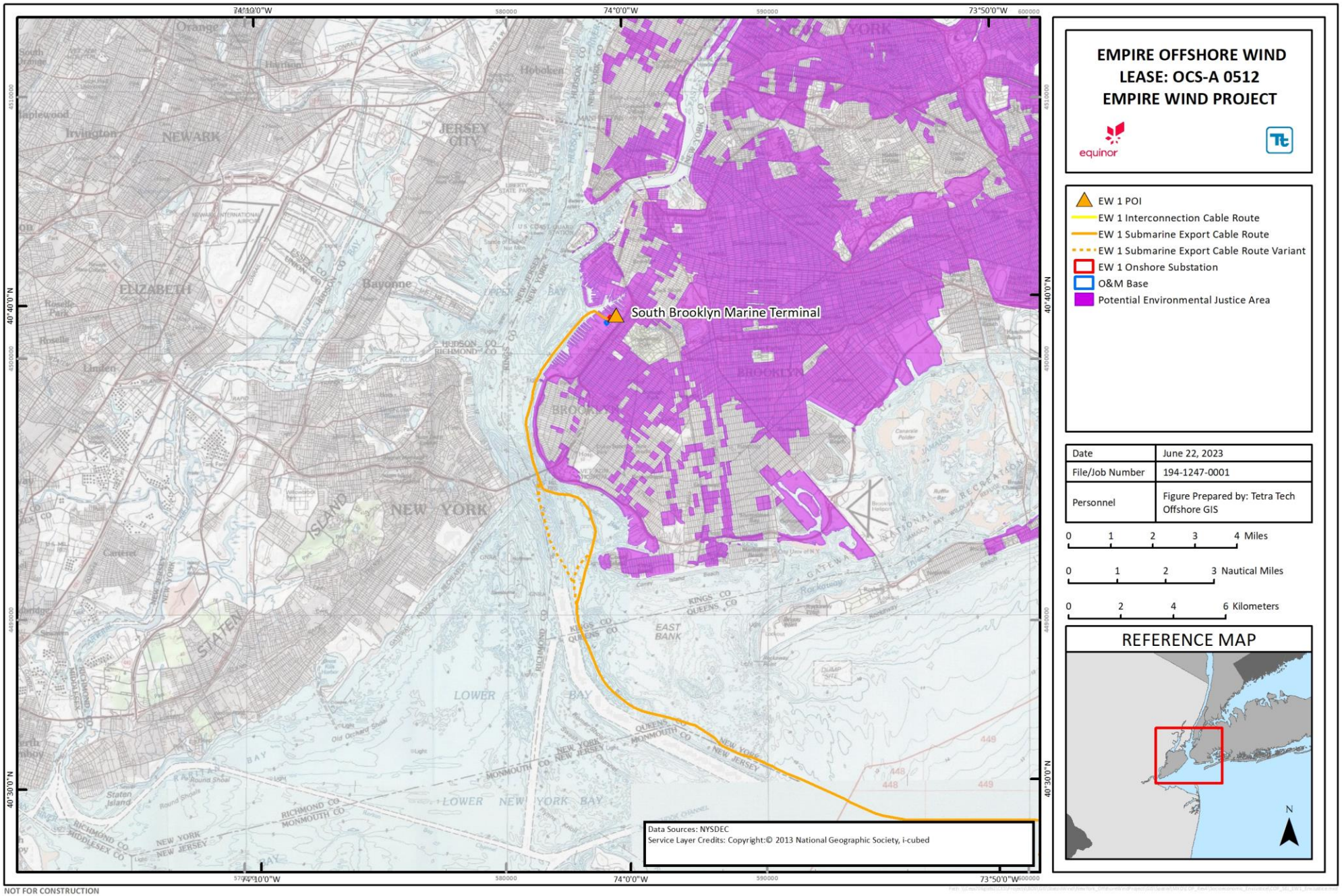

Figure 8.4-3 Environmental Justice Communities within the EW 1 Study Area

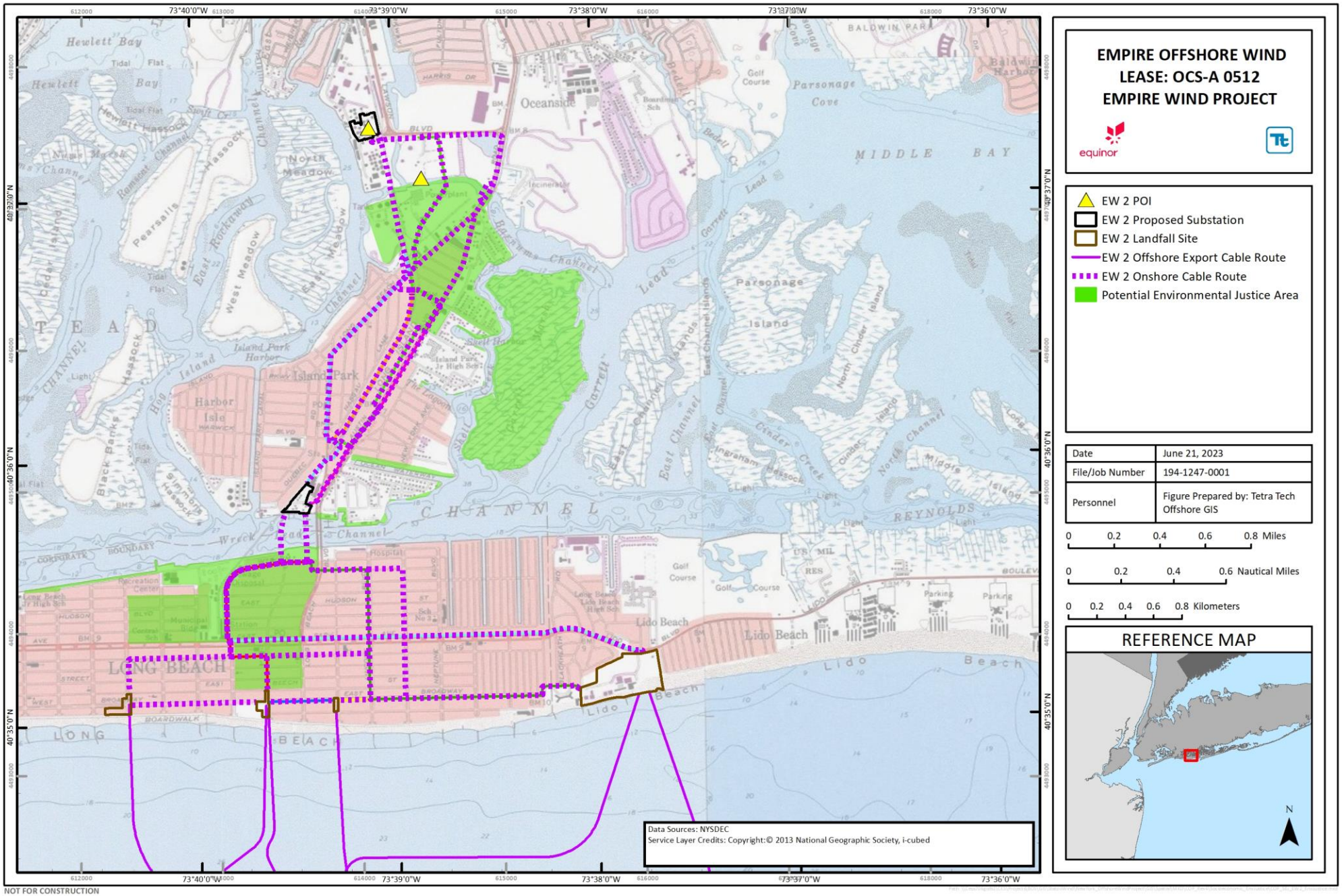

Figure 8.4-4 Environmental Justice Communities within the EW 2 Study Area

8.4.2 Impacts Analysis for Construction, Operations, and Decommissioning

In regard to the EPA's Environmental Justice Policy, the potential impact-producing factor is that a federal action will have a disproportionately high and adverse health or environmental effect on a minority or low-income population. Therefore, potential environmental justice impacts resulting from the construction, operations, and decommissioning of the Project are based on the maximum design scenario from the PDE (for a complete description of the construction, operations, and decommissioning activities that Empire anticipates for the Project, see **Section 3**). For environmental justice communities, the maximum scenario is the full build-out of offshore and onshore components, as described in **Table 8.4-2**. The parameters provided in **Table 8.4-2** represent the maximum potential impact from full Lease Area build-out. This design concept incorporates two export cable routes to EW 1 and EW 2, the associated onshore substations, and the O&M Base.

Table 8.4-2 Summary of Maximum Design Scenario Parameters for Environmental Justice Communities

Parameter	Maximum Design Scenario	Rationale
Construction		
Onshore construction duration	Based on EW 1 and EW 2. Construction and installation of two export cables landfalls, onshore export and interconnection cables, onshore substations, and O&M Base.	Representative of the maximum period required to install the onshore components, which has the potential to temporarily impact resources in the Project Area.
Project-Related vehicles	Based on EW 1 and EW 2. The maximum associated Project-related vehicles.	Representative of the maximum number of vehicles, which would result in an increase to local traffic and reduce available parking.
Export cable landfall	Based on EW 1 and EW 2. EW 1: HDD in a 200-ft by 200-ft (61-m by 61-m) area. EW 2: HDD or Direct Pipe installation in a 260-ft by 680-ft (79-m by 207-m) area.	Representative of the maximum area to be utilized to facilitate the export cable landfall.
Onshore export and interconnection cables	Based on EW 1 and EW 2. EW 1: 0.2 mi (0.4 km). EW 2: 6.4 mi (10.3 km).	Representative of the maximum length of onshore export and interconnection cables to be installed.
Onshore substations	Based on EW 1 and EW 2. EW 1: 10.8-ac (4.4-ha) area. EW 2: 6.4-ac (2.6-ha) area.	Representative of the maximum area to be utilized to facilitate the construction of the onshore substation(s).
O&M Base	6.5-ac (2.6-ha) area.	Representative of the maximum area to be utilized to facilitate the construction of the O&M Base.

Table 8.4-2 Summary of Maximum Design Scenario Parameters for Environmental Justice Communities (continued)

Parameter	Maximum Design Scenario	Rationale
Staging and construction areas, including port facilities, work compounds, and lay down areas	Based on EW 1 and EW 2. Maximum number of work compounds and lay down areas required. Ground disturbing activities are not anticipated. Independent activities to upgrade or modify staging, construction areas, and ports prior to Project use will be the responsibility of the facility owner.	Representative of the maximum area required to facilitate the offshore and onshore construction activities.
Operations and Maintenance		
Offshore structures	Based on full build-out of EW 1 and EW 2 (147 wind turbines and 2 offshore substations). EW 1: 57 wind turbines and 1 offshore substation. EW 2: 90 wind turbines and 1 offshore substation.	Representative of the maximum number of structures for EW 1 and EW 2.
Offshore O&M activities	Based on full build-out of EW 1 and EW 2. Based on the maximum number of structures (147 wind turbines and 2 offshore substations), the longest operational duration, and the maximum amount of Project-related activities expected per year.	Representative of the maximum amount of activities from the Project during the O&M phase.
Onshore substations	Based on EW 1 and EW 2. EW 1: 4.8-ac (1.9-ha) area. EW 2: 6.4-ac (2.6-ha) area.	Representative of the presence of a new structure in an area where there was previously none.
O&M Base	4.5-ac (1.8-ha) area.	Representative of the presence of a new structure in an area where there was previously none.
Onshore O&M activities	Based on EW 1 and EW 2. Longest operational duration, with the maximum amount of Project-related activities expected per year.	Representative of the maximum amount of activities from the Project during the O&M phase, which would have the potential to impact local traffic patterns and available parking in the Project Area.

8.4.2.1 Construction

During construction, the potential impact-producing factors to environmental justice communities may include:

- Staging activities and assembly of Project components at applicable facilities or areas; and
- Construction of the onshore components, including the export cable landfall, the onshore export and interconnection cables, the onshore substations, and the O&M Base.

The following impacts may occur as a consequence of the factors identified above.

- Short-term creation of additional construction jobs;
- Short-term increase in workforce;
- Short-term increase in the demand for public services;
- Short-term increase in tax revenue and economic benefits;
- Short-term increase in onshore construction vehicle traffic and activities; and
- Short-term shortage of affordable housing due to increased demand.

Creation of additional construction jobs. The Project is expected to lead to the creation of additional jobs during construction, including construction laborers, crane operators, vessel crew, pile drivers, steel workers, and electricians. According to the 2017 NYSERDA report, approximately 3,500 manufacturing and installation jobs are anticipated to support New York wind farms (NYSERDA 2017). In addition, a 2018 report from E2 found that a 352-MW wind farm would directly generate 2,345 jobs in New York during the construction period (E2 2018). In an assessment completed by Empire, approximately 1,261 direct jobs are anticipated to be created during the construction phase of the Project for EW 1, with an additional 2,154 direct jobs for EW 2. In total, approximately 2,326 direct, indirect, and induced jobs are anticipated to be created during the construction phase of the Project for EW 1, with an additional 4,046 jobs for EW 2 (see **Appendix O Economic Impacts of the Empire Wind Project [EW 1 and EW 2]** for additional information). Most of these jobs are anticipated to be located within the Study Area, specifically along the onshore export and interconnection cable routes in Kings and Nassau counties in New York. New jobs are also likely to be located around the construction and staging areas.

Empire has also committed to investing approximately $25 to $30 million in various community development and workforce training and readiness fund in New York over the entire lifetime of both EW 1 and EW 2. While construction-related jobs would be temporary during the construction period for EW 1 and EW 2, the specific skills and experience gained would be applicable to other offshore windfarm projects as they enter the construction phase.

Increase in workforce. While a portion of the newly created jobs will likely be filled with the local workforce, it is anticipated that there will be a slight influx of workers relocating to the Study Area (see Creation of additional construction jobs for estimates provided by various agencies). This increase in workforce is likely to be the most pronounced along the onshore export and interconnection cable routes in Kings and Nassau Counties in New York. New jobs are also likely to be located around the construction and staging areas.

Increase in demand for public services. Construction activities and the influx in the non-local workforce will likely result in an increased demand for public services, including police and fire services. The Study Area contains numerous hospitals, fire departments, law enforcement personnel and public schools. It is well-developed with sufficient capacity such that the Project will not impact the availability of public services. Therefore, the anticipated increase in demand for public services is unlikely to create a shortage for the general public. Additional details on potential impacts to health and public safety is discussed in **Section 8.12 Public Health and Safety**.

Increase in tax revenue and economic benefits. The creation of jobs and increased purchasing of construction materials is expected to lead to an increase in tax revenue to local communities. In an assessment completed by Empire, the EW 1 Project is expected to provide a total of $283.0 million in direct, indirect, and induced economic benefits, with an additional $24.9 million in state and local taxes (see **Appendix O** for additional information). Other studies and reports project similar economic benefits. According to the 2017 NYSERDA study, offshore wind would result in as much as $6.3 billion of expenditures in New York

(NYSERDA 2017). In addition, the 2018 E2 report showed that construction of a 352-MW project would generate over $737 million in economic benefits in New York (this includes direct, indirect, and induced values). The report also showed that for every $1 spent in building an offshore wind farm in New York, $1.72 would be generated into the state's economy. In 2019, NYSERDA issued a report on Phase 1 of its offshore wind solicitation in which NYSERDA selected EW 1 and another offshore wind project. The 2019 NYSERDA report stated that the two offshore wind projects are expected to provide more than $3.2 billion in new economic activity in labor, supplies, development, and manufacturing in New York. The report also expects approximately $700 million of avoided health impact benefits from the two projects.

Increase in construction vehicle traffic and activity. An increase in Project-related construction, support, and workforce vehicle traffic along the onshore export and interconnection cable routes, onshore substation sites, O&M Base, ports, and staging and construction areas is anticipated during construction. Activities at staging and construction facilities will be consistent with the established and permitted uses of these facilities, and Empire will comply with applicable permitting standards to limit environmental impacts from Project-related activities. During this time, nearby communities, including potential environmental justice communities, will experience an increase in construction related activities, including a short-term increase in construction related noise and equipment emissions. As the Project utilizes existing roads, ROWs, and infrastructure, new impacts resulting from construction activities will be minimized to the extent practicable and is anticipated to be similar in nature to other utilities installations or road improvement works carried out in these locations. Furthermore, construction activities are not anticipated to disproportionately impact the environmental justice communities along the onshore export and interconnection cable routes. Potential public health impacts from the construction phase are discussed in **Section 8.12**, including accidental release of hazardous material. Air quality impacts from Project-related vehicle traffic is discussed in **Section 4.3 Air Quality**.

Empire proposes to implement the following measures to avoid, minimize, and mitigate impacts:

- Regular updates to the local community through social media, public notices, and/or other appropriate communications tools; and
- The development of a Traffic Management Plan, to be developed in coordination with, and approved by, the affected local municipalities, as applicable.

Shortage of affordable housing due to increased demand. As discussed in **Section 8.1 Population, Economy, Employment and Housing and Property Values** and **Section 8.3 Recreation and Tourism,** the Project could result in increased demand for housing during the construction phase to accommodate additional workers. An increase in housing demand could disproportionately affect environmental justice communities. However, this anticipated increase in relocated workers is unlikely to be greater than the available number of temporary housing units and is not expected to create a shortage.

8.4.2.2 Operations and Maintenance

During operations, the potential impact-producing factors to environmental justice communities may include:

- The presence of fixed structures (e.g., wind turbines and offshore substations);
- Operations and maintenance activities associated with the onshore export and interconnection cables and onshore substations; and
- Operations at the O&M Base.

The following impacts may occur as a consequence of the factors identified above:

- Long-term creation of additional operations and maintenance jobs;

- Long-term increase in workforce;
- Long-term increase in the demand for public services;
- Long-term increase in tax revenue and economic benefits;
- Long-term shortage of affordable housing due to increased tourism demand;
- Long-term presence of new fixed structures in the Lease Area (e.g., wind turbines and offshore substations);
- Long-term presence of new fixed structures onshore (e.g., onshore substations and O&M Base); and
- An increase in operations and maintenance vehicle traffic.

Creation of additional operations and maintenance jobs. The Project is expected to lead to the creation of jobs during operations. In an assessment completed by Empire, approximately 1,797 direct jobs are anticipated to be created during the lifetime of the Project for EW 1, with an additional 2,723 direct jobs for EW 2. In total, approximately 4,069 direct, indirect, and induced jobs are anticipated to be created during the lifetime of the Project for EW 1, with an additional 6,173 jobs for EW 2 (see **Appendix O** for additional information). Further, according to the 2017 NYSERDA report, approximately 2,000 operations and maintenance jobs are anticipated to support New York wind farms (NYSERDA 2017). In addition, a 2018 report from E2 found that a 352-MW wind farm would directly generate 75 jobs in New York in the operations phase (E2 2018).

Empire has also committed to investing approximately $25 to $30 million in various community development and workforce training and readiness fund in New York over the entire lifetime of both EW 1 and EW 2. As with the construction phase, the specific skills and experience gained by workers would be applicable to other offshore windfarm projects as Empire enters its operations phase. Most of these jobs are anticipated to be located within the Study Area, specifically in Brooklyn, Kings County, New York, at the proposed location for the O&M Base.

Increase in workforce. It is anticipated that there will be a slight influx in workers relocating to the Study Area (see Creation of additional operations and maintenance jobs for estimates provided by various agencies). This increase in workforce is likely to be the most pronounced in Brooklyn, Kings County, New York at the O&M Base.

Increase in demand for public services. Operation activities and the slight increase in the workforce will likely result in a slight increase in demand for public services. The Study Area already contains numerous hospitals, fire departments, law enforcement personnel and public schools, and is well developed with sufficient capacity such that the Project will not have an impact on the availability of public services. Therefore, this anticipated increase in demand for public services is very unlikely to create a shortage for the general public. Additional details on the potential impacts to health and public safety is discussed in **Section 8.12**.

Increase in tax revenue and economic benefits. The creation of jobs and operations activities are expected to also lead to an increase in tax revenue to local communities. In an assessment completed by Empire, EW 1 is expected to provide a total of $493.8 million in direct, indirect, and induced economic benefits, with an additional $48.8 million in state and local taxes (see **Appendix O** for additional information). In the 2018 E2 report, operations of a 352-MW project would generate over $29 million in economic benefits in New York (this includes direct, indirect, and induced values) (E2 2018). Therefore, it is expected that the operation activities associated with the Lease Area will result in a significant increase in tax revenue to local communities in New York. In 2019, NYSERDA issued a report on Phase 1 of its offshore wind solicitation in which NYSERDA selected EW 1 and another offshore wind project. The 2019 NYSERDA report states that the two offshore wind projects are expected to provide more than $3.2 billion in new economic activity in labor, supplies, development, and manufacturing in New York. EW 1 is expected to bring $792.2 million in economic

benefits. The report also expects approximately $700 million of avoided health impact benefits from the two projects.

In addition to these economic benefits, Empire has also committed to investing approximately $25 to $30 million in various community development and workforce training and readiness fund in New York over the entire lifetime of both EW 1 and EW 2.

Shortage of affordable housing due to increased tourism demand. As discussed in **Section 8.1** and **Section 8.3**, the Project could result in increased tourism and corresponding increased demand for vacation housing during the operations phase to accommodate additional visitors to the Study Area. An increase in housing demand could disproportionately affect environmental justice communities. However, this anticipated increase is unlikely to be greater than the available number of temporary housing units and is not expected to create a shortage.

Presence of a new fixed structures in the Lease Area. The presence of new fixed structures within the Lease Area has the positive beneficial potential to attract new and/or additional marine users to the area. The wind turbines may create a new demand for sightseeing trips and charter tours. This was observed following the installation of the Block Island Wind Farm, with local vessel owners using their vessels full time to take tourists to view the windfarm (Brunetti 2018).

It is possible that the offshore Project Area would also be used for recreational and/or commercial fishing by environmental justice communities that are not within the onshore Study Area, as defined in this section. Shoreline fishing is the most common access point for recreational fishing (NOAA Fisheries 2019a), which includes participants from environmental justice communities located near the potential export cable landfalls. Boats from New York, New Jersey, Massachusetts, and Rhode Island were reported to work in the area seasonally, with catches brought into ports in those same states or other commercial ports within the region, such as New Bedford, Massachusetts; Cape May/Wildwood, New Jersey; and Point Judith, Rhode Island (NOAA Fisheries 2019b). Empire is committed to coexistence with commercial and recreational fishing and is conducting extensive outreach and engagement with the fishing community as part of this Project, which will assist in identifying additional environmental justice communities that may rely on the offshore Project Area for fishing and who may require additional engagement (see **Section 8.8 Commercial and Recreational Fishing** for additional information).

Presence of new fixed structures onshore. The onshore substations will be constructed in areas where there previously were no structures, with the exception of the EW 2 Onshore Substation A site, which currently supports industrial uses and contains minor temporary infrastructure that would need to be removed for the construction of the onshore substation, and the EW 2 Onshore Substation C site, which currently supports commercial uses and contains infrastructures that would need to be removed for the construction of the onshore substation. In addition, the onshore substations will generate some operational noises (see **Section 4.4.1 In-Air Acoustic Environment** for additional information on anticipated noise levels). The presence of these new structures and the introduction of new sounds could disproportionately affect environmental justice communities. However, this impact will be minimized as the structures will be consistent with the land use and zoning in the surrounding area (see **Section 8.2** for additional information). Although the EW 2 Onshore Substation C site is not entirely zoned for industrial use, the area immediately opposite the onshore substation site across Reynolds Channel in the City of Long Beach, which is mapped as a potential environmental justice community, consists of industrial land use similar to that proposed for the EW 2 Onshore Substation C site; therefore, the proposed substation would not be inconsistent with the character of the area in general.

Increase in operations and maintenance vehicle traffic. An increase in Project-related vehicle traffic along the onshore export and interconnection cable routes and onshore substation parcels is anticipated during the operations and maintenance phase. The number of workers transiting to the O&M Base and onshore substations is anticipated to be low; however; and is not expected to add a noticeable increase to existing traffic congestion or air emissions (see **Section 4.3 Air Quality** for additional information on anticipated air emissions associated with the operations and maintenance of the Project).

8.4.2.3 Decommissioning

During decommissioning, the potential impact-producing factors to environmental justice communities are expected to be similar to those experienced during construction, as described in Section 8.4.2.1. 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 additional information on the decommissioning activities that Empire anticipates for the Project, please see **Section 3**.

Offshore impacts have not been assessed with respect to environmental justice communities, which would include commercial and recreational fishing uses that could be impacted by the Project. It is possible that environmental justice communities not identified in this section would rely on the Project Area for commercial or recreational fishing. Empire continues to seek input from fishermen, and fishermen's inputs continue to play a substantial role in finalizing the Project design, in order to minimize and prevent impacts to fishermen, including those who may be from environmental justice communities.

8.4.3 Summary of Avoidance, Minimization, and Mitigation Measures

Empire has maintained, and will continue to maintain, a strong community engagement policy throughout life of the Project. Fundamental points of the community engagement policy include pre-application meetings with local agencies and stakeholders, open houses throughout the Project Area, and a Project website that provides Project updates to the local community.

In addition to the community engagement policy, the following avoidance, minimization, and mitigation measures are proposed in order to reduce the potential impact-producing factors described in Section 8.4.2, and to ensure that environmental justice communities are not disproportionately affected.

8.4.3.1 Construction

During construction, Empire will commit to the following avoidance, minimization, and mitigation measures to mitigate the impacts described in Section 8.4.2.1:

- Regular updates to the local community through social media, public notices, and/or other appropriate communications tools;
- Installation of onshore components within existing ROWs and within previously developed areas designated for such uses, to the extent practicable; and
- The development of a Traffic Management Plan, to be developed in coordination with, and approved by, the affected local municipalities, as applicable.

8.4.3.2 Operations and Maintenance

During operations, while no specific avoidance, minimization, and mitigation measures will be implemented to mitigate impacts to environmental justice communities, Empire will continue to use measures similar to those implemented during construction.

8.4.3.3 Decommissioning

Avoidance, minimization, and mitigation measures proposed to be implemented during decommissioning are expected to be similar to those implemented during construction and operations, as described in Section 8.4.2.1. A full decommissioning plan will be approved by BOEM prior to any decommissioning activities, and avoidance, minimization, and mitigation measures for decommissioning activities will be proposed at that time.

Given the strong community engagement policy and the proposed avoidance, minimization, and mitigation measures, the Project is believed to be consistent with the EPA's Environmental Justice policies. While the New York Environmental Justice Policy does not apply, the Project will be undergoing a stringent review through the Article VII process, which will require public notification and community engagement.

8.4.4 References

Table 8.4-3 Data Sources

Source	Includes	Available at	Metadata Link
ESRI	Potential Environmental Justice Area (NY)	https://www.arcgis.com/home/item.html?id=1c924a53319a491ab43d5cb1d55d8561	N/A
NYC.GOV	Zoning Districts	https://www1.nyc.gov/site/planning/data-maps/open-data/dwn-gis-zoning.page	https://www1.nyc.gov/assets/planning/download/pdf/data-maps/open-data/nyzd_metadata.pdf?r=1219
NYGIS	Town Boundary	http://gis.ny.gov/gisdata/fileserver/?DSID=927&file=NYS_Civil_Boundaries.shp.zip	http://gis.ny.gov/gisdata/metadata/nysgis.NYS_Civil_Boundaries_GDB.pdf
NYSDEC	Potential Environmental Justice Area (NY)	http://www.dec.ny.gov/maps/pejalink.kmz	http://gis.ny.gov/gisdata/metadata/nysdec.peja_KML.xml
Town of Hempstead/ City of Long Beach	Zoning Districts	https://www.longbeachtownship.com/images/zoning_map_10-05-11.pdf	N/A
USGS	Land Use	https://www.usgs.gov/core-science-systems/science-analytics-and-synthesis/gap/science/land-cover-data-download?qt-science_center_objects=0#qt-science_center_objects	N/A
Village of Island Park	Zoning Districts	http://www.kpsearch.com/DF/Villageofislandpark-n/images/Finished%20PDF/Island_Park_Zoning.pdf	N/A

American Community Survey. 2019. 2015-2019 American Community Survey 5-Year Estimates. Available online at: https://www.census.gov/acs/www/data/data-tables-and-tools/data-profiles/. Accessed January 19, 2021.

Brunetti, Michelle. 2018. "Nations First Wind Farm Creates Fishing, Tourism Hot Spot." Press of Atlantic City. February 17. Available online at: https://www.pressofatlanticcity.com/news/breaking/nations-first-wind-farm-creates-fishing-tourism-hot-spot/article_8f9ba597-0675-5afe-a08c-6bee92d6b918.html. Accessed July 15, 2019.

E2. 2018. "Offshore Wind: Generating Economic Benefits on the East Coast." E2. August 30. Available online at: https://www.e2.org/wp-content/uploads/2018/08/E2-OCS-Report-Final-8.30.18.pdf. Accessed October 16, 2018.

EPA (U.S. Environmental Protection Agency). 2018a. "Learn About Environmental Justice." EPA. April 5. Available online at: https://www.epa.gov/environmentaljustice/learn-about-environmental-justice. Accessed March 11, 2021.

EPA. 2018b. "Environmental Justice and National Environmental Policy Act." United States Environmental Protection Agency. Available online at: https://www.epa.gov/environmentaljustice/environmental-justice-and-national-environmental-policy-act. Accessed March 11, 2021.

NOAA Fisheries (National Oceanic and Atmospheric Administration, National Marine Fisheries Service). 2019a. Recreational Fisheries Statistics Queries. NOAA: Available online at: https://www.st.nmfs.noaa.gov/recreational-fisheries/data-and-documentation/queries/index. Accessed July 5, 2019.

NOAA Fisheries. 2019b. Commercial Fisheries Statistics. NOAA. Available online at: https://www.st.nmfs.noaa.gov/commercial-fisheries/commercial-landings/index. Accessed July 5, 2019. Accessed July 5, 2019.

NYSERDA (New York State Energy Research and Development Authority). 2017. The Workforce Opportunity of Offshore Wind in New York. NYSERDA Report 17-25t, New York City: Available online at: https://www.nyserda.ny.gov/All-Programs/Programs/Offshore-Wind/Economic-Opportunities/Workforce. Accessed October 15, 2018.

8.5 Land Transportation and Traffic

This section describes land transportation and traffic. Potential impacts to land transportation and traffic resulting from construction, operations, and decommissioning of the Project are discussed. Proposed Project-specific measures adopted by Empire are also described, which are intended to avoid, minimize, and/or mitigate potential impacts to land transportation and traffic.

Other resources and recent assessments detailed within this COP that are related to land transportation and traffic include:

- Land Use and Zoning (Section 8.2);
- Aviation (Section 8.6); and
- Marine Transportation and Navigation (Section 8.7 and Appendix DD).

Data Relied Upon and Studies Completed

For the purposes of this section, the Study Area includes a 0.25-mi (0.4-km) buffer around the EW 1 and EW 2 onshore export and interconnection cable routes, the onshore substations, O&M Base, and the POI (see **Figure 8.5-1** and **Figure 8.5-2**)[4].

The Average Annual Daily Traffic (AADT) volume is referenced in this section to provide a basis for projected future traffic volumes. The AADT is defined as an estimated average daily traffic volume on a certain route segment and is used by both federal and state agencies to determine the average traffic volume on a particular road[5]. AADT volumes are taken from traffic count stations, which are short, pre-determined portions of a road over which traffic volumes are approximately equal (NYSDOT 2020). Considerably higher or lower values often result in areas of seasonal activities and when comparing weekend versus weekday traffic (NYSDOT 2017).

8.5.1 Affected Environment

The affected environment is defined as the onshore areas that have the potential to be directly affected by the construction, operations, and decommissioning of the Project. For the purposes of this section, the affected environment includes the onshore components, including onshore export cables, onshore substations, interconnection cables, O&M Base, and the POIs. Permits necessary for the improvement of port and construction/staging facilities will be the responsibility of the owners of these facilities. Empire expects such improvements will broadly support the offshore wind industry and will be governed by applicable environmental standards, which Empire will comply with in using the facilities.

EW 1: The EW 1 submarine export cables will make landfall at SBMT, in Brooklyn, New York. The EW 1 interconnection cable route will start within the EW 1 onshore substation site and connect into the existing Gowanus POI through 2nd Avenue. The O&M Base will also be located at SBMT, directly to the south of the EW 1 onshore substation (**Figure 8.5-1**).

[4] 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.
[5] Actual daily volumes encountered on highways may vary from the AADT.

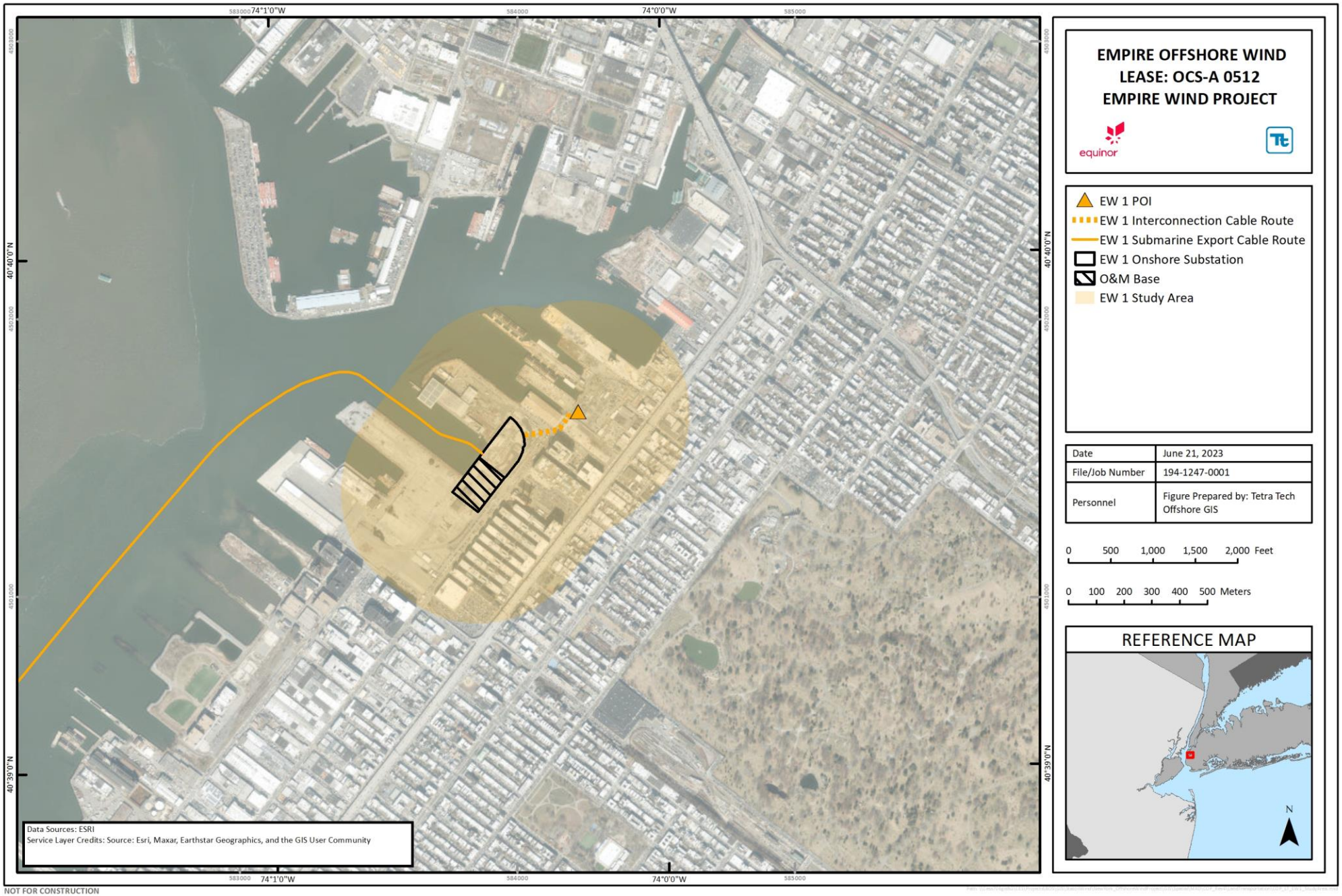

Figure 8.5-1 EW 1 Land Transportation and Traffic Study Area

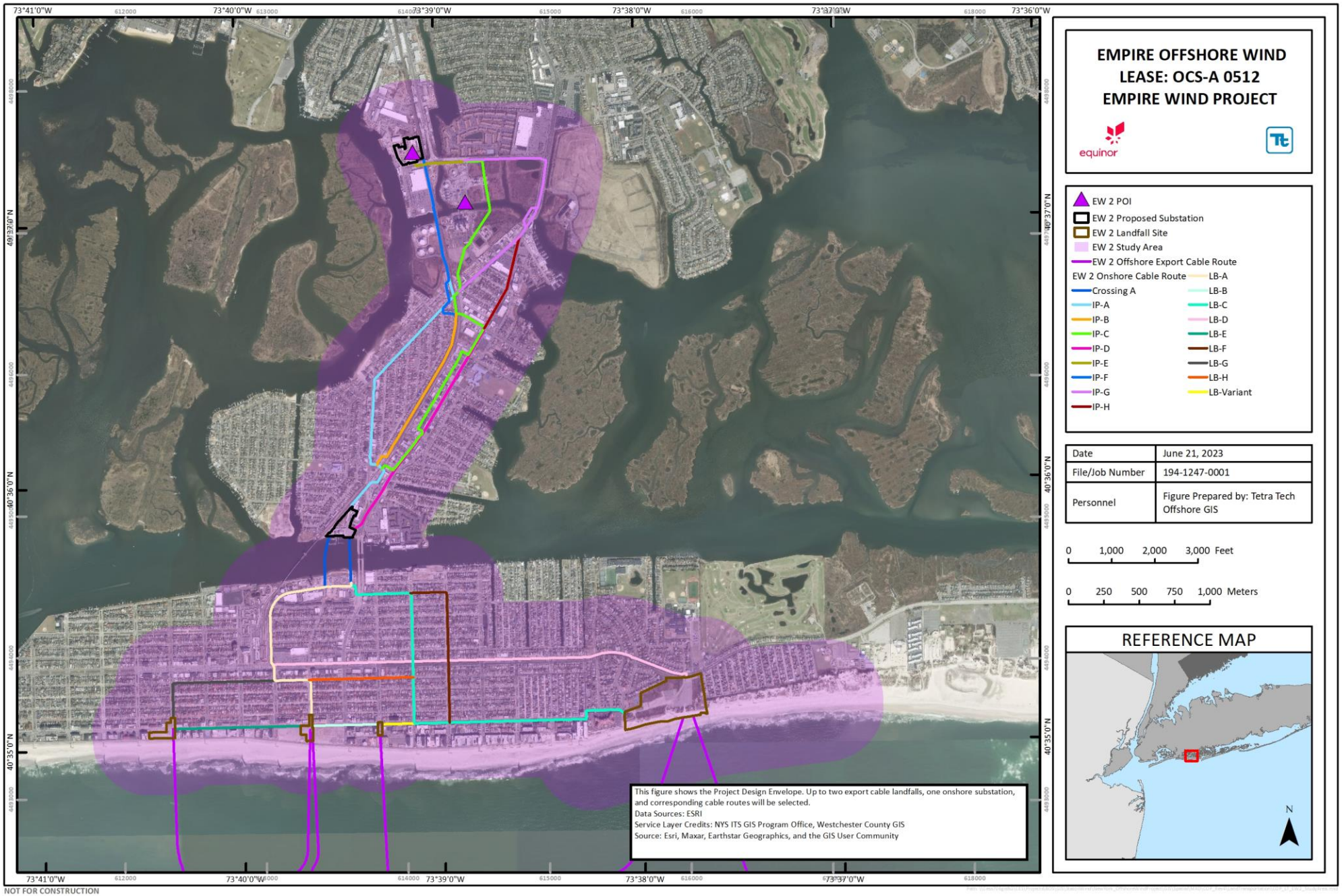

Figure 8.5-2 EW 2 Land Transportation and Traffic Study Area

Average Annual Daily Traffic volumes were identified for the following roadways along the EW 1 Study Area:

- 1st Avenue: 6,395 (from U.S. Army Supply to 39th Street, 2019);
- 2nd Avenue: 8,482 (from 65th Street to Dead End, 2019); and
- 39th Street: 4,010 (from 2nd Avenue to 1st Avenue, 2019).

EW 2: The EW 2 submarine export cables will make landfall at up to two of the EW 2 Landfalls A through E (**Figure 8.5-2**). All export cable landfalls under consideration for EW 2 are located within Nassau County, New York. EW 2 Landfall A, EW 2 Landfall B, and EW 2 Landfall E would make landfall within Long Beach, while the EW 2 Landfall C would make landfall within Lido Beach. The EW 2 Landfall C is located within existing parks and will not impact traffic as a result of landfall activities.

The proposed onshore export and interconnection cable route segments (including Long Beach [LB] A through H and Variant and Island Park [IP] A through H) are located within existing roads and ROWs, with the exception of portions of EW 2 Routes IP-B, IP-C, IP-E, and IP-F, which are located entirely within private property and therefore will not impact traffic as a result of installation activities. AADT volumes were identified for the following major roadways along EW 2 onshore export and interconnection route segments:

- **EW 2 Route LB-A**: Riverside Boulevard: 3,543 (from Boardwalk to East Pine Street, 2019); and Park Avenue: 28,400 (from Washington Boulevard to Long Beach Boulevard);
- **EW 2 Route LB-B**: Monroe Boulevard: 4,103 (from Boardwalk to East Bay Drive, 2019); and East Broadway: 7,001 (from Neptune Boulevard to Magnolia Boulevard, 2019);
- **EW 2 Route LB-C**: East Broadway: 4,999 (from Maple Boulevard to Neptune Boulevard, 2019) and 7,001 (from Neptune Boulevard to Magnolia Boulevard, 2019); and Lincoln Boulevard: 2,868 (from Boardwalk to East Bay Drive, 2019);
- **EW 2 Route LB-D**: Lido Boulevard: 28,334 (from Hempstead T/L [near Blackheath Road] to Loop Parkway, 2019); and Park Street: 31,154 (from Long Beach Boulevard to Hempstead T/L, 2019);
- **EW 2 Route LB-E**: Lido Boulevard: 28,334 (from Hempstead T/L to Loop Parkway, 2019);
- **EW 2 Route LB-F**: Franklin Boulevard: 3,482 (from East Broadway to East Harrison Street, 2019);
- **EW 2 Route LB-G**: Laurelton Boulevard: 1,708 (from West Bay Drive to the Boardwalk, 2019); West Park Avenue: 28,400 (from Washington Boulevard to Long Beach Boulevard, 2019);
- **EW 2 Route LB-H**: West Broadway: 5,446 (from Laurelton Boulevard to Magnolia Boulevard, 2019);
- **EW 2 Route LB Variant:** East Broadway: 7,001 (from Neptune Boulevard to Magnolia Boulevard, 2019);
- **EW 2 Route IP-A**: Long Beach Road: 6,483 (from Warwick Road to Island Parkway, 2019) and 9,650 (from Island Parkway to Hempstead T/L, 2019);
- **EW 2 Route IP-B**: Nassau Lane: 739 (from Warwick Road to Kildare Road, 2019);
- **EW 2 Route IP-C**: Austin Boulevard: 40,249 (from Long Beach Road to Trafalgar Boulevard, 2019);
- **EW 2 Route IP-D**: Long Beach Road: 9,101 (from Long Beach CTYL [crossing Reynolds Channel] to Station Plaza, 2019); and Austin Boulevard: 40,249 (from Long Beach Road to Trafalgar Boulevard, 2019);
- **EW 2 Route IP-E**: Daly Boulevard: 24,652 (from Lawson Boulevard to Long Beach Boulevard, 2019);
- **EW 2 Route IP-F**: Kildare Road: 558 (from Nassau Lane to Long Beach Road, 2020);
- **EW 2 Route IP-G**: Long Beach Road: 10,735 (from Hempstead TL to Austin Boulevard, 2019); Long Beach Road: 58,923 (from Long Beach Bridge to Daly Boulevard, 2019); and Daly Boulevard: 24,652 (from Lawson Boulevard to Long Beach Boulevard, 2019); and

- **EW 2 Route IP-H**: Austin Boulevard: 35,857 (Trafalgar Boulevard to Long Beach Road, 2019).

The EW 2 onshore export and interconnection cable route segments also cross smaller roads; AADT data is not available along these roadways.

8.5.2 Impacts Analysis for Construction, Operations, and Decommissioning

The potential impacts resulting from the construction, operations, and decommissioning of the Project are based on the maximum design scenario from the PDE (for a complete description of the construction, operations, and decommissioning activities that Empire anticipates for the Project, see **Section 3**). For land transportation and traffic, the maximum design scenario from a regional perspective is the construction of both EW 1 and EW 2, which will include installation of onshore export cables, interconnection cables, onshore substations at two individual locations, and the O&M Base, as described in **Table 8.5-1**. The parameters provided in **Table 8.5-1** represent the maximum potential impact on land transportation and traffic within the Study Areas from full build-out of EW 1 and EW 2. It should be noted that there will be no overlap of the two onshore locations or onshore affected areas at any point in time. The maximum design scenario for assessments associated with full build-out is represented by applying the longest onshore construction period for EW 1 and EW 2. This design concept incorporates the longest construction and installation of the two onshore substations, two export cable routes to EW 1 and EW 2, and the O&M Base.

Table 8.5-1 Summary of Maximum Design Scenario Parameters for Land Transportation and Traffic

Parameter	Maximum Design Scenario	Rationale
Construction		
Onshore components	Based on EW 1 and EW 2. Construction and installation of two export cables landfalls, onshore export and interconnection cables, onshore substations, and O&M Base.	Representative of the maximum onshore construction work, which has the potential to temporarily impact local traffic and reduce available parking in the Study Area.
Onshore Safety zones	Based on EW 1 and EW 2. The implementation of appropriate safety zones and traffic restrictions.	Representative of the maximum area in which local traffic would be restricted from entering.
Project-related vehicles	Based on EW 1 and EW 2. The maximum associated Project-related vehicles.	Representative of the maximum number of vehicles, which would result in an increase to local traffic and reduce available parking.
Onshore construction Duration	Based on EW 1 and EW 2. Construction and installation of export cable landfalls, onshore export and interconnection cables, onshore substations, and O&M Base.	Representative of the maximum period required to install the onshore components, which has the potential to temporarily impact resources in the Study Area.

Table 8.5-1 Summary of Maximum Design Scenario Parameters for Land Transportation and Traffic (continued)

Parameter	Maximum Design Scenario	Rationale
Work compounds and lay-down areas, including ports and construction and staging areas	Based on EW 1 and EW 2. Maximum number of work compounds and lay-down areas required. Ground disturbing activities are not anticipated. Independent activities to upgrade or modify staging, construction areas, and ports prior to Project use will be the responsibility of the facility owner.	Representative of the maximum area required to facilitate the offshore and onshore construction activities.
Operations and Maintenance		
Onshore O&M activities	Based on EW 1 and EW 2. Longest operational duration, with the maximum amount of Project-related activities expected per year.	Representative of the maximum amount of activities from the Project during the O&M phase, which would have the potential to impact local traffic patterns and available parking in the Project Area.

8.5.2.1 Construction

During construction, the potential impact-producing factors to land transportation and traffic may include:

- Construction of the onshore components, including duct banks and splice bays (installation techniques include open cut trenching, HDD, and Direct Pipe for cable crossings and/or landfall);
- Staging activities and assembly of Project components at applicable facilities or areas; and
- Construction of new onshore substations and O&M Base.

The following impacts may occur as a consequence of the factors identified above:

- An increase in Project-related construction vehicle traffic, including workforce; and
- The temporary modification of local traffic patterns.

Increased construction vehicle traffic. An increase in Project-related construction, support, and workforce vehicle traffic along the onshore export and interconnection cable routes, onshore substation parcels, O&M Base, ports, and staging and construction areas is anticipated during construction (see **Section 8.1 Population, Economy, Employment and Housing and Property Values** for additional information on anticipated workforce). Activities at staging and construction facilities will be consistent with the established and permitted uses of these facilities, and Empire will comply with applicable permitting standards to limit environmental impacts from Project-related activities. Due to the relatively small number of crew expected, the potential incremental impact of Project-related construction vehicle traffic on land transportation and local traffic during construction activities, beyond that previously permitting, is anticipated to be small and similar in nature to other utilities installations or road improvement works carried out in these locations. Empire proposes to implement the following measures to avoid, minimize, and mitigate impacts:

- The development of a Traffic Management Plan, to be developed in coordination with, and approved by, the affected local municipalities, as applicable;

- The development of Project-related vehicle routes to and from construction sites, which are consistent with allowable uses, to the extent practicable; and
- Regular updates to the local community through social media, public notices, and/or other appropriate communications tools.

Temporary modification to local driving patterns. Installation of the onshore export and interconnection cables, onshore substations, and O&M Base could result in the temporary closure of roads, sections of roads (e.g., a traffic lanes), and/or parking lots at various points during construction. Roadways will not be closed and/or blocked for long periods of time to allow for local vehicular traffic patterns to be maintained to the extent practicable. Parking lots may be closed for the duration of construction and installation activities; however, Empire will work with the local municipalities to offset this impact. Empire proposes to implement the following measures to avoid, minimize, and mitigate impacts:

- The development of a Traffic Management Plan, to be developed in coordination with, and approved by, the affected local municipalities as applicable;
- Temporary, localized construction zones to minimize areas or sections of road closure;
- Highly visible marking and lighting of active construction sites; and
- Regular updates to the local community through social media, public notices, and/or other appropriate communications tools.

8.5.2.2 Operations and Maintenance

During operations, the potential impact-producing factors to land-based transportation and traffic uses may include:

- Operations and maintenance activities associated with the onshore export and interconnection cables and onshore substations.

The following impacts may occur as a consequence of the factors identified above:

- An increase in O&M vehicle traffic, including workforce.

Increase O&M vehicle traffic. An increase in Project-related vehicle traffic along the onshore export and interconnection cable routes, onshore substation parcels, and O&M Base is anticipated during the O&M phase. The number of workers transiting to the O&M Base and onshore substations is anticipated to be low and impacts to local traffic are not expected. The increase in staff transiting to the O&M Base is not expected to add a noticeable increase to existing traffic congestion (see **Section 8.1** for additional information on anticipated workforce). The onshore substations will be unmanned during routine operations and will only be inspected periodically, therefore are not expected to add a noticeable increase to existing traffic. Personnel will be on site as necessary for any maintenance and repairs. Empire also proposes that each onshore substation will contain sufficient parking on-site to support onshore O&M workers, which will further avoid, minimize, and mitigate impacts.

8.5.2.3 Decommissioning

Impacts during decommissioning are expected to be similar or less than those experienced during construction, as described in Section 8.5.2.1. 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 additional information on the decommissioning activities that Empire anticipates for the Project, please see **Section 3**.

8.5.3 Summary of Avoidance, Minimization, and Mitigation Measures

In order to mitigate the potential impact-producing factors described in Section 8.5.2, Empire is proposing to implement the following avoidance, minimization, and mitigation measures.

8.5.3.1 Construction

During construction, Empire will commit to avoidance, minimization, and mitigation measures to mitigate the impacts described in Section 8.5.2.1:

- The development of a Traffic Management Plan, to be developed in coordination with, and approved by, the affected local municipalities, as applicable;
- The development of Project-related vehicle routes to and from construction sites, which are consistent with allowable uses, to the extent practicable;
- Highly visible marking and lighting of active construction sites;
- Temporary, localized construction zones to minimize areas or sections of road closure; and
- Regular updates to the local community through social media, public notices, and/or other appropriate communications tools.

8.5.3.2 Operations and Maintenance

During operations, in the unlikely event that onshore export and interconnection cable repair is required, Empire will commit to implementing avoidance, minimization, and mitigation measures, which are expected to be similar to those proposed for construction, as described above.

8.5.3.3 Decommissioning

Avoidance, minimization, and mitigation measures proposed to be implemented during decommissioning are expected to be similar to those implemented during construction, as described in Section 8.5.3.1. A full decommissioning plan will be approved by BOEM prior to any decommissioning activities, and avoidance, minimization, and mitigation measures for decommissioning activities will be proposed at that time.

8.5.4 References

NYSDOT (New York State Department of Transportation). 2017. Highway Roadway Inventory 2017. Available online at: https://www.dot.ny.gov/divisions/engineering/technical-services/highway-data-services/inventory-listing. Accessed February 1, 2021.

NYSDOT. 2020. Traffic Data Viewer. Available online at: https://www.dot.ny.gov/divisions/engineering/applications/traffic-data-viewer/. Accessed February 1, 2021.

8.6 Aviation

This section describes the airspace and aviation radar known within and surrounding the Project Area, which primarily includes the Lease Area. Potential impacts to airspace and aviation radar resulting from construction, operation, and decommissioning of the Project are discussed. Proposed Project-specific measures adopted by Empire as a result of outreach and engagement are also described, which are intended to avoid, minimize, and/or mitigate potential impacts to airspace and aviation radar within the Lease Area and surrounding environment.

Other resources and assessments detailed within this document that are related to airspace and aviation radar include:

- Department of Defense and OCS National Security Maritime Uses (Section 8.9);
- ADLS Analysis (Appendix BB); and
- Obstruction Evaluation and Airspace Analysis (Appendix CC).

Regulatory Context

In accordance with 49 U.S.C. § 44718 and 14 CFR Part 77, the FAA has jurisdiction to assess all structures within the U.S. territorial waters that are greater than 200 ft (61 m) above ground level (AGL). Additionally, the FAA may have jurisdiction over lower structures depending on proximity to airports. The FAA's mission is to ensure that these structures, which fall within their jurisdictional zone, do not have adverse effects on the safety or efficient utilization of navigable airspace. Beyond the 12-nm (22-km) limit from the shoreline, BOEM accepts this role. In all cases, structures are assessed by the DoD and Department of Homeland Security for potential impacts to military operations and/or radar systems.

A small section of the northwestern portion of the Lease Area (approximately 1,102 ac [446 ha]) is within the 12-nm (22-km) FAA jurisdiction (**Figure 8.6-1**). Any structure with a height greater than 499 ft (152 m) AGL within FAA's jurisdictional boundary must be identified as a potential obstruction for assessment. However, the FAA requests that Projects file structures within 13 nautical miles (12 nm, plus a 1 nm buffer) to ensure that the FAA's defined boundary is being used. When reviewing applications, the FAA will then confirm that the Project's structures are located outside of their jurisdictions. It is assumed that beyond the FAA jurisdictional boundary, BOEM will work with FAA to promote a cohesive hazard assessment and lighting/marking scheme (see **Section 3 Project Description** for additional information on lighting and marking measures associated with the Project).

Data Relied Upon and Studies Completed

In order to support the assessment of these impacts, the Project commissioned an Obstruction Evaluation and Airspace Analysis through Capitol Airspace Group (**Appendix CC**). The purpose of the Obstruction Evaluation and Airspace Analysis was to identify obstacle clearance surfaces established by the FAA that could limit the placement of wind turbines (with maximum blade tip heights of 951 ft [290 m] AGL). The analysis generated overlays to determine Lease Area proximity to airports, published instrument procedures, enroute airways, FAA minimum vectoring altitude (MVA) and minimum instrument flight rules (IFR), altitude charts, and military airspace and training routes. In addition to this proximity determination, the analysis evaluated all 14 CFR Part 77 imaginary surfaces, published instrument approach and departure procedures, visual flight rules operations (VFR), FAA MVA, minimum IFR altitudes, and enroute operations. In compliment to the Obstruction Evaluation and Airspace Analysis, the Project conducted a due diligence review of radar line of sight relevant to the Lease Area.

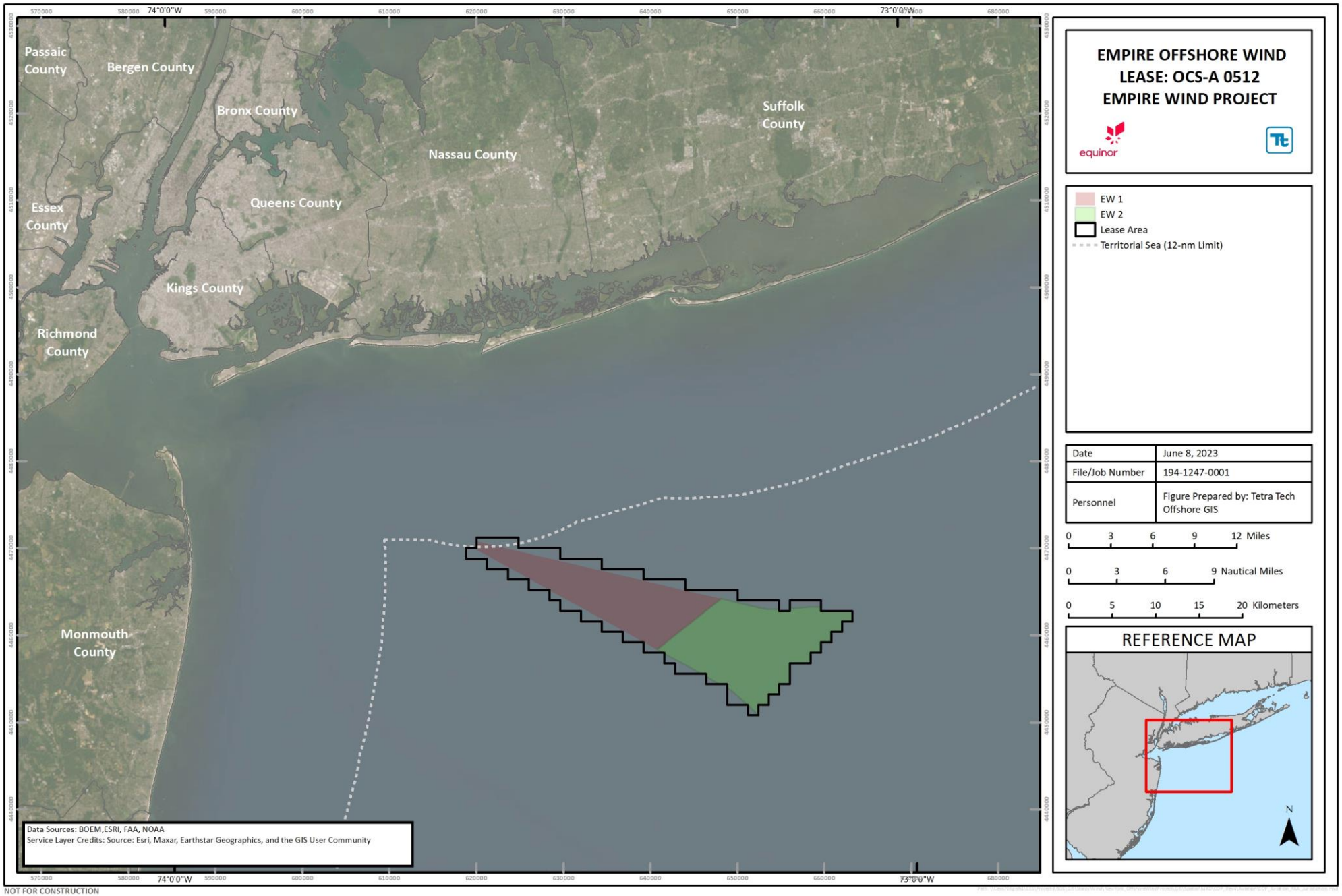

Figure 8.6-1 12-nm FAA Jurisdictional Boundary Line with Lease Area and Wind Farm Development Area

The Project also analyzed air traffic flow data in order to determine the requirements needed to implement an ADLS to control the activation of obstruction lighting (**Appendix BB ADLS Analysis**). For the purpose of this assessment, it is assumed the Lease Area will adopt an ADLS. This analysis utilized historic air traffic data obtained from the FAA (dating from 2018-2019) to determine the total lights-on duration anticipated after implementing an ADLS system. An ADLS utilizes radar surveillance systems to track aircraft transiting in proximity to the wind project, and activates the wind turbine field's obstruction lights when an aircraft flies within the ADLS systems coverage area. This coverage area is a pre-determined, Project-specific vertical and horizontal distance from the edge of the wind farm (referred to as an ADLS three-dimensional volume). In accordance with FAA Advisory Circular 70/7460-1L Change 2[6], lights controlled by an ADLS must be activated and illuminated prior to an aircraft reaching 3 nautical miles from, and 1,000 feet above, any wind turbine. For the purposes of the assessment completed for the Project, a conservative 3.42-nm (6.33-km) horizontal distance from the edge of the Project and a conservative horizontal distance of 2,500 ft (762 m) above the maximum tip height of an 18-MW wind turbine was used.

Once the aircraft has departed this coverage area, the lights are deactivated by the ADLS. This effectively provides nighttime conspicuity on an "as-needed" basis and reduces the amount of time that the obstruction lights will be illuminated (for a complete overview of the Project's lighting and marking scheme, please see **Section 3**). Historical air traffic data indicate that obstruction lights within the Lease Area controlled by an ADLS would have been activated for an average of approximately 30 hours per month over a one-year period (2018-2019). Considering the local sunrise and sunset times, obstruction lights controlled by an ADLS would be activated only 7.5 percent of the time that full-time obstruction lights would be active. It is important to note, the ADLS utilized by Empire will be customized to be Project-specific by the selected ADLS manufacturer once the final wind turbines and layout are determined. The dimensions of the coverage area from the selected ADLS system will be designed to meet the FAA Advisory Circular, but will likely exceed the minimum criteria per industry standard. As a result, the actual total light system activated duration may vary.

8.6.1 Affected Environment

The affected environment is defined as the coastal and offshore areas, inclusive of the Lease Area, and a surrounding 25-nm (46.3-km) buffer that have the potential to be directly or indirectly affected by the construction, operations, and decommissioning of the Project. Permits necessary for the improvement of port and construction/staging facilities will be the responsibility of the owners of these facilities. Empire expects such improvements will broadly support the offshore wind industry and will be governed by applicable environmental standards, which Empire will comply with in using the facilities.

8.6.1.1 Airports

There are a number of public-use, private-use, and military airports and heliports within 25 nm (46.3 km) of the Lease Area (**Figure 8.6-2**), including John F. Kennedy International and Republic. Between these two airports, 35 published instrument approach procedures were identified and assessed (**Appendix CC**). The associated impact assessment (**Appendix CC**) and figure (**Figure 8.6-2**) include any airport that would potentially be affected, including both public airports and any private airports that have special procedures attached to them, within the 25-nm (46.3-km) buffer. There are no anticipated impacts on published instrument departure or approach procedures and therefore these are not discussed further. An evaluation of 14 CFR § 77.19 imaginary surfaces was also completed. These airport surfaces are used to determine if structures in proximity to airports are considered obstructions, even at heights lower than 499 ft (152 m) AGL. It was

[6] FAA Advisory Circular (AC) 70/7460-1L Change 2, August 17, 2018, Chapter 14. Aircraft Detection Lighting Systems, 14.2 General Standards.

determined that no public-use airport imaginary surfaces overlie the Lease Area and therefore these are not discussed further.

In addition to evaluating the potential for affecting IFR operations, an analysis of known VFR operations was completed. This included analyzing local VFR traffic pattern airspace used by pilots entering or leaving the airport environment and the potential for interfering with VFR routes. There are no VFR traffic patterns that overlap with the Lease Area. Further, since there are no recognizable landmarks in proximity to the Lease Area, it is unlikely that the proposed wind turbines would affect regularly used VFR routes. Therefore, these features are not discussed further.

8.6.1.2 Enroute Airways and Minimum Vectoring Altitudes

Enroute airways provide pilots a means of navigation when flying from airport to airport and are defined by radials between Very High Frequency (VHF) omni-directional ranges. The FAA publishes minimum altitudes for airways to ensure clearance from obstacles and terrain. The FAA requires that each airway has a minimum of 1,000 ft (305 m) of obstacle clearance in non-mountainous areas. Proposed structures that exceed enroute airway obstacle clearance surfaces would require an increase to their minimum obstruction clearance altitudes and/or minimum enroute altitudes. These same limitations apply to the MVA and IFR altitudes. The altitudes are published by the FAA and define the MVA and minimum IFR altitude sectors, which provide the lowest altitudes at which air traffic controllers can issue radar vectors to aircraft based on obstacle clearance. The Empire Lease Area is in proximity to multiple low-altitude enroute airways (including V44, V139, V268, and V308) as well as MVA sectors utilized by New York Terminal Radar Approach Control Facilities (TRACON) (**Appendix CC**).

8.6.1.3 Military Airspace and Training Routes

Within the eastern portion of the Lease Area, there is presence of a U.S. Navy Fleet Area Control and Surveillance Facility, airspace warning area, W-106A. It is not FAA policy to evaluate military airspace; however, the Project will continue to engage with the applicable military contacts to assess any potential impacts (**Section 8.9 Department of Defense and OCS National Security Maritime Uses**). **Figure 8.6-3** details the boundaries of the military airspace in relation to the Project Area.

8.6.1.4 Radar

The following 17 radar sites are located in proximity to the Project Area: Gibbsboro ARSR-4, Islip ASR-9, New York ASR-9, Newark ASR-9, Riverhead ARSR-4, White Plains ASR-9, McGuire Air Force Base DASR, Floyd Bennet Field TDWR, Woodbridge TDWR, SeaSonde AMAG, SeaSonde BRAD, SeaSonde HEMP, SeaSonde HOOK, SeaSonde LOVE, SeaSonde MRCH, SeaSonde SEAB, and SeaSonde SPRK (**Figure 8.6-4**). Of these 17 radar sites, four contain weather radar systems: Islip ASR-9 (contains a NEXRAD system in Brookhaven, New York), the Floyd Bennett TDWR, the Woodbridge TDWR, and the McGuire Air Force Base DSAR (contains a NEXRAD system in Fort Dix, New Jersey; NOAA n.d.) and eight are SeaSonde Radars (Colburn et al. 2020). A review of radar line of sight indicates that the proposed wind turbines, at a maximum height of 951 ft (290 m), could be within line of sight (partial or full) of the Islip ASR-9, New York ASR-9, Riverhead ARSR-4, Floyd Bennett TDWR, White Plains ASR-9, and Woodbridge TDWR surveillance radar systems, as well as the eight SeaSonde Radars identified. Empire is continuing discussions with both the FAA and DoD regarding the potential for interference and to determine if there are any operational impacts to these systems.

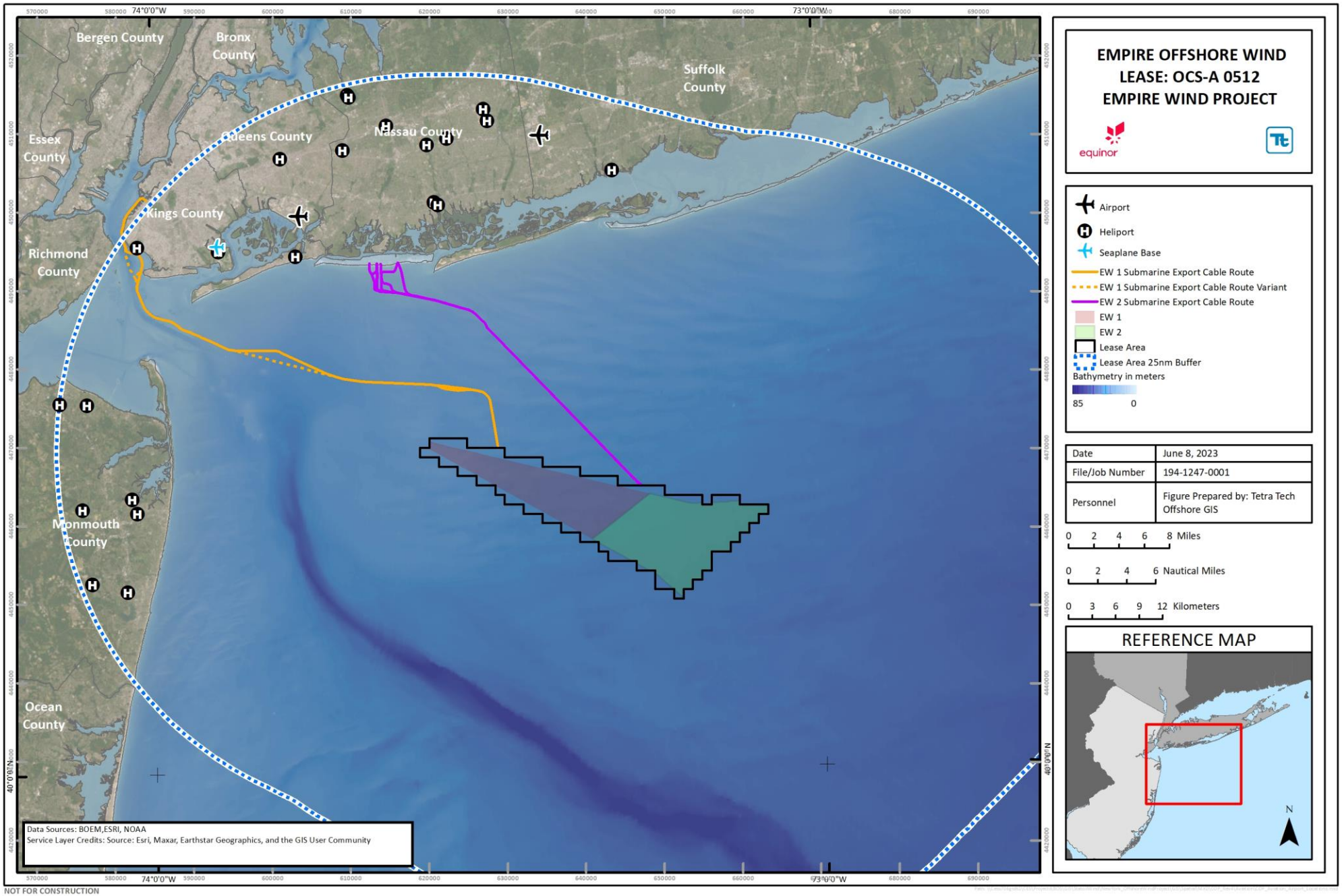

Figure 8.6-2 Airports, Heliports, and Seaplane Bases in proximity (25 nm) to the Project

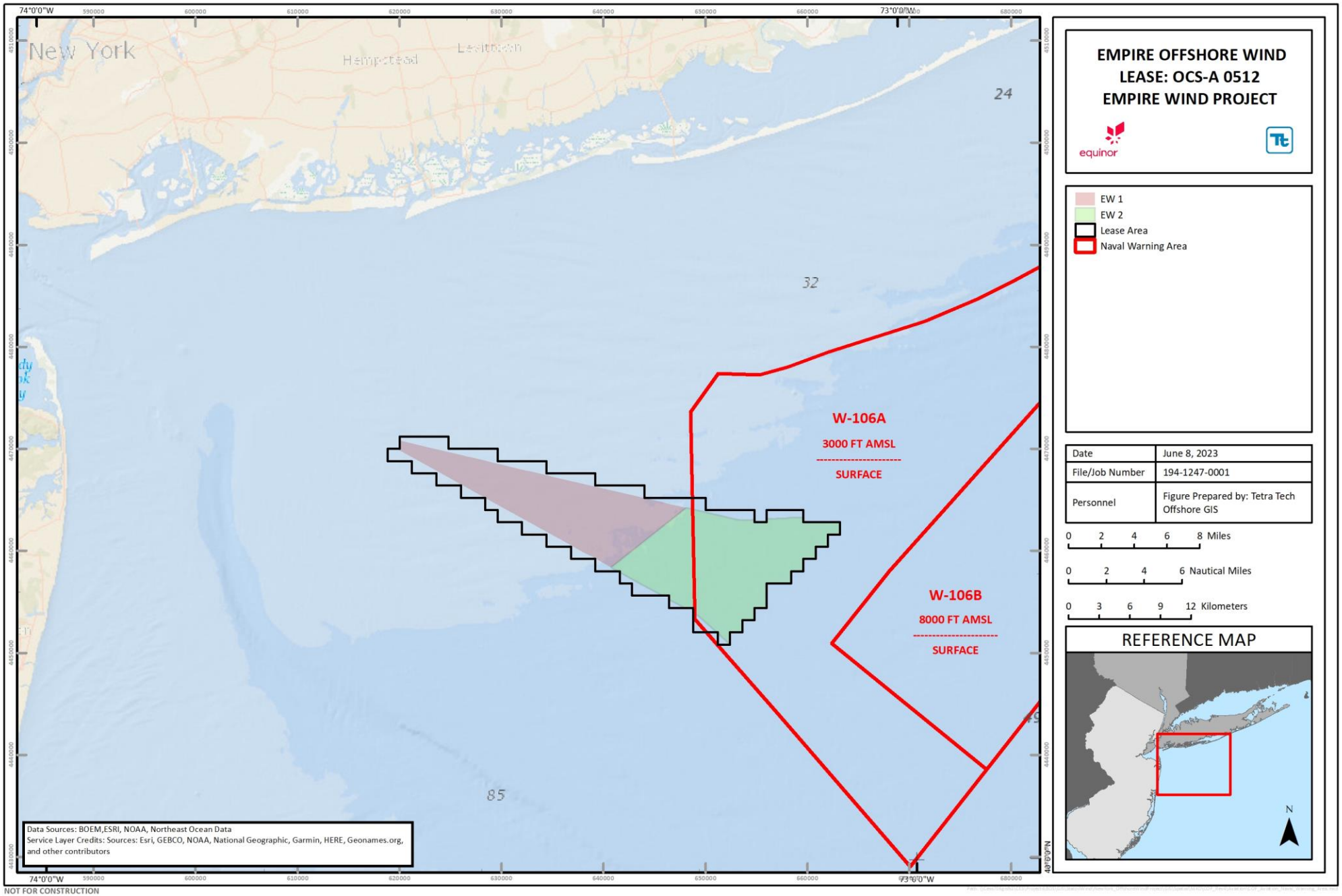

Figure 8.6-3 Military Airspace in the Project Area

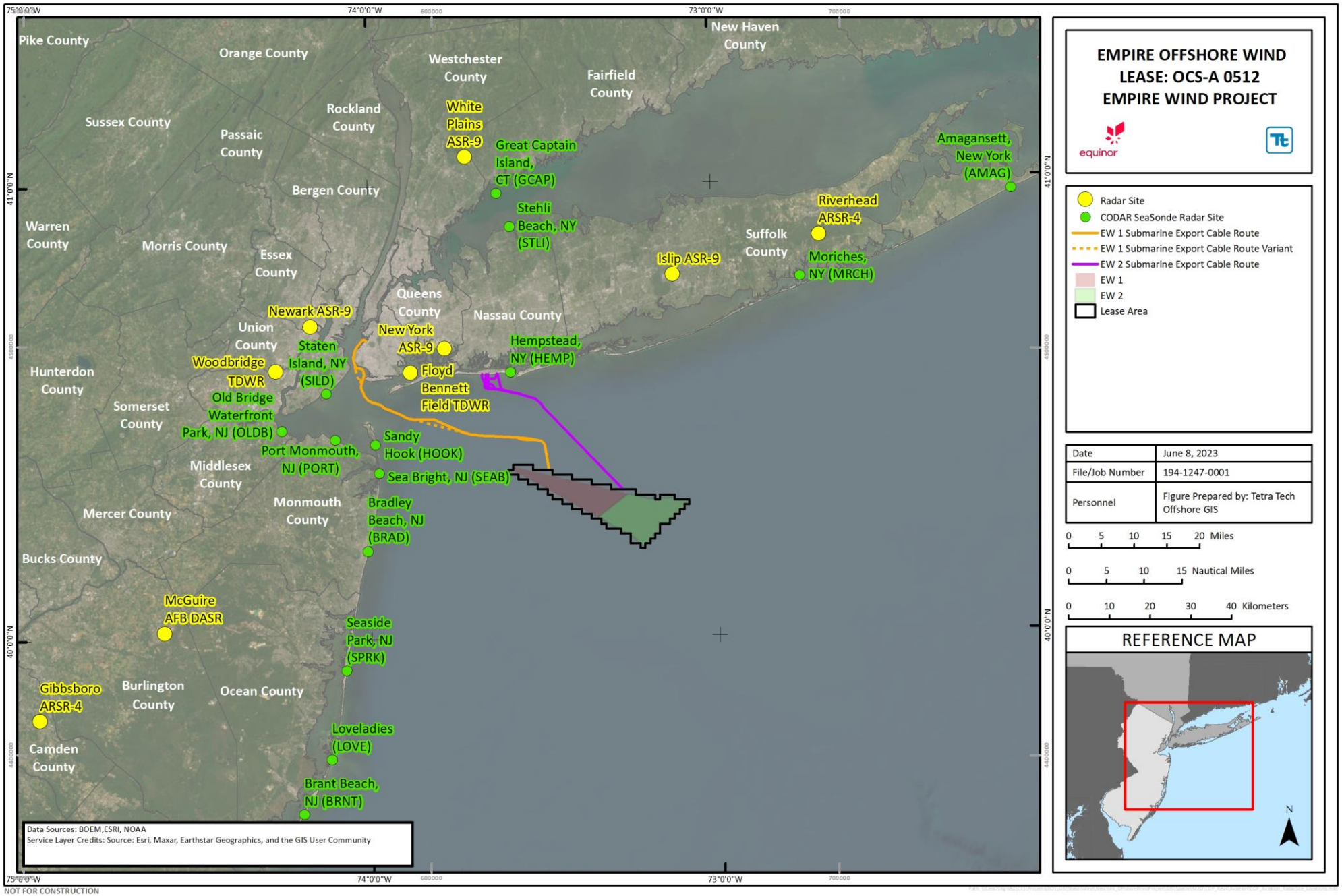

Figure 8.6-4 Radar Sites Located in Proximity to the Lease Area

8.6.2 Impacts Analysis for Construction, Operations, and Decommissioning

The potential impacts resulting from the construction, operations, and decommissioning of the Project are based on the maximum design scenario from the PDE (for a complete description of the construction, operations, and decommissioning activities that Empire anticipates for the Project, see **Section 3**). For airspace and aviation radar, the maximum design scenario is the maximum number of the tallest structures as described in **Table 8.6-1**. The parameters provided in **Table 8.6-1** represent the maximum potential impact from full Lease Area build-out of EW 1 and EW 2 and incorporates a total of up to 149 foundations at any of 176 locations within the Lease Area, at a maximum height of 951 ft (290 m) AGL.

Table 8.6-1 Summary of Maximum Design Scenario Parameters for Aviation and Radar

Parameter	Maximum Design Scenario	Rationale
Construction		
Vessel Height	656 ft (200 m)	Represents the tallest vessel transiting to and from the Lease Area
Operations and Maintenance		
Wind Turbines	Based on full build-out of EW 1 and EW 2 (147 wind turbines). EW 1: 57 wind turbines. EW 2: 90 wind turbines.	Representative of the maximum number of structures for EW 1 and EW 2 and therefore the greatest exposure to aviation
Rotor Height	951 ft (290 m) HAT	Based on the maximum wind turbine rotor height and therefore the greatest exposure to aviation

8.6.2.1 Construction

During construction, the potential impact-producing factors to aviation uses may include:

- Transportation of materials (e.g., foundations) and equipment (e.g., cranes) during construction from onshore staging areas to the Lease Area and between marshalling yards; and
- Use of cranes to install nacelles and wind turbine blades in the Lease Area.

The following impacts may occur as a consequence of the factors identified above:

- Short-term interference with airspace due to the temporary presence of construction equipment and the transport of Project components; and
- Short-term interference with aviation radar due to the temporary presence of construction equipment and the transport of Project components.

Interference with airspace and aviation radar: For port activities, the Project will utilize cranes for assembly and loading/unloading of materials. Activities at staging and construction facilities will be consistent with the established and permitted uses of these facilities, and Empire will comply with applicable permitting standards to limit environmental impacts from Project-related activities. If introduction of new crane(s) is required, heights are not anticipated to exceed existing or historical crane heights, however, additional assessment will be

completed to investigate any potential interference that could take place during the transit of Project components. The Project has also considered impacts as a result of the transport of large materials (e.g., wind turbine components) from staging areas to the Lease Area and the presence of large construction equipment (e.g., cranes and barges) offshore. Transiting vessels will not exceed 200 ft (61 m) and therefore should not require coordination with the FAA. Equipment utilized for offshore construction within the Lease Area will not surpass the assessed height of the wind turbines.

8.6.2.2 Operations and Maintenance

During operations, the potential impact-producing factors to aviation uses may include:

- The presence of fixed structures, for example wind turbines (i.e., fixed structures greater than 499 ft [152 m] above sea level).

The following impacts may occur as a consequence of the factors identified above:

- Long-term interference with regulated airspace; and
- Long-term interference with aviation radar systems.

Interference with regulated airspace. At 951 ft (290 m) AGL, wind turbines proposed in the western section of the study area (nearshore area, **Figure 8.6-5** and **Figure 8.6-6**) would exceed the MVA obstacle clearance surfaces and may require an increase to minimum vectoring altitudes, pending review and decision by FAA and BOEM. As shown in **Figure 8.6-5** and **Figure 8.6-6**, the sector MVA (shown in pink numbers) for the TRACON Fusion 3 and TRACON Fusion 5 sectors around the Lease Area are 1,500 ft (457 m) above mean sea level (AMSL) and 1,800 ft (549 m) AMSL, respectively. Additionally, each of these sectors are shown with a corresponding buffer area (yellow, hatched extension) of 3 nm (5.6 km) for TRACON Fusion 3 and 5 nm (9.3 km) for TRACON Fusion 5, as prescribed by the FAA. With a maximum design scenario of a 951 ft (290 m) wind turbine, the vertical distance between the wind turbine and the MVAs of TRACON Fusion 3 and 5 would be 549 ft (167 m) and 849 ft (258 m), respectively. In addition to the long-term presense of the Project's fixed structures, there is also the potential for short-term impacts to regulated airspace due to the use of cranes to repair or replace wind turbine compoenents within the Lease Area.

Interference with radar systems. Preliminary review of radar line of sight results indicates that at 951 ft (290 m) AGL, the wind turbine structures, and their associated motions, could be within line of sight (partial or full) of the following surveillance radar systems: Islip ASR-9, New York ASR-9, Riverhead ARSR-4, Floyd Bennett TDWR, White Plains ASR-9, and Woodbridge TDWR. In addition, the following high frequency weather radars could be within line of sight (partial or full), SeaSonde AMAG, SeaSonde BRAD, SeaSonde HEMP, SeaSonde HOOK, SeaSonde LOVE, SeaSonde MRCH, SeaSonde SEAB, and SeaSonde SPRK. Wind turbine structures that are visible to radar sites within proximity to the Lease Area have the potential to affect radar performance.

Primary consultation through the DoD Clearinghouse has identified potential impacts to two radar systems as a result of the full build-out of the Project. On July 29, 2020, Empire received a request from the DoD Clearinghouse to enter into a partnership to initiate mitigation discussion for potential impacts resulting from the construction and installation of the Project. Empire intends to enter into this partnership, responding with a confirmation letter on August 19, 2020. Empire met with the DoD in November 2021 and discussions are ongoing to finalize the mitigation agreement.

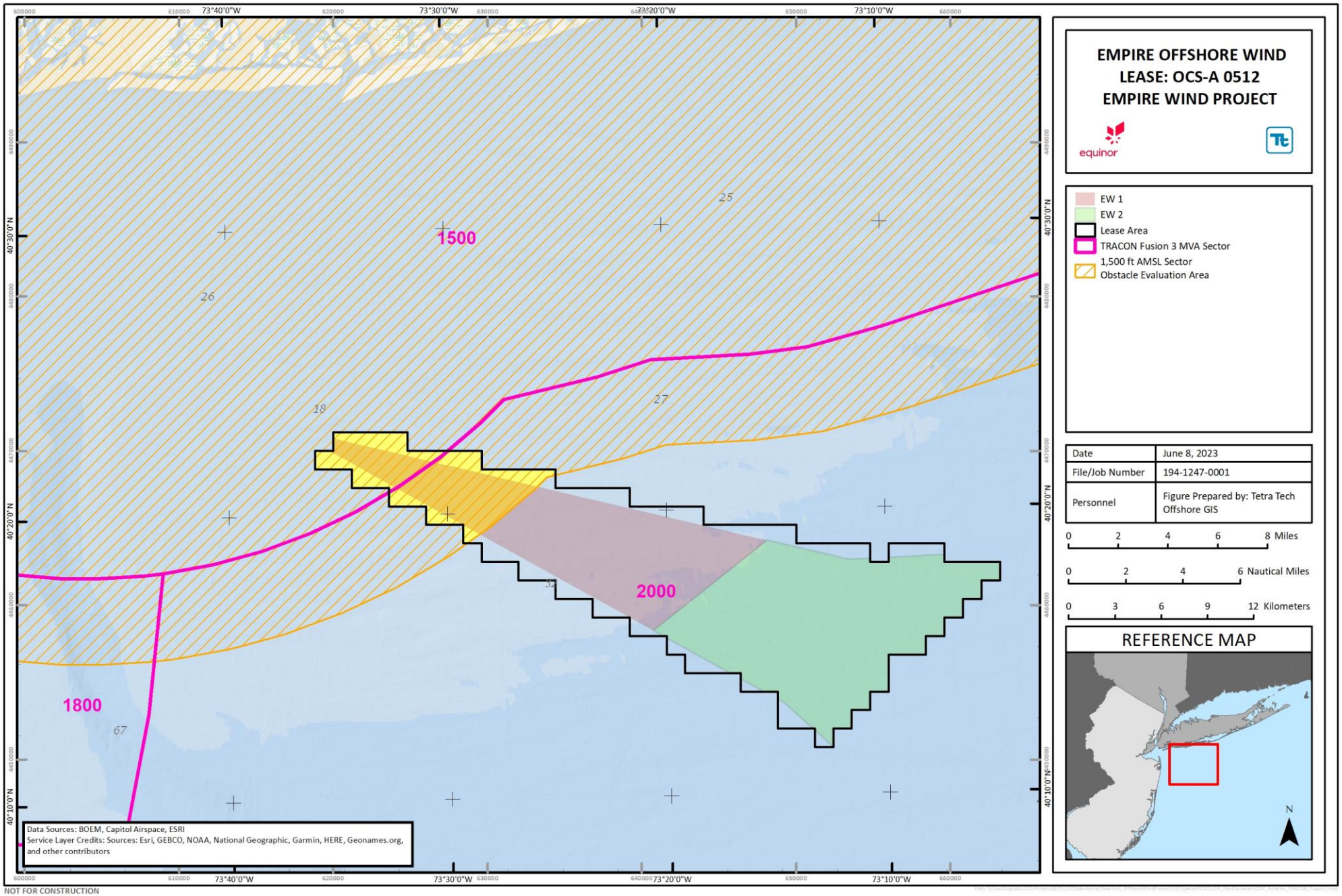

Figure 8.6-5 New York (N90) TRACON FUSION 3 MVA sectors

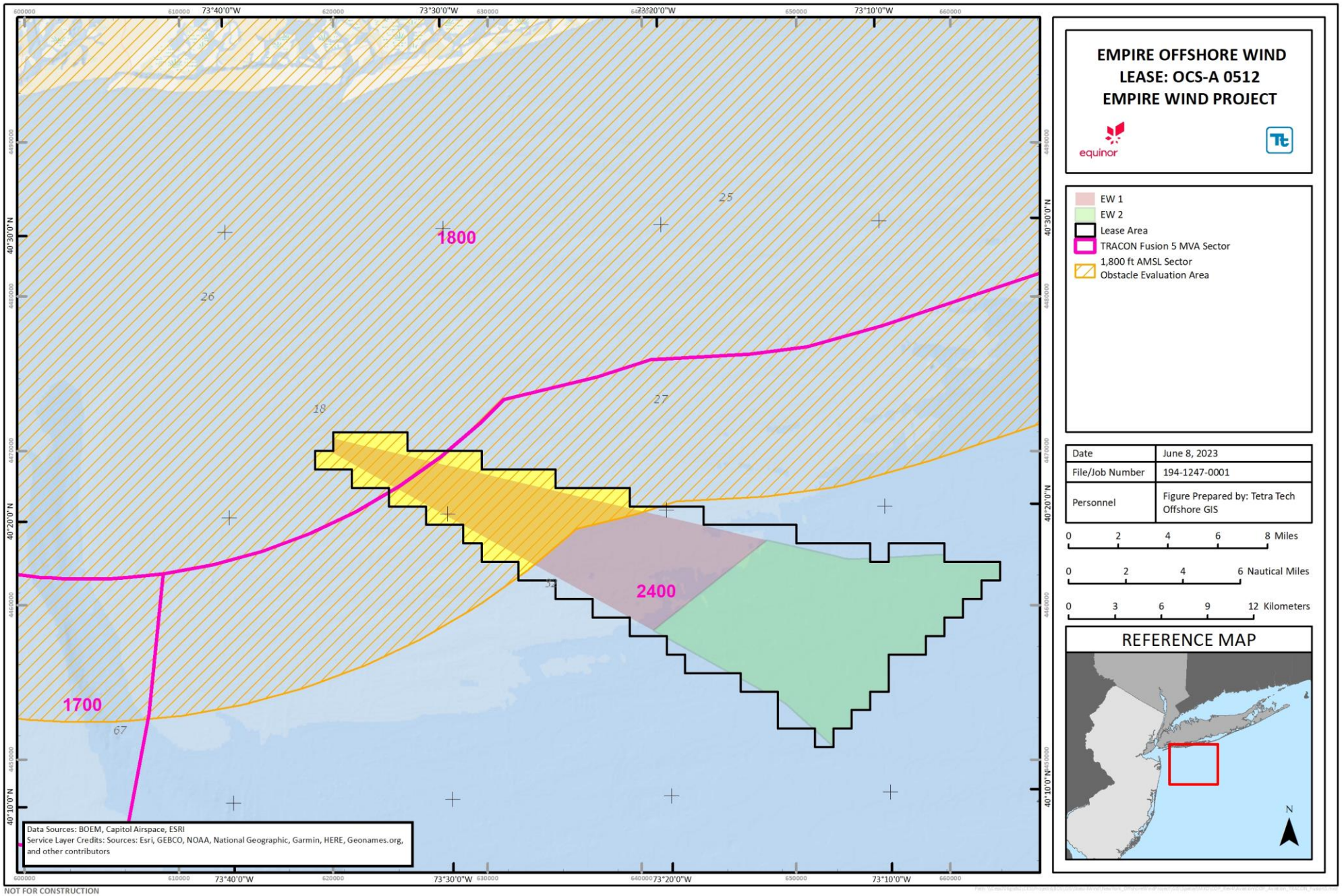

Figure 8.6-6 New York (N90) TRACON FUSION 5 MVA sectors

Empire has also initiated primary coordination with NOAA to discuss Project-specific impacts to high-frequency weather and current radar systems as a result of the full build-out of the Project. Discussions regarding mitigation were initiated in September 2021 and are ongoing.

8.6.2.3 Decommissioning

Impacts during decommissioning are expected to be similar or less than those experienced during construction, as described in Section 8.6.2.1. 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 additional information on the decommissioning activities that Empire anticipates for the Project, please see **Section 3**.

8.6.3 Summary of Avoidance, Minimization, and Mitigation Measures

In order to mitigate the potential impact-producing factors described in Section 8.6.2, Empire is proposing to implement the following avoidance, minimization, and mitigation measures.

8.6.3.1 Construction

During construction, Empire will commit to the following avoidance, minimization, and mitigation measures to mitigate the impacts described in Section 8.6.2.1:

- Continue consultation with DoD Clearinghouse, including the engagement of a formal Mitigation Agreement process to offset identified impacts to radar systems. On July 29, 2020, Empire received a request from the DoD Clearinghouse to enter into a partnership to initiate mitigation discussion for potential impacts resulting from the construction and installation of the Project. Empire intends to enter into this partnership, responding with a confirmation letter on August 19, 2020;
- Coordination with NOAA to minimize, and/or mitigate potential impacts to high frequency weather and current radar systems;
- Direct communication with applicable agencies and personnel to alert the appropriate parties to planned construction movements and actions; and
- All wind turbines and construction equipment will be properly lit and marked in accordance with FAA's Advisory Circular number 70/7460-1L within FAA jurisdiction and beyond, or other methods as deemed required during consultation and as applicable (see **Section 3** for additional information on proposed marking and lighting measures).

8.6.3.2 Operations and Maintenance

During operations, Empire will commit to the following avoidance, minimization, and mitigation measures to mitigate the impacts described in Section 8.6.2.2:

- Regular communications and updates with key aviation stakeholders, including the DoD Clearinghouse, on wind turbine locations. On July 29, 2020, Empire received a request from the DoD Clearinghouse to entire a partnership to initiate mitigation discussion for potential impacts resulting from the construction and installation of the Project. Empire intends to enter into this partnership, responding with a confirmation letter on August 19, 2020; and
- All wind turbines will be properly lit and marked in accordance with FAA's Advisory Circular number 70/7460-1L within FAA jurisdiction and beyond, or other methods as deemed required during

consultation and as applicable (see **Section 3** for additional information on proposed marking and lighting measures)[7].

8.6.3.3 Decommissioning

Avoidance, minimization, and mitigation measures proposed to be implemented during decommissioning are expected to be similar to those implemented during construction and operations, as described in Section 8.6.3.1 and Section 8.6.3.2. A full decommissioning plan will be approved by BOEM prior to any decommissioning activities, and avoidance, minimization, and mitigation measures for decommissioning activities will be proposed at that time.

8.6.4 References

Table 8.6-2 Summary of Data Sources

Source	Includes	Available at	Metadata Link
BOEM	Lease Area	https://www.boem.gov/BOEM-Renewable-Energy-Geodatabase.zip	N/A
BOEM	State Territorial Waters Boundary	https://www.boem.gov/Oil-and-Gas-Energy-Program/Mapping-and-Data/ATL_SLA(3).aspx	http://metadata.boem.gov/geospatial/OCS_SubmergedLandsActBoundary_Atlantic_NAD83.xml
NOAA	Territorial Sea (12-nm Limit)	http://maritimeboundaries.noaa.gov/downloads/USMaritimeLimitsAndBoundariesSHP.zip	https://inport.nmfs.noaa.gov/inport-metadata/NOAA/NOS/OCS/inport/xml/39963.xml
NOAA NCEI	Bathymetry	https://www.ngdc.noaa.gov/mgg/coastal/crm.html	N/A
Northeast Ocean Data	Naval Warning Area	http://www.northeastoceandata.org/files/metadata/Themes/NationalSecurity.zip	http://northeastoceandata.org/files/metadata/Themes/Security/NEWarningAreas.pdf

Colburn R., C. Randolph, C. Drummond, M. Miles, F. Brody, C. McGillen, A. Krieger, R. Jankowski. 2020, August. *Radar Interference Analysis for Renewable Energy Facilities on the Atlantic Outer Continental Shelf.* U.S. Department of the Interior, Bureau of Ocean Energy Management. McLean, VA. OCS Study BOEM 2020-039. 189 p. Available online at: https://www.boem.gov/sites/default/files/documents/environment/Radar-Interferance-Atlantic-Offshore-Wind_0.pdf. Accessed March 8, 2021.

NOAA (National Oceanic and Atmospheric Administration). No Date. "NEXRAD Doc Network Sites". *NOAA Radar Operations Center NEXRAD WSR-88D.* Available online at: https://www.roc.noaa.gov/wsr88d/Program/NetworkSites.aspx. Accessed September 1, 2020.

[7] As a part of the lighting and marking scheme, Empire proposes to include an ADLS to turn the aviation obstruction lights on and off in response to detection of nearby aircraft, pending commercial availability, technical feasibility and agency review and approval.

8.7 Marine Transportation and Navigation

This section discusses marine transportation and navigation within and surrounding the Project Area. Potential impacts resulting from construction, operations, and decommissioning of the Project are discussed. Proposed Project-specific mitigation measures adopted by Empire as a result of outreach and engagement are also described, which are intended to avoid, minimize, and/or mitigate potential impacts to marine transportation and navigation.

Other resources and assessments detailed within this COP that are related to marine transportation and navigation include:

- Recreation and Tourism (Section 8.3);
- Commercial and Recreational Fishing (Section 8.8);
- Department of Defense and OCS National Security Maritime Uses (Section 8.9);
- Other Marine Uses (Section 8.11); and
- Navigation Safety Risk Assessment (Appendix DD).

The Ports and Waterways Safety Act acknowledges that navigation and vessel safety and protection of the marine environment are matters of national importance. The Ports and Waterways Safety Act requires the USCG to conduct studies to provide safe access routes for vessel traffic in the waters under the jurisdiction of the United States. In addition, the USCG must take into account all possible uses of the waterways to reconcile the need for safe access routes with the needs of all other uses of the waterways.

The USCG serves as a cooperating agency in the BOEM review process by providing recommendations as the subject matter expert for safety, maritime security, maritime mobility (management of maritime traffic, commerce, and navigation), national defense, and protection of the marine environment. Guidance is provided by the USCG for offshore wind farms in the form of a Navigation and Inspection Circular (NVIC). This guidance includes a recommendation for the development of a Navigation Safety Risk Assessment (NSRA), a key study used by the USCG to make their recommendation to BOEM. The NSRA complies with the requirements set out in the NVIC 01-19 (USCG 2019a). A checklist is contained in Attachment B of the NSRA to show how each element of the NVIC has been addressed, or a description as to how/where addressed if outside of the NSRA. The NVIC provides guidance on information and factors the USCG will consider when reviewing an application for a permit to build and operate an Offshore Renewable Energy Installation in United States navigable waters.

In 2011, the USCG began a Port Access Route Study for the entire Atlantic Coast in order to develop reasonable routing measures (where required) to provide for the safe transit of vessels near offshore wind energy developments (see Section 8.7.1). The Atlantic Coast Port Access Route Study (ACPARS) work group was tasked with identifying historical transit routes, by vessel class, focusing on transits occurring in the north-south/south-north direction along the Atlantic Coast. The final ACPARS was published on March 14, 2016 (USCG 2016a) and included responses to comments from maritime stakeholders who were seeking more clarity about guidance for setback distances for wind turbines from a TSS. The ACPARS report stressed that a particular setback distance, for any given wind farm, would be determined by the unique circumstances of the project that would be developed on a case-by-case basis. The ACPARS study included the Marine Planning Guidelines, which were provided to assist offshore developers and marine planners with their evaluation of the navigational impacts of any projects with multiple permanent fixed structures. It notes that the "guidelines are not regulatory" and do not impact the boundaries of any existing leases for site characterization and site assessment activities, but do inform suitability of siting structures within a lease area. These guidelines were

considered within the preliminary assessment undertaken and Empire consulted with the USCG prior to the NSRA with regards to an appropriate and safe setback distance.

As part of this effort, the USCG investigated the development of a network of shipping safety fairways along the Atlantic Coast. The definition used for a fairway (as per 33 CFR § 166.105) is as follows: "a lane or corridor in which no artificial island or fixed structure, whether temporary or permanent, will be permitted". The USCG published an advanced notice of proposed rulemaking on June 19, 2020 for Atlantic Coast Shipping Safety Fairways that were identified in the ACPARS final report (USCG 2016a). These proposed routing measures run in a mostly north–south direction that corresponds with vessel traffic along the Atlantic Coast.

The USCG released the NNYBPARS Final Report (USCG 2021) in December 2021. The key output of the study was proposals to revise/establish fairways and the Ambrose anchorages within the NNYBPARS study area. It is noted that the fairway amendments include a proposal to amalgamate the separate Nantucket/Ambrose Fairways into a single fairway (see Appendix DD).

Subsequent to the publication of the final ACPARS report in 2016, a Commandant Instruction (COMDTINST 16003.2A) was published as a policy document to provide further guidance for marine planning, including a discussion about recommended navigational safe distances (USCG 2016b). USCG Marine Planning Guidelines are based on the United Kingdom Maritime Guidance Note (MGN) 371, which suggest a 2-nm (3.5-km) buffer from a TSS and a 5-nm (9.3-km) buffer at the entry and exit of the TSS where vessels are converging and diverging from multiple directions (UKMCA 2008). Since then the United Kingdom MGN Guidance has been updated to MGN 543, following experiences from siting offshore wind farms in proximity to European TSSs (UKMCA 2016). MGN 543 no longer references a specific distance between a shipping route and the parallel boundary (or exit) of a TSS. Instead, it states that risk associated with buffers of between 0.5 nm and 3.5 nm (0.9 km and 6.4 km) can be tolerable if as low as reasonably practicable (ALARP). These general planning guidelines are based on generic deep draft vessel maneuvering characteristics and are consistent with existing European guidelines. They account for the minimum distances for larger vessels to maneuver in emergency situations. In practice, European wind farm buffer distances are less than 2 nm (3.7 km) with mitigations in place. Some wind farms have buffer distances of 0.3 nm (0.5 km) with the average approximately 1 nm (1.8 km). Assessments of buffer distances require case-by-case analysis and the application of appropriate mitigations to reduce risk to ALARP. The International Maritime Organization's (IMO's) General Provisions on Ships Routing (Resolution A.572(14)) as amended was also considered and it was found that the existing routing measures already incorporate these provisions.

Also, it should be noted that an updated COMDINST 16003.2B (USCG 2019b) was published on June 28, 2019, describing how various studies, such as port access route studies and NSRAs, are used by the USCG for decision making about Marine Transportation System issues.

Data Relied Upon and Studies Completed

To satisfy the information requirements of 30 CFR § 585.627(a)(8), Empire contracted Anatec Limited to prepare a NSRA in support of the COP[8]. BOEM relies on the USCG to review the NSRA and advise BOEM on its adequacy and the adequacy of any proposed navigational safety mitigation measures. Anatec Limited has successfully completed a number of navigation risk assessments for both offshore wind and oil and gas projects in Europe and around the world. A full description of the methodology, information gathered and processed, and results of the analysis are presented in greater detail within the NSRA (**Appendix DD Navigation Safety**

[8] The NSRA modeled up to 176 wind turbines and 2 offshore substations, given that the proposed 147 wind turbines is fewer than assumed in the modeling, the current enveloped is considered as being within the worst case parameters assessed.

Risk Assessment). The results of the NSRA were used to supplement this section. The NSRA was prepared in accordance with:

- BOEM's Guidelines for a Renewable Energy Construction and Operations Plan (BOEM 2020); and
- USCG Navigation and Vessel Inspection Circular No. 01-19, Guidance on Coast Guard's Roles and Responsibilities for Offshore Renewable Energy Installations (OREI) (USCG 2019a).[9]

The NSRA also considered the following guidance documents:

- Atlantic Coast Port Access Route Study Final Report (USCG 2016a);
- Commandant Instruction (COMDTINST) 16003.2A (USCG 2016b); and
- MGN 543 (Merchant and Fishing) Safety of Navigation: Offshore Renewable Energy Installations (OREIs)-Guidance on UK Navigational Practice, Safety and Emergency Responses (UKMCA 2016).

The USCG will review the NSRA to evaluate the following:

- The impact the project will have on other marine users; and
- The potential for it to interfere with vessels, aircraft, or other authorized users of the air space and the sea surface, water column, or sea bottom (for example, fisheries).

The key features of the NSRA include:

- An assessment of visual navigation and collision avoidance;
- Impacts on communications systems, radars, and positioning systems;
- Waterway characteristics such as weather, tides, currents, and ice;
- Vessel traffic survey of 12 months of traffic data;
- Risk of collision, allision, and grounding;
- Safe clearance of wind turbine rotors for identified vessel types;
- Assessment of safe navigation within the wind farm;
- Impact on USCG missions;
- Analysis of marine environmental response incidents in the Lease Area;
- Analysis of dredging activities in the area that may be affected; and
- Risk mitigation strategies.

A complete list of the data used for the Project's assessment of marine transportation and navigation includes:

- Vessel traffic data:
  - AIS data recorded via satellite receivers between August 2017 and July 2018;
  - AIS data recorded via coastal receivers between August 2017 and July 2018;
  - Visual observation and AIS data recorded from the survey vessel Ocean Researcher during 2018; and
  - Northeast Ocean Data Portal and MARCO Data Portal Recreational Boater Density Survey data (2012 and 2013) (MARCO 2013);

[9] NVIC 01-19 requires the developer to undertake an NSRA which includes "*a change analysis whereby potential impacts of the structure can be compared and considered to the baseline situation*." No defined methodology is provided; therefore, in order to undertake a risk-based decision-making process, the NSRA considers the IMO's Formal Safety Assessment (2018) as its risk assessment process.

- Fishing specific data:
  - Vessel Monitoring System (VMS) Transit Counts recorded during 2017 – Northeast Ocean Data Portal (Northeast Ocean Data 2017); and
  - VMS Transit data provided by NOAA Fisheries following the transit workshop held by the Responsible Offshore Development Alliance (RODA), NYSERDA, and NYSDEC during March 2019;
- Maritime incident data:
  - USCG Marine Information for Safety and Law Enforcement database (2008 to 2017) (USCG 2018); and
  - Marine Accident Investigation Branch collision and allision incident data (1995 to 2014)[10] (National Transportation Safety Board 2019);
- Navigational features:
  - NOAA Nautical Charts 12300, 12326, 12327, 12402, and 13003 (accessed February 2018);
  - United Kingdom Hydrographic Office (UKHO) Admiralty Charts 3204 and 2860 (UKHO 2016);
  - United States Coast Pilot 2 – 47th Edition (NOAA 2018a);
  - UKHO Pilot NP68 (UKHO 2016);
  - Multipurpose Marine Cadastre U.S. Navy Military Operating Area Boundaries: Atlantic/Gulf of Mexico (Marine Cadastre 2017); and
  - Multipurpose Marine Cadastre U.S. Navy Military Submarine Transit Lanes: Atlantic/Gulf of Mexico (Marine Cadastre 2018); and
- Meteorological and Oceanographic (Metocean) data:
  - Appendix I Metocean Design Basis;
  - Wave height data collected from Ocean Data Acquisition Systems Buoy 44025 (NOAA 2018b); and
  - Tidal stream data taken from UKHO chart 3204 (UKHO 2016).

Additionally, Empire has evaluated the potential impacts to marine transportation and navigation associated with transporting Project components within the New York region, inclusive of the Hudson River. This activity has been discussed with stakeholders including USCG and the Hudson River Safety Navigation and Operations Committee. Additional detail regarding potential construction logistics to/from New York ports is provided in an addendum to the NSRA and will continue to be communicated to USCG and BOEM as available.

8.7.1 Affected Environment

The affected environment is defined as the coastal and offshore areas where marine transportation and navigation activities are known to occur and have the potential to be directly or indirectly affected by the construction, operations, and decommissioning of the Project. Permits necessary for the improvement of port and construction/staging facilities will be the responsibility of the owners of these facilities. Empire expects such improvements will broadly support the offshore wind industry and will be governed by applicable environmental standards, which Empire will comply with in using the facilities.

In an effort to fully capture the affected environment, the Project engaged with a number of stakeholders during the development phase to identify potential impacts related to the Project (see the outreach table provided in

[10] Historical incident data provided by the Marine Accident Investigation Branch under the Freedom of Information Act. This data was used by Anatec Limited (in the NSRA) for the purpose of comprehensive calibration of the CollRisk allision and collision models and has therefore not been presented directly within this NSRA.

Appendix B Summary of Agency Engagement for a summary of coordination efforts with the USCG and additional information provided in **Appendix DD** regarding coordination efforts with other stakeholders).

8.7.1.1 Baseline Characterization

The New York Bight is one of the busiest areas for commercial vessel traffic on the Eastern Seaboard with a large number of vessels transiting through these waters to and from the Port of New York and New Jersey. In addition, there are a number of commercial and recreational fishing vessels that transit and fish in the waters in and near the Lease Area. The coastal New York Bight waters are also a favorite area for other recreational uses such as sailing races, surfing, diving, sightseeing, and cruising. As these shared uses have grown over many years, regulations and routing measures have been put in place to mitigate the risks of collisions and other marine casualties that are elevated by the variety and volume of vessel traffic in the area. The IMO, in cooperation with the USCG and NOAA, has the responsibility for approving new or amended routing measures in the ports of all signatory nations. The approaches to the Port of New York and Port of New Jersey have a routing measure made up of three TSSs to help control vessel traffic routing and to provide a separation between vessels on opposite headings and to manage traffic crossing the TSS lanes. The Lease Area is located between two of these TSSs, the Nantucket/Ambrose TSS and the Hudson Canyon/Ambrose TSS.

In addition to the data sources described below and a summary of each resource, Empire has collected supplemental data by tracking and recording vessel activity observed from project survey vessels working in the Lease Area. This has been achieved through visual observations and radar detections offshore during survey activities within the Lease Area and submarine export cable routes from March to December 2018. This supplemental dataset is useful in ground-truthing AIS data and collecting additional data for vessels that may turn off their AIS tracking system or are not required to install and transmit AIS (for example vessels under 65 ft [20 m]). Noting consultation feedback that not all vessels carry AIS and therefore AIS may underrepresent maritime traffic conditions, the frequency of "observed but not carrying/transmitting AIS" versus "observed and transmitting AIS" can be used to apply an upscale factor.

Additionally, historical (2-year-old) AIS data was obtained from the USCG through a Freedom of Information Act request. The USCG maintains an extensive network of AIS monitoring stations nationwide and captures and stores approximately 1.6 terabytes of AIS data per day. These data are generally considered the best available; however, the USCG does not provide the vessel name, the IMO number, or the Maritime Mobile Service Identity number, making it impossible to analyze vessel tracks for specific vessels. However, the Project's other sources of AIS data do contain these data fields.

The process of siting offshore energy projects in the Northeast has benefitted significantly from regional ocean planning initiatives including the Northeast Regional Ocean Council, MARCO, and the Regional Planning Bodies that were established in 2010 under Executive Order 13547 (EO 13547, July 2010). As a result of these initiatives, data portals were developed, ocean use data were acquired, and these resources have been increasingly used to characterize ocean uses for initial siting investigations. Furthermore, the Northeast Ocean Plan and the Mid-Atlantic Regional Ocean Action Plan, certified by the National Ocean Council in December 2016, contain a wealth of information about the shared use of the waterway near the Lease Area.

Commercial fishing vessels engaged in federal fisheries are required to install and operate a VMS that provides information about where the vessel is fishing and what species the vessel is fishing for along with vessel location on at least an hourly basis. Obtaining detailed VMS data from NOAA Fisheries has proven to be difficult due to the fact that NOAA Fisheries has agreed to not reveal "individual business practices" for specific vessels. Aggregate data that show fishing effort in specific areas is generally available through NOAA Fisheries. Another source of commercial fishing data comes from vessel trip reports that are submitted to NOAA Fisheries. These

data are subject to data entry errors and do not pinpoint the areas where fishing effort has been expended; however, they often are the best data available. To supplement AIS and VMS data for commercial fishing vessels, Empire has also referenced alternative data sources, for example fishing vessel transit data supplied by the commercial fishing industry as part of the New York State sponsored Fisheries Transit Workshop in Port Jefferson, New York. Empire has also collected, processed, and analyzed commercial fishing vessel AIS for vessels in fishing operations to better understand tow lengths, tow speeds, tow directions, and widths of multiple tows for use in understanding potential impacts and layout planning to reduce the impacts, as described in more detail in **Section 8.8 Commercial and Recreational Fishing**.

The primary source of commercial vessel traffic data is the AIS, which is required for most commercial vessels. AIS data received from vessels in the Lease Area is considered to be good, even though parts of the Lease Area are beyond 25 nm (46.3 km) from the shore. AIS data segregated by vessel type reveal different degrees of fidelity to the TSS entering and exiting the Port of New York and the Port of New Jersey. According to 2013 AIS data, tankers and cargo vessels honor the TSS lanes in large measure although there are vessel tracks across the Lease Area. Tug and barge vessels crossing New York Bight appear to disregard the TSS zones for the sake of minimizing the mileage of a transit from New Jersey to Long Island. The data for fishing vessels is inconclusive as it appears that many of the vessels may turn off their AIS tracking system.

Recreational vessel activity in the Lease Area can be found on the Northeast Data Portal (2017) and MARCO Data Portal (2013). The Northeast Data Portal shows areas for whale watching, diving, and coastal recreation areas. These recreational traffic data were obtained through the voluntary submission of activities through surveys conducted by SeaPlan and the Northeast Regional Ocean Council. Although there are areas where no activity is indicated, that does not mean that recreational vessels do not use these areas, but rather that there may be a lighter use in these areas. The MARCO Data Portal provides recreational use data for the coastal shores of New Jersey and Long Island. Of particular interest are the recreational fishing areas that were identified during a New York MARCO workshop.

A complete list of the data resources utilized by the Project to assess marine transportation and navigation within the Project Area are described in the Data Relied Upon and Studies Completed subsection.

Commercial Shipping Navigation

The Lease Area is located between the Nantucket/Ambrose and Hudson Canyon/Ambrose TSS lanes, two of the three TSS lanes guiding large vessel traffic into the Port of New York and the Port of New Jersey area. The third TSS lane located in proximity to the Project Area, Barnegat/Ambrose, runs north-south off the coast of New Jersey (see **Figure 8.7-1**). TSSs are internationally recognized through the IMO and are designed to reduce the risk of collision in high vessel traffic areas; regulations do not allow for fixed structures to be permitted within these lanes. TSSs are designed to be used by large commercial vessels to provide safe transit in and out of port areas. Transit and maneuvering rules for vessels within a TSS can be found in 33 CFR § 83.10 (COLREGs Rule 10). TSSs consist of an inbound lane, outbound lane, and separation zone located between the two lanes. The presence of inbound and outbound lanes indicates the direction of vessel traffic within the TSS. Adjacent to the Lease Area, the TSS lanes range in width from 1.8 to 5 nm (3.3 to 9.3 km).

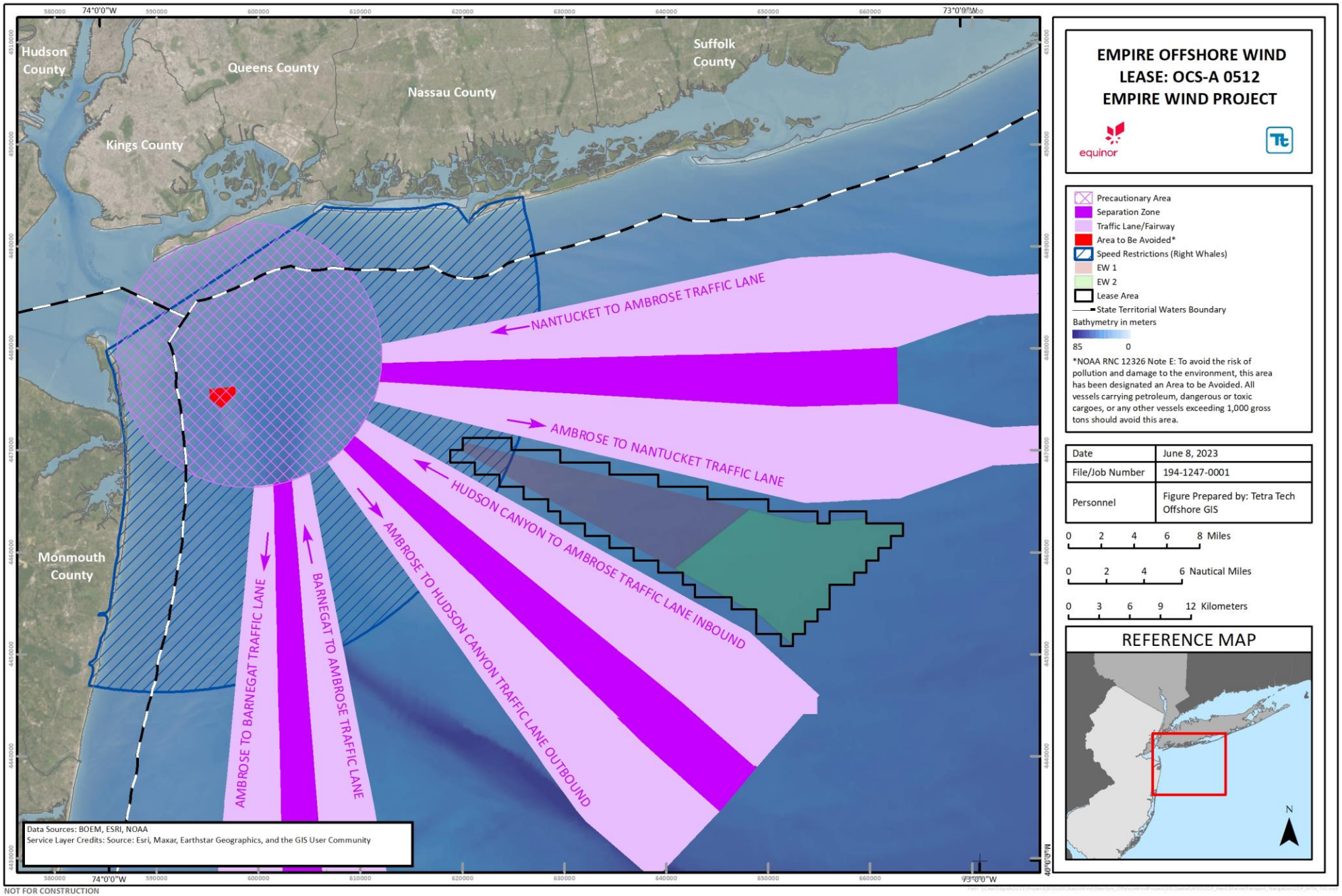

Figure 8.7-1 Commercial Shipping Navigation within the Study Area

The TSS lanes converge into a centralized precautionary area at the entry of the Port of New York and New Jersey area, the largest seaport on the East Coast and the third largest seaport in the United States. In 2018, the ports handled 4,095,454 cargo containers with an overall estimated value of over $200 billion (PANYNJ 2019). Following outreach and engagement efforts, maritime users requested an assessment be done to quantify the number of vessels utilizing the TSS lanes (**Appendix DD**). In response, commercial shipping data within the region was assessed using AIS data. As detailed in the NSRA (**Appendix DD**), the majority of commercial (cargo or tanker) vessels utilize these TSS lanes. By contrast, commercial tug vessels, which are covered in the next section, prefer a more coastal route. Between August 2017 and July 2018 (AIS survey period), cargo vessels accounted for about 34 percent of traffic within the Study Area and about 16 percent of traffic within the Lease Area. Throughout the AIS Survey Period, an average of 18 unique cargo vessels per day were recorded in the Study Area and one every 11 days within the Lease Area. See **Figure 8.7-2** for an overview of the study areas identified for the purpose of the NSRA assessment. The Study Area encompasses a buffer of 15 nm (27.8 km) around the Lease Area.

Tug and Barge Navigation and Atlantic Coast Port Access Route Study

Annual AIS data for tug-tow vessels show a general pattern in which vessels tend to transit primarily along the coastline with a slightly lower volume of transits crossing the New York Bight in a diagonal, southwest to northeast, direction. **Figure 8.7-3** shows tug-tow annual AIS transits from 2017.

To better understand and manage the Atlantic Coast waterways, the USCG initiated the ACPARS in 2016. This study engaged waterway users through a working group to define north-south transit patterns and historical routes. As a result of this work, USCG released draft proposed fairways specifically designed for tug-tow vessel traffic, and in June 2020, the USCG published an advanced notice of proposed rulemaking for these fairways. These fairways, as identified by the ACPARS working group, were developed to be representative of traditional tug and barge transits in the region, as shown in **Figure 8.7-3**, and are located both along the coast and cutting diagonally across the New York Bight just east of the Lease Area. While these proposed fairways have not yet been formally adopted, once implemented, they would represent designated areas in which obstructions or structures would be prohibited in order to support tug-tow navigation.

Passenger Vessel Navigation

Passenger vessel navigation, which includes passenger ferries and cruise ships, was also recorded within the Study Area (**Figure 8.7-4**). Passenger ferries operate to and from the Port of New York and the Port of New Jersey, and Long Island. Cruise ships also call to the Port of New York and the Port of New Jersey through the three major terminals in the area: the Manhattan Cruise Terminal, the Brooklyn Cruise Terminal, and the Cape Liberty Port. Both cruise and ferry traffic represent routing that is typically pre-determined and regular, with cruise vessels utilizing the TSS lanes as they enter and exit the port areas. Both cruise and ferry traffic increase during the summer months. During the NSRA AIS Survey Period, an average of three to four unique passenger vessels per day were recorded within the Study Area. A total of five passenger vessels were recorded within the Lease Area itself during the study period.

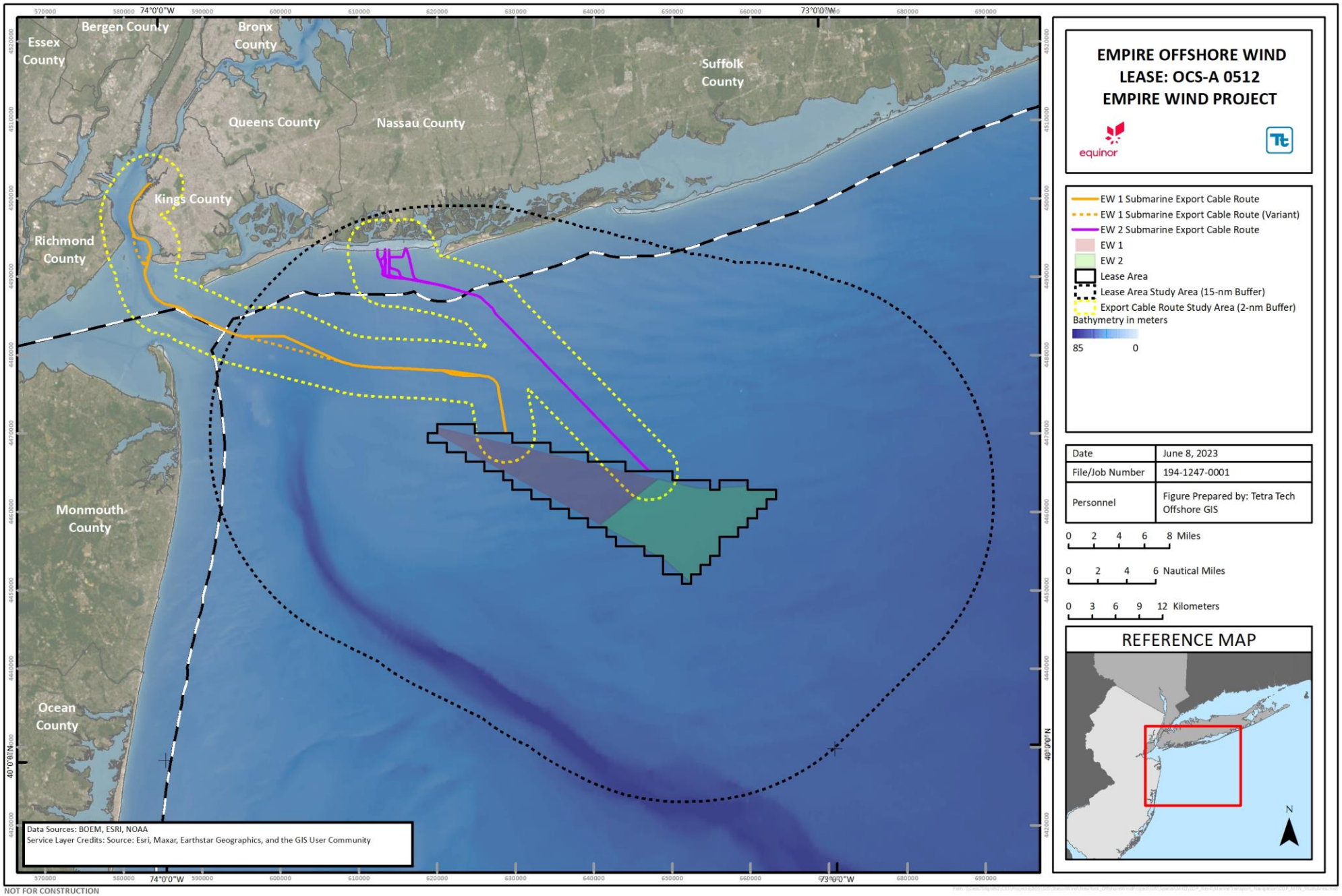

Figure 8.7-2 Navigation Safety Risk Assessment Study Area and Submarine Export Cable Route Study Area

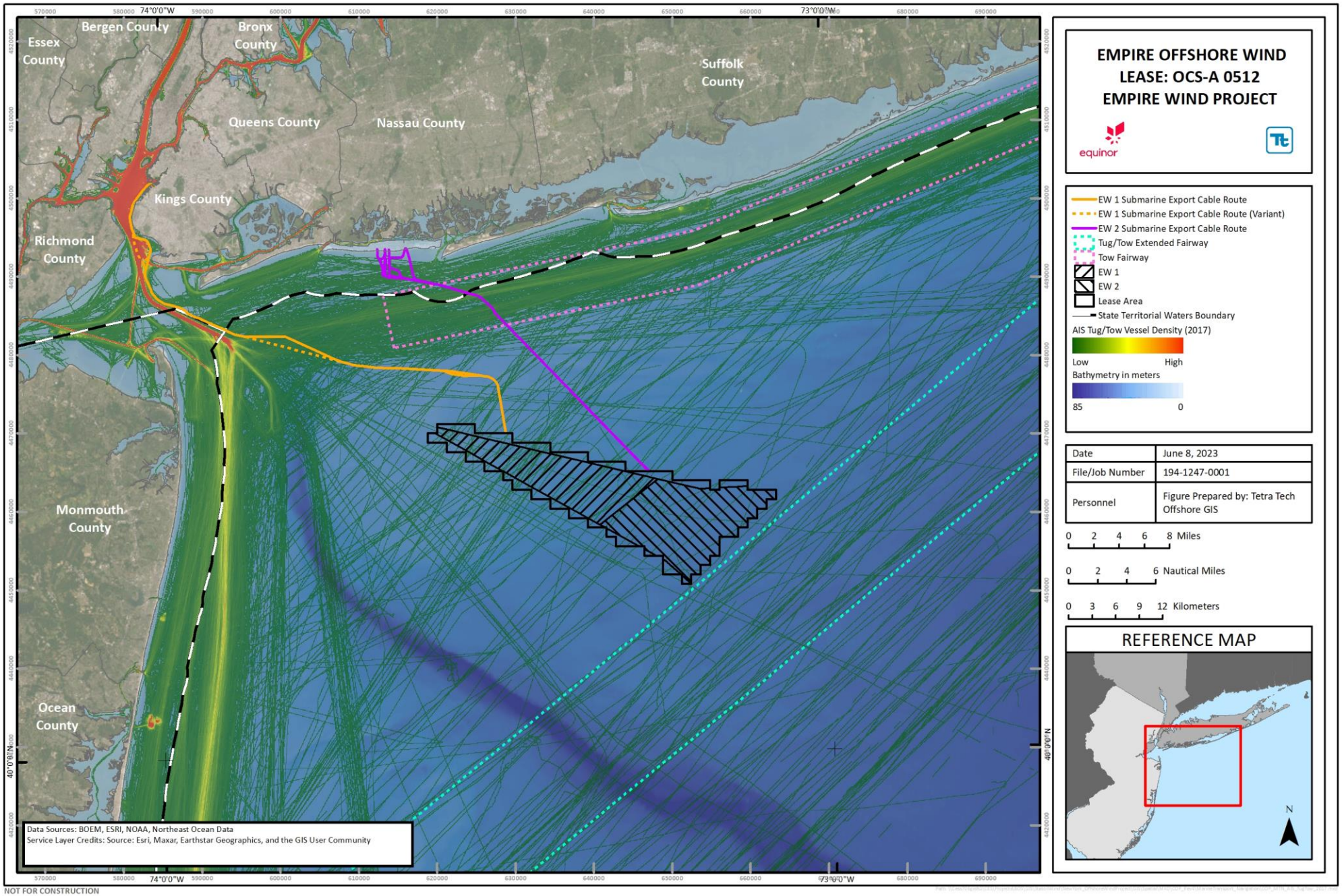

Figure 8.7-3 Tug-Tow AIS Data and ACPARS Proposed Fairways

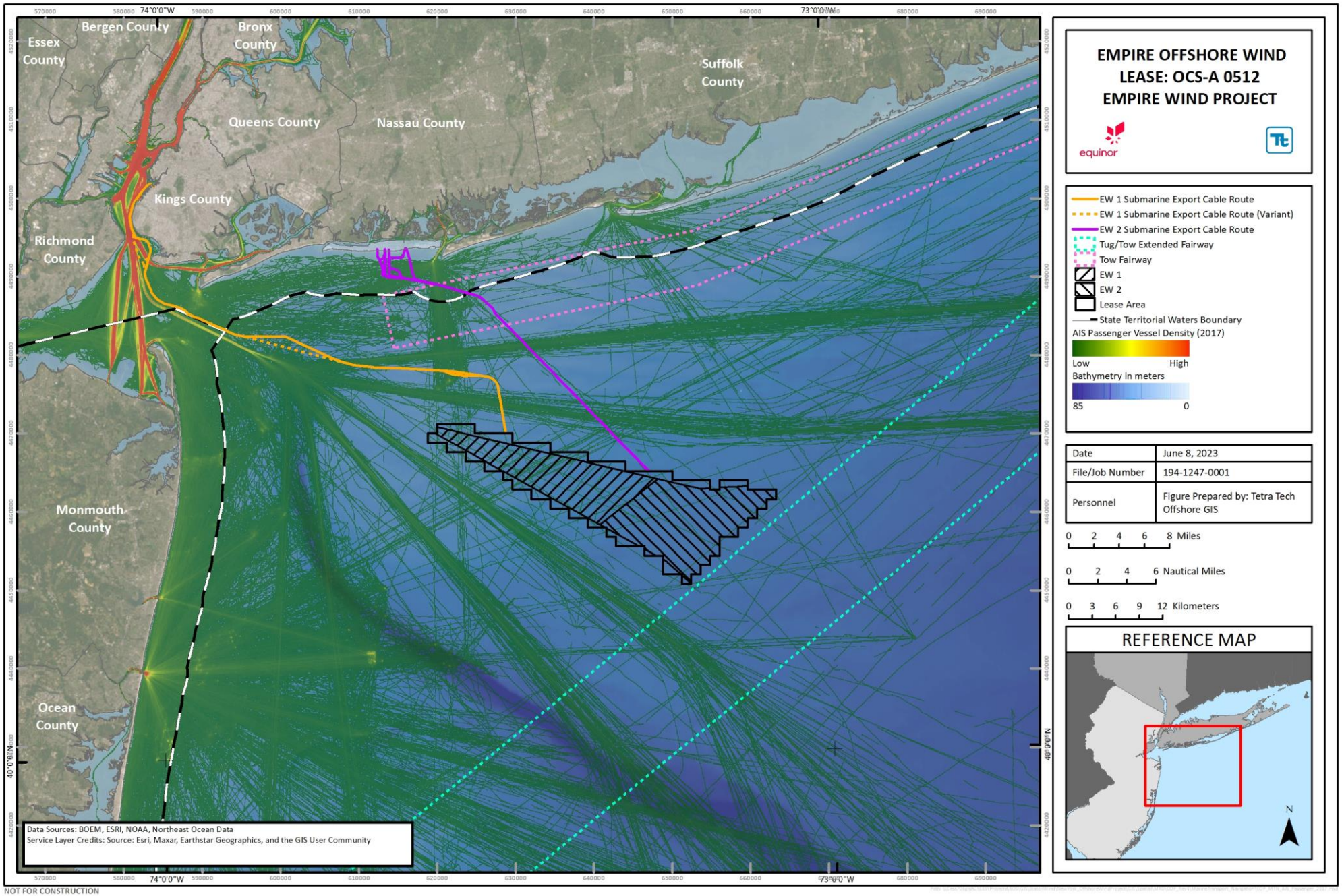

Figure 8.7-4 Passenger AIS Data and ACPARS Proposed Fairways

Fishing Vessel Navigation

An analysis of commercial and recreational fishing vessels transiting the Study Area was conducted as a part of the NSRA process (**Appendix DD**). The assessment found that fishing vessels accounted for approximately 8 percent of AIS vessel traffic during the survey period and an average of five unique fishing vessels per day were recorded within the Study Area. However, it is important to note that not all fishing vessels are required to utilize AIS and, as such, the Project has also relied upon visual observations, VMS, and transit workshop data to paint a more complete picture of this group's use of the waterway. For example, while the AIS data (**Figure 8.7-5**) shows a heavy presence across the Lease Area, VMS data isolated for vessels traveling below 4 knots (Northeast Ocean Data Portal) show much more segmented activity both within and around the Lease Area (Northeast Ocean Data Portal n.d.). Further analysis of potential impacts to commercial and recreational fishing vessels actively engaged in fishing activity is provided in **Section 8.8**. For a full list of the data utilized, please see the **Data Relied Upon and Studies Completed** subsection.

Recreational Navigation

Recreational navigation in the waters off New York and New Jersey is utilized to cruise between destinations, sightsee, fish, race, and participate in other recreational activities (see **Section 8.11 Other Marine Uses** for additional information). The majority of recreational navigation activity occurs between May and October, with the summer months being the busiest (NYSERDA 2017). Within the New York Bight, the majority of recreational navigation off of New York occurs within 3 nm (5.5 km) of the coastline; this is consistent with the 2012 Northeast Recreational Boater Survey, which recorded that more than half of recreational navigation takes place within 0.87 nm (1.6 km) of the shore (NYSERDA 2017). A comparison of recreational boater survey densities for both New York and New Jersey are provided in **Figure 8.7-6** and **Figure 8.7-7** from the Northeast Data Portal (2012) and the Mid-Atlantic Data Portal (2013) (Northeast Ocean Data Portal 2017; MARCO 2013).

While the Project recognizes that not all recreational boaters utilize AIS, these regional survey efforts are consistent with the results of the NSRA, which found that during the AIS Survey Period, recreational vessels accounted for approximately 7 percent of the AIS data recorded. Of the three TSSs in the area, recreational traffic utilized the Barnegat/Ambrose lanes most frequently.

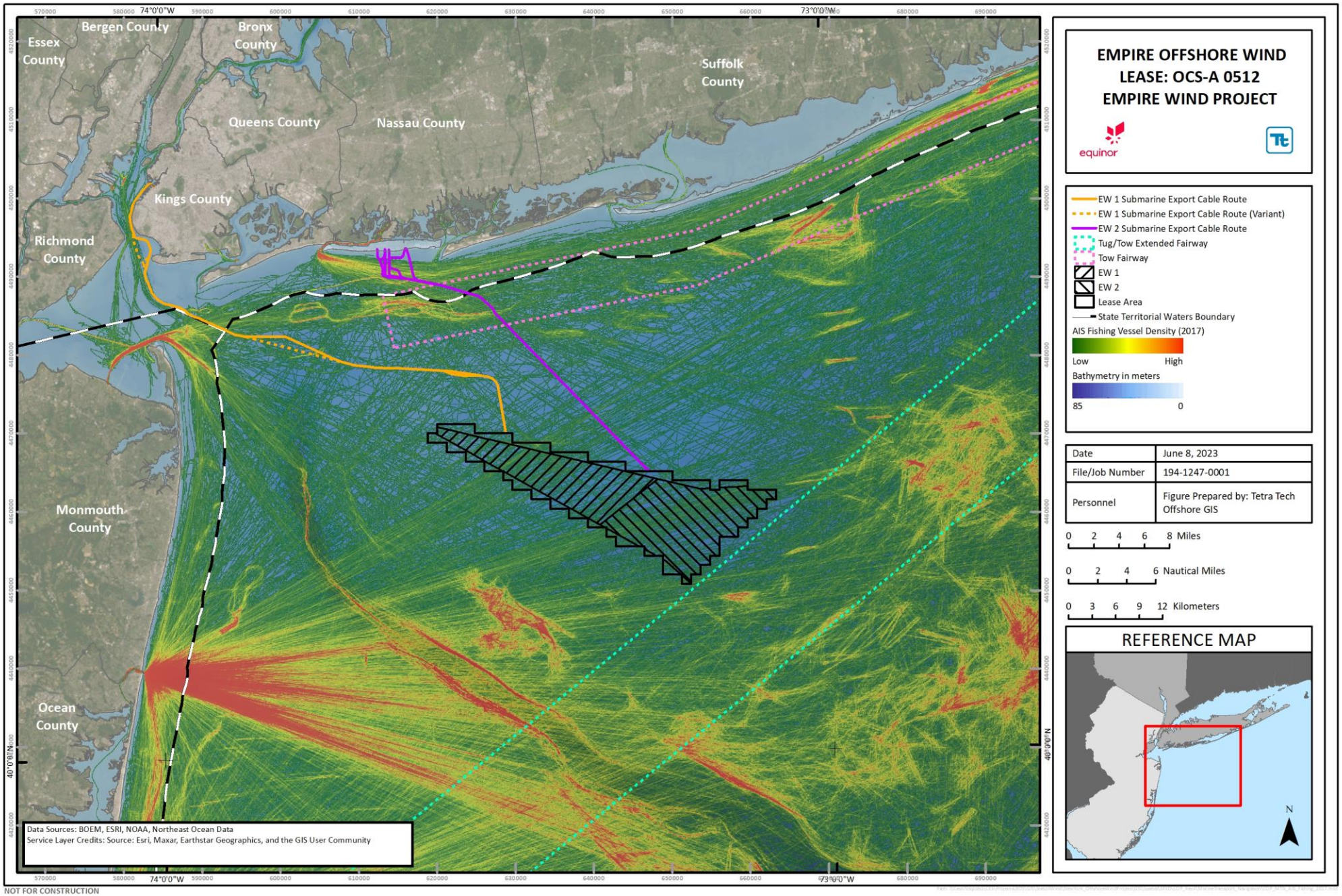

Figure 8.7-5 Fishing Vessel AIS Data and ACPARS Proposed Fairways

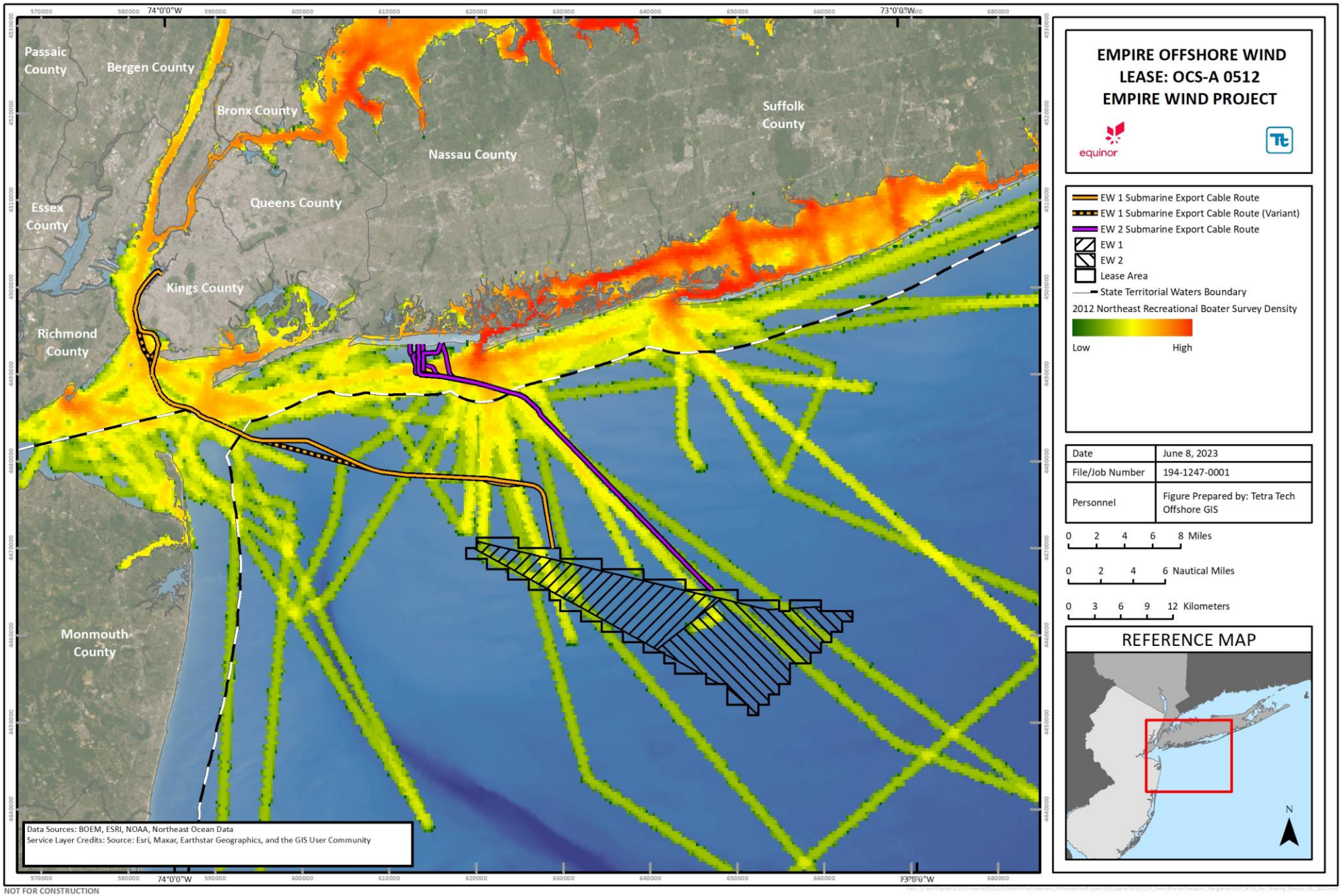

Figure 8.7-6 Recreational Boating Density (NY-Based) 2012

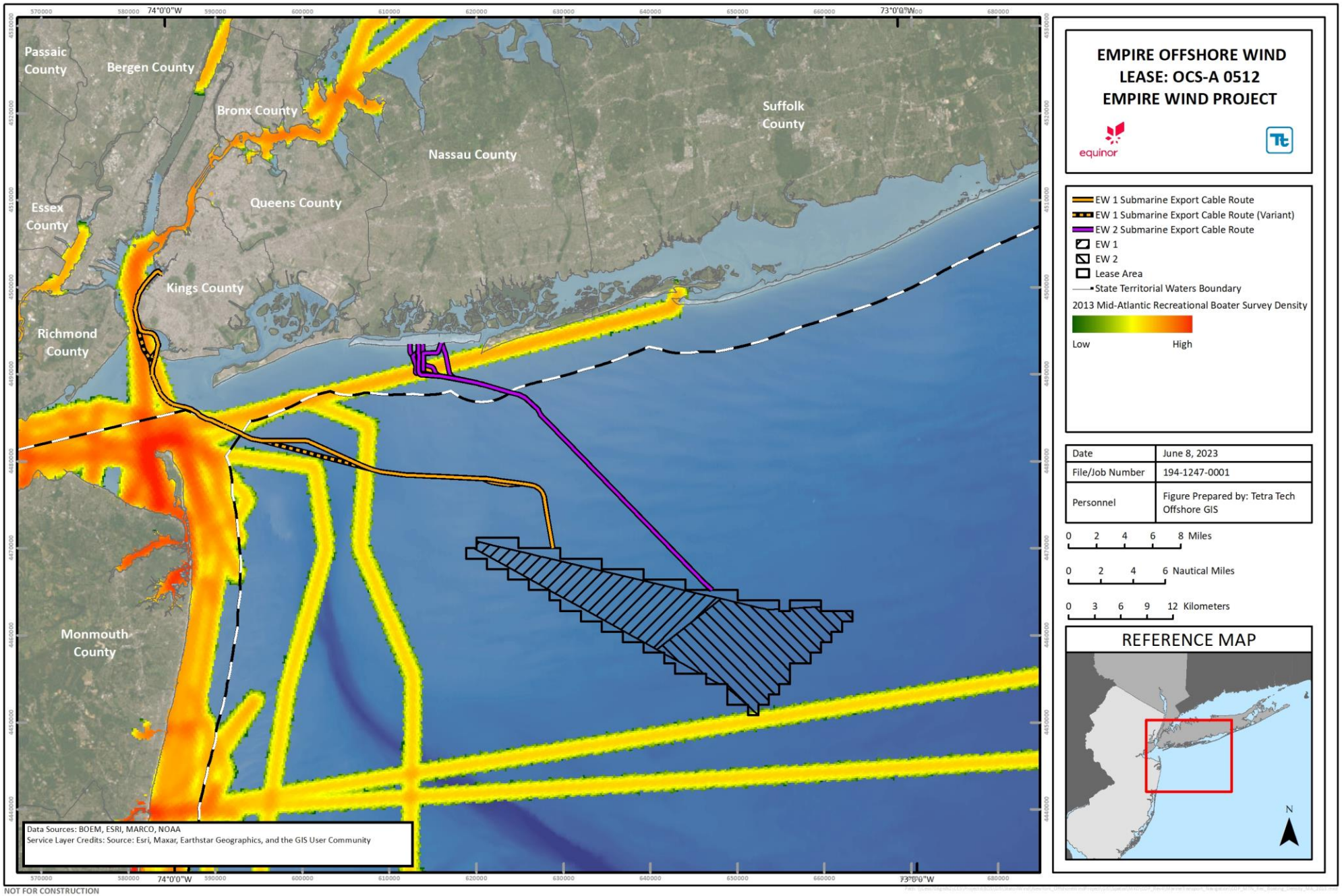

Figure 8.7-7 Recreational Boater Density (NJ-Based) 2013

United States Coast Guard Incident Response

Responses by USCG to Search and Rescue (SAR) incidents within the New York Bight fall within the Area of Responsibility of two USCG Districts (Districts 1 and 5, see **Figure 8.7-8** for the location of all USCG Stations within the vicinity of the Project Area). The USCG responds to SAR incidents with both air and sea assets, with the Lease Area in proximity to Air Station Cape Cod and Air Station Atlantic City. In addition, the USCG operates seasonal stations within the region due to the increase in both recreational and commercial fishing during the summer months. For example, Stations Jones Beach and Fire Island operate with crews and response vessels during this time and are closed during the off-season. Within the last 10 years (2008-2017), the USCG has responded to a total of 922 incidents, 18 of which were located within the Lease Area.

Anchorage Areas and Submarine Export Cable Routing

While there are no Anchorage Areas located within the Lease Area itself, there are a number of them found in proximity to the Lease Area and submarine export cable siting corridors. Each of the submarine export cable routes have been carefully micro-sited to avoid these areas to the extent practicable (see **Section 2 Project Design Development** for cable routing studies). The EW 1 submarine export cable route runs parallel to, and outside of, a traditional anchorage area used by tanker and cargo vessels that are waiting to enter the Port of New York and New Jersey (**Figure 8.7-9**; see also **Appendix DD** for an overview of navigational features within the waterway). The EW 1 submarine export cable route also runs parallel to the Ambrose shipping channel, along the eastern side of the channel, and crosses into the western edge of USCG Anchorage #25. Following a careful alternative analysis (see **Section 2**), several variants along this portion of the EW 1 submarine export cable route were maintained in the PDE. The EW 2 submarine export cable route avoids crossing any anchorage areas.

Additionally, Empire is also aware that the USACE has recently signed a project partnership agreement with the Port Authority of New York and New Jersey to initiate a study of the needs for further improvements to the federally managed channels within the area. Following engagement with USACE, updates could include both the deepening and widening of the channels as they work to accommodate the larger classes of container vessels expected to call to both ports in the future. A draft feasibility study was released in October 2020 (USACE 2020). USACE has also identified a Tentative Selected Plan to widen and deepen the USCG Anchorage #25 area. The final report was released in April 2020 (USACE 2020) and Empire is committed to continuing to work with USACE to de-risk any potential use conflicts within this portion of the EW 1 submarine export cable route.

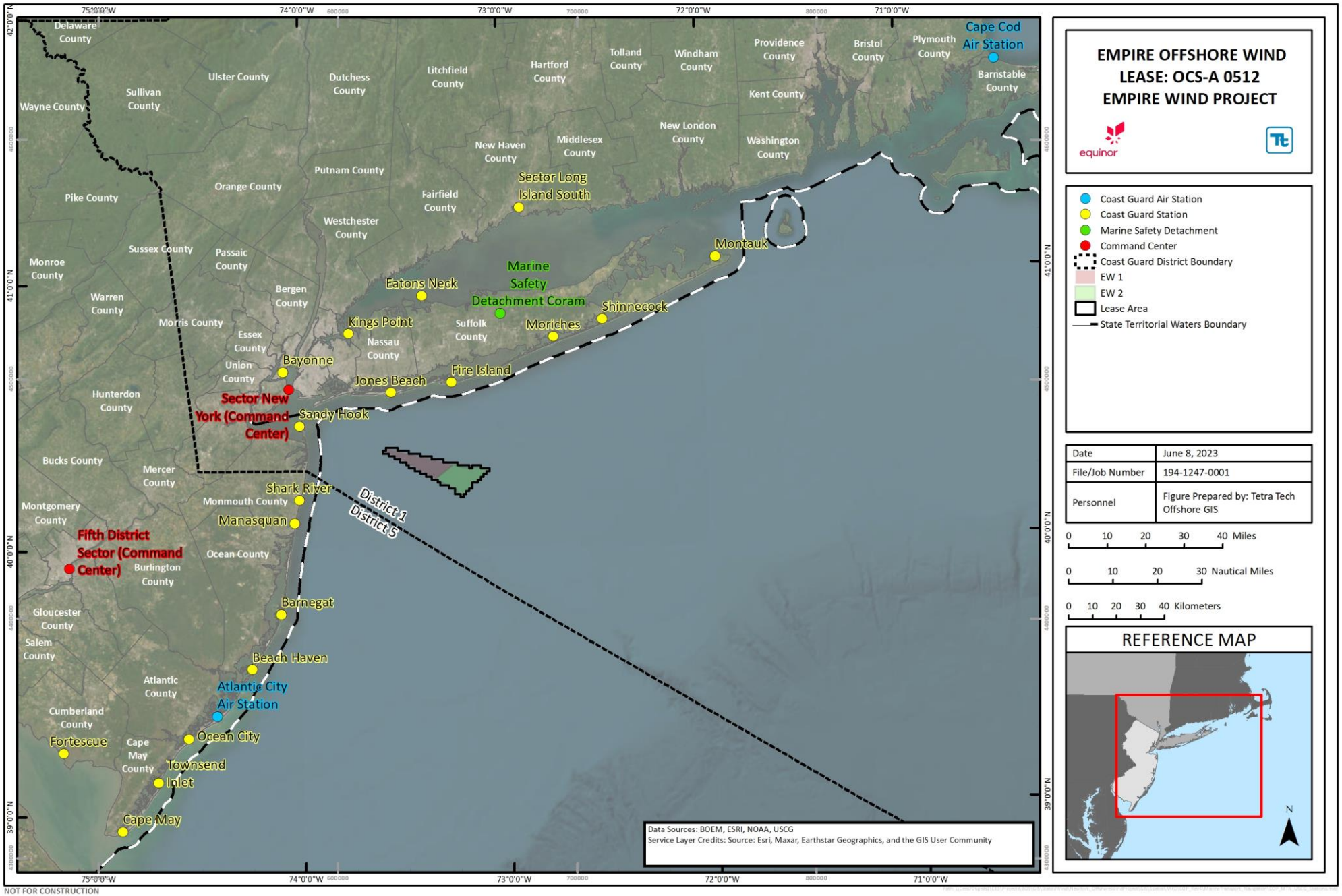

Figure 8.7-8 USCG Stations in the Project Area

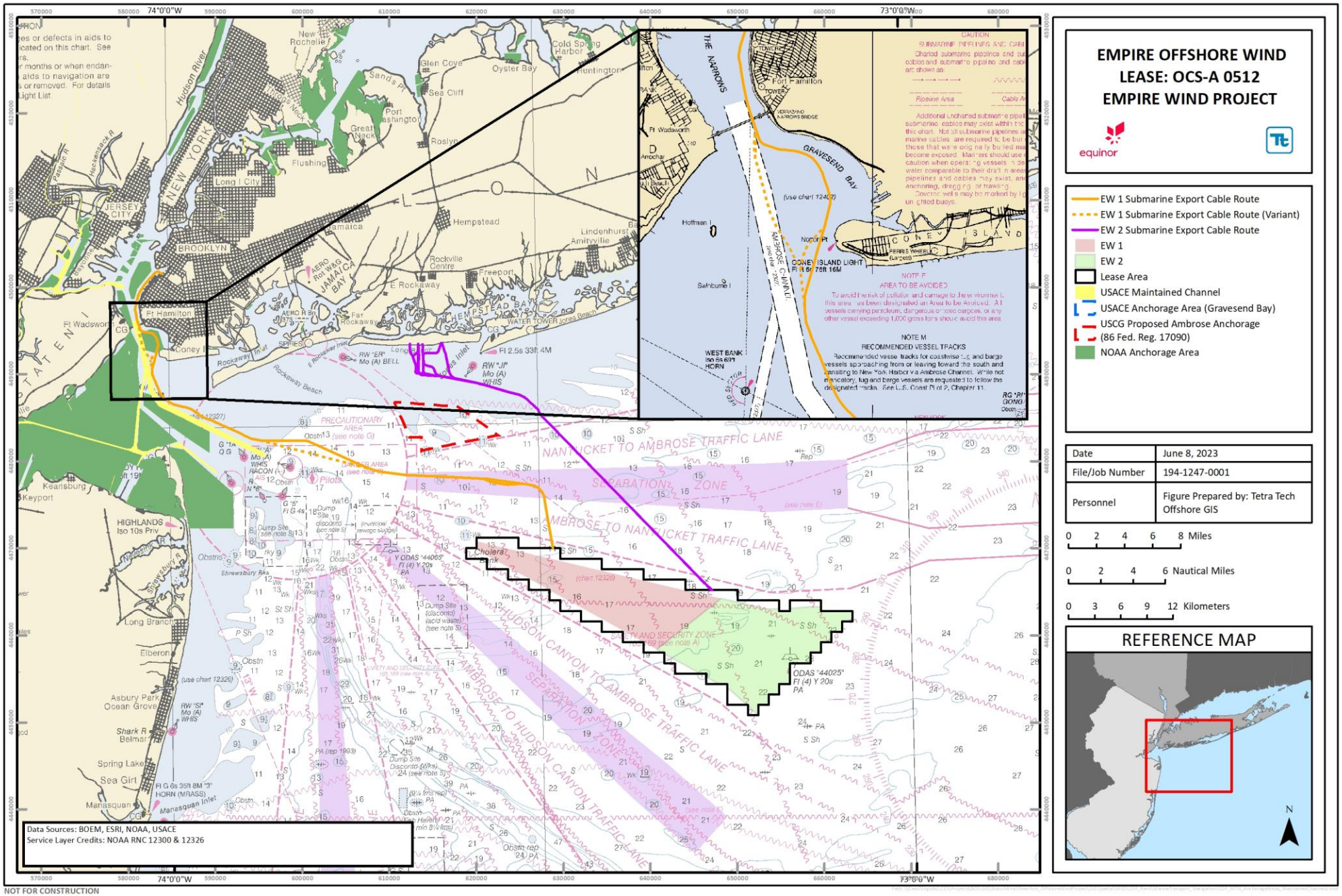

Figure 8.7-9 New York Bight Anchorage Areas and Submarine Export Cable Routes

8.7.2 Impacts Analysis for Construction, Operations, and Decommissioning

The potential impacts resulting from the construction, operations, and decommissioning of the Project are based on the maximum design scenario from the PDE (for a complete description of the construction, operations, and decommissioning activities that Empire anticipates for the Project, see **Section 3**). For maritime navigation, the maximum design scenario is the maximum number of wind turbines, and therefore fixed structures in the water, as described in **Table 8.7-1**. The parameters provided in **Table 8.7-1** represent the maximum potential impact from the full build-out of the Lease Area for EW 1 and EW 2 and incorporates a total of up to 149 foundations at any of 176 locations within the Lease Area (made up of up to 147 wind turbines and 2 offshore substations) with two submarine export cable routes to EW 1 and EW 2.

Table 8.7-1 Summary of Maximum Design Scenario Parameters for Marine Transportation

Parameter	Maximum Design Scenario	Rationale
Construction		
Offshore structures	Based on full build-out of EW 1 and EW 2 (147 wind turbines and 2 offshore substations). EW 1: 57 wind turbines and 1 offshore substation. EW 2: 90 wind turbines and 1 offshore substation.	Representative of the maximum number of structures for EW 1 and EW 2.
Submarine export cables	Based on full build-out of EW 1 and EW 2. EW 1: 40 nm (74 km). EW 2: 26 nm (48 km).	Representative of the maximum length of new submarine export cables to be installed, which would result in the maximum potential interactions with maximum number of associated Project-related vessels.
Foundations Allision risk	Presence of partially constructed structures / partially completed wind farms.	Representative of the longest exposure to partially constructed structures, contributing to the greatest risk of allision.
Project-related vessels Collision risk	Based on full build-out of EW 1 and EW 2, which corresponds to the maximum number of structures (147 wind turbines and 2 offshore substations) and maximum associated vessels.	Representative of the maximum predicted Project-related vessels for collision risk.
Operations		
Offshore structures	Based on full build-out of EW 1 and EW 2 (147 wind turbines and 2 offshore substations). EW 1: 57 wind turbines and 1 offshore substation. EW 2: 90 wind turbines and 1 offshore substation.	Representative of the maximum number of structures / maximum overall footprint for vessel displacement (collision risk) and vessel to structure allision. Representative of the maximum effects on the ability to perform SAR operations. Representative of the maximum effect on navigation equipment (e.g., radar).

Table 8.7-1 Summary of Maximum Design Scenario Parameters for Marine Transportation (continued)

Parameter	Maximum Design Scenario	Rationale
Wind turbine foundation	Monopile	Representative of the maximum physical footprint, which would result in the maximum risk to vessel to structure allision.
Project-related vessels Collision risk	Based on full build-out of EW 1 and EW 2, which corresponds to the maximum number of structures (147 wind turbines and 2 offshore substations) and maximum number of vessels and movements for servicing and inspections.	Representative of the maximum predicted Project-related vessels for collision risk.
Offshore O&M activities	Based on full build-out of EW 1 and EW 2. Based on the maximum number of structures (147 wind turbines and 2 offshore substations) and the longest operational duration, the maximum amount of Project-related activities expected per year.	Representative of the maximum amount of activities from the Project during the O&M phase.
Interarray cables	Based on full build-out of EW 1 and EW 2, with the maximum number of structures (147 wind turbines and 2 offshore substations) to connect. EW 1: 116 nm (214 km). EW 2: 144 nm (267 km).	Representative of the maximum length of interarray cables, which would result in the maximum condition for risk of interactions with vessels anchors. Representative of the maximum extent of reduced draft and risk for interactions with vessel anchors. (snagging of commercial fishing gear is covered separately in **Section 8.8**).
Submarine export cables	Based on full build-out of EW 1 and EW 2. EW 1: 40 nm (74 km). EW 2: 26 nm (48 km).	Representative of the maximum number and length of submarine export cables, which would result in the greatest exposure to EMF on the cable routes.
Coverage of submarine export and interarray cables	Based on 10% of submarine export and interarray cables requiring remedial surface protection (other 90% achieving suitable burial depth).	Representative of the maximum portion of the submarine export cables that would require remedial surface cable protection.

8.7.2.1 Impacts Assessed within the NSRA

The NSRA is drafted for the purpose of assessing that any risks to shipping and navigation users from the Project are ALARP. The assessment assumes that "embedded mitigations"[11] will be in place (e.g., access to

[11] Embedded mitigation refers to measures put in place and committed to at this stage of development; therefore, they can be considered as part of the risk assessment process.

anchorage areas, no main route deviations, use of TSS lanes, and layout considerations) and identifies risks as either: Broadly Acceptable (impacts are acceptable and do not require further mitigations), Tolerable (impacts are acceptable, assuming they are ALARP [additional mitigation may therefore be necessary: "tolerable with mitigation"]), and Unacceptable (impacts must be mitigated to within "tolerable" levels). **Table 8.7-2** provides an overview of the risk levels associated with each of the impact and vessel types from the NSRA. It should also be noted that impacts to Ports and Anchored Vessels were assessed under a different set of factors and all impacts were found to be either Broadly Acceptable or Tolerable with Mitigation. For a full analysis of the impacts assessed within the NSRA, please see **Appendix DD**.

Table 8.7-2 Overview of Impacts and Vessels Assessed within the NSRA

Impact Type	Commercial Vessels	Military Vessels	Fishing Vessels	Recreational Vessels	Cumulative Impacts
Deviation	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable	Negligible (no impact)	Broadly Acceptable
Collision	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable
Allision (Powered)	Tolerable w/ Mitigation	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable
Allision (Drifting)	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable
Emergency Response	N/A	Broadly Acceptable	N/A	N/A	N/A

8.7.2.2 Layout Rules

During the development of the Project, Empire has worked to create Layout Rules, which were developed through engagement with regulatory agencies and maritime stakeholders that will be used to shape the final proposed array layout(s), and which restrict the array patterns employed in order to address particular navigational issues, stakeholder concerns, or environmental sensitivities. Empire has opted to administer these rules on the Project in an effort to develop an outcome that promotes both safety and the shared use of the surrounding waterways, while maintaining design flexibility to apply the best available technology at the time of investment decisions and the ability to adapt to stakeholder requirements during the regulatory process. For example, Layout Rule Number 2 was adopted by Empire to minimize allision risk; the rule requires the Project arrange wind turbines and offshore substation platforms in straight or curved lines in an understandable pattern, so far as is practicable. A complete review of the Project's Layout Rules is provided in **Section 3**. Additionally, as discussed in Section 5 of **Appendix DD**, the following list identifies the layout rules that will be implemented and reconciled as appropriate:

Rule 1: Layout Pattern and Regularity

The position of all wind turbines and substation platforms (except those covered by Rule 2) shall, so far as is practicable, be arranged in straight and easily understandable patterns within individual wind farm site layouts, avoiding structures which break this pattern and without any dangerously projecting peripheral structures.

Reason: To facilitate safe navigation, aid location of casualties or incidents during emergency response, and to avoid creating an isolated hazard in or around the wind farm, while allowing the flexibility to optimize wind turbine arrays with consideration for issues such as local geology, seabed obstacles, and energy capture.

Rule 2: Perimeter-Type Layouts

The position of all wind turbines and substation platforms forming a line of perimeter structures around a Lease Area shall, so far as is practicable, be arranged in straight or curved lines in an understandable pattern, avoiding structures which break this pattern and without any dangerously projecting or peripheral structures.

Reason: To facilitate safe navigation, aid location of casualties or incidents during emergency response, and to avoid creating an isolated hazard in or around the wind farm, while allowing the flexibility to optimize wind turbine arrays with consideration for issues such as local geology, seabed obstacles, and energy capture.

Rule 3: Layout Clarity

Any changes in wind turbine size and separation distance within the Lease Area will be introduced so as to minimize potential visual confusion for any vessel navigating through the wind farm. For example, should the Lease Area be built out as individual wind farms, a future wind farm with larger wind turbines should be designed to be distinguishable from, but not significantly different in orientations as compared to earlier wind farms within the Lease Area with smaller turbines.

Reason: To facilitate safe navigation for vessels which are working within the Empire Lease Area, (noting an assumption of no significant levels of passing traffic within the zone other than fishing, small commercial, tugs and barges, and recreational craft).

Rule 4: Boundary Clarity

Opposing wind farm site boundaries within the Lease Area, which approach closer than 2 nm (3.7 km) to each other (for example, Project 1 and Project 2) shall be aligned broadly parallel with one another and marked to distinguish between separate wind farms, for example an early wind farm followed by a later wind farm.

Reason: To facilitate safe navigation for vessels which are working within the wind farm (noting an assumption of no significant levels of passing traffic within the zone other than fishing, small commercial, tugs and barges and recreational craft).

Rule 5: Proximity to Project Boundaries

All wind farm surface and sub-surface structures, including rotor swept areas, will be located wholly within the relevant wind farm or cable corridor lease area boundaries. No permanent above seabed infrastructure will be located in the submarine export cable corridors, save for cable protection where appropriate.

Reason: To ensure all aspects of the development are within the assessed and permitted areas.

Rule 6: Turbine Spacing

Where feasible, wind turbine spacing should be consistent and as far apart as possible, with maximum spacing in the dominant trawl tow direction, where feasible with minimum spacing no less than 0.65 nm (1.2 km).[12]

Reason: To ensure adequate space in rows for SAR activity and to facilitate continued fishing opportunities within the operational Projects.

Rule 7: Rows

There should be at least one line of orientation of rows of turbines with a clear line of sight and heading from one entrance at the perimeter to an exit and the opposite perimeter. Where there is a dense perimeter, but fewer

[12] See Appendix DD for further discussion.

turbines in the wind farm, there should be an ability to conduct SAR flights and trawl tows entering and exiting at the perimeters and maintaining a fixed heading.

Reason: To allow for safe navigation of fishing vessels or small craft within the offshore wind energy development area and to ensure potential requirements for search and rescue activities are met (for example, the search patterns of SAR helicopters).

Rule 8: Orientation of Rows

Where feasible, align turbines with rows that are sympathetic to the dominant trawl directions of most active and potentially impacted fisheries. For example, for the Lease Area, a southwest to northeast orientation in line with bathymetry.

Reason: To facilitate continued opportunities for fishing vessels to tow trawls within operational Projects, minimizing modifications to existing practices (for the Lease Area, this is a southwest to northeast orientation in line with bathymetry).

Rule 9: Burial of Cables

Interarray and submarine export cables to be buried to a target burial depth of at least 6 ft (1.8 m) where feasible. Deeper burial depths to be targeted as appropriate to CBRAs and regulatory requirements (for example in federally managed channels, anchorage areas and areas fished by bottom impacting gear).

Reason: To minimize the risk of mariners interacting with offshore wind energy development cables.

Rule 10: Lower Tip Heights

Blade lower tip heights should equal or exceed 85 ft (26 m) above Highest Astronomical Tide (HAT).

Reason: To ensure safe clearance of recreational and small commercial vessels.

8.7.2.3 Construction

During construction, the potential impact-producing factors to marine transportation and navigation may include:

- Increase in Project-related vessel traffic;
- Introduction of partially installed structures; and
- Presence of safety zones.

The following impacts may occur as a consequence of the factors identified above:

- Short-term increase in Project-related vessel traffic resulting in the displacement of existing vessel traffic and increased collision risk;
- Short-term presence of partially installed structures presenting allision risk; and
- Short-term implementation of safety zones around construction vessels, partially installed structures and installation activities creating deviations to vessel routes.

Short-term increase in construction vessel traffic: An increase in vessel traffic associated with Project-related construction and support vessels within the Lease Area and along the submarine export cable routes is anticipated during construction. This presence could lead to the displacement of existing vessel traffic to other trafficked areas with an indirect consequence of increased collision risk there, as well as the direct risk of

collisions with Project vessels. Potential impacts are further discussed in the NSRA (**Appendix DD**) and include risks of deviations, increased encounters, collision, allision, and displacement of anchoring ability, which were deemed either Negligible or Broadly Acceptable in the NSRA. Empire proposes to implement the following measures to avoid, minimize, and mitigate these potential impacts (which are also described in the NSRA):

- Continued consultation with stakeholders, including but not limited to: the USCG, New York Vessel Traffic Service, PANYNJ and the USACE on best practices;
- Highly visible marking and lighting of active construction sites;
- Compliance by vessels associated with the Project with international and flag state regulations including the COLREGs and the International Convention for the Safety of Life at Sea (SOLAS);
- Utilization of existing TSSs, maintained channels, and transit lanes by vessels associated with the Project to comply with existing uses and management of the surrounding waterway, to the extent practicable;
- Completion of a Cable Installation Plan, detailing how cable installation will be managed to ensure disruption is minimized, in particular within port approaches;
- Completion of a Construction Method Statement, detailing specific construction logistics between New York ports and the Lease Area, inclusive of transport configuration, vessels, and schedule of transport operations;
- Inclusion by Empire of a requirement in contracts that all construction vessels be equipped with working AIS transceivers at all times;
- Regular updates to the local marine community through social media, the USCG LNM, and active engagement with Maritime Association of the Port of New York and New Jersey Harbor Safety, Navigation, and Operations Committee;
- Marine coordination for vessels associated with the Project (i.e., a central coordination hub from which all Project vessel movements will be managed, and third-party traffic will be monitored);
- Minimum advisory safe passing distances for cable laying vessels (where feasible); and
- Monitoring of third-party vessel traffic by AIS.

Short-term presence of partially installed structures: During construction, new, partially installed structures will be incrementally added to the Lease Area, varying in completion status as the construction phase progresses; for example, there may be periods of partially constructed wind turbines and periods where parts of the Lease Area have structures before other parts of the Lease Area. Construction vessels conducting heavy lift activities (e.g., foundation installation) will temporarily establish fixed positions and be immovable for a period of time (hours to days, depending on the activity). Additionally, as wind turbines and offshore substation platforms are installed, the construction sequence may result in a period of time between installation of the foundations and the super structure. Empire proposes to implement the following measures to avoid, minimize, and mitigate these potential impacts:

- The implementation of up to a 1,640-ft (500-m) safety zone around active construction sites (including partially installed wind turbines), pending agreement with USCG;
- Highly visible marking and lighting of active construction sites;
- Implementation of the Layout Rules (see **Section 3**) during layout design process, most notably:
  - One nautical mile separation between wind farm and the edge of the TSS lanes;
  - Straight line edges parallel to TSS lanes (no isolated or protruding turbines); and
  - At least one line of orientation in final layout;

- Marine coordination for vessels associated with the Project (i.e., a central coordination hub from which all Project vessel movements will be managed, and third-party traffic will be monitored);
- Minimum advisory safe passing distances for cable laying vessels (where feasible);
- Monitoring of third-party vessel traffic by AIS;
- Regular updates, including the positions of installed and partially installed structures, to the local marine community through social media, the USCG LNM, and active engagement with Maritime Association of the Port of New York and New Jersey Harbor Safety, Navigation, and Operations Committee;
- Ongoing consultation with stakeholders, in particular, in relation to the submarine export cable(s); and
- The potential use of buoys and/or support vessels to mark temporary working areas or potential hazards (e.g., partially installed structures).

Implementation of temporary safety zones: During construction, Empire proposes to utilize 1,640-ft (500-m) safety zones around relevant structures, activities, and vessels in a dynamic approach, as previously defined for the Block Island Wind Farm (81 FR 31862). Should USCG safety zone authorities not extend beyond 12 nm (22 km) at the time of construction, Empire will utilize a combination of safety vessels, LNMs, and COLREGS to promote both awareness of these activities and the safety of the construction equipment and personnel, as well as third party users. All areas will be marked and lit in accordance with USCG requirements and monitored by a Project safety vessel that will be available to assist local mariners. The locations of the safety zones will be posted in LNMs, as well as on the Project website. Vessels will not be permitted to enter the safety zone without express consent from Empire. Marine users associated with the "affected environment" will likely be restricted by the application of these safety zones, which may require re-routing and may be considered a displacement impact; however, these restrictions will only be temporary and are a form of mitigation. Furthermore, given that these safety zones will only be placed around active construction sites, the extent of the affected area will be minimized, and marine users will be able to access the remainder of the offshore area. Empire proposes to implement the following measures to minimize impacts from Project-related safety zones to the extent practicable:

- The operation of Project safety vessels monitoring and communicating with vessels operating in the area;
- Highly visible marking and lighting of active construction sites;
- Regular safety zone updates to the local marine community through social media, the USCG LNM, and active engagement with Maritime Association of the Port of New York and New Jersey Harbor Safety, Navigation, and Operations Committee;
- Dynamic construction and safety zones where feasible, focusing on sites being actively worked on, to minimize the extent of the affected area;
- Marine coordination for vessels associated with the Project (i.e., a central coordination hub from which all Project vessel movements will be managed, and third-party traffic will be monitored); and
- Monitoring of third-party vessel traffic by AIS.

8.7.2.4 Operations and Maintenance

During operations, the potential impact-producing factors to marine transportation and traffic may include:

- New fixed structures (e.g., wind turbines and offshore substations);
- O&M vessel traffic; and
- Presence of Project-related electrical cables, including in proximity to anchorage areas.

The following impacts may occur as a consequence of the factors identified above:

- Long-term presence of new fixed structures (e.g., wind turbines and offshore substations) in the Lease Area;
- Increased Project-related vessel traffic;
- Submarine export cable and interarray cable snagging by anchors, including in anchorage areas; and
- Long-term impacts to marine radar/navigation instruments due to the presence of wind turbines.

Long-term presence of new fixed structures: The presence of new fixed structures within the Lease Area has the potential to require the long-term modification of vessel route patterns in proximity to the Lease Area, with consequential indirect collision risk as vessels are displaced to other trafficked areas and potential increased transit times. The presence of established navigation patterns (i.e., TSS lanes) immediately adjacent to the Lease Area, with a high level of fidelity to the TSS from larger vessels as shown in the AIS data, either already avoids or mitigates this impact, or provides alternative highly regulated shipping routing measures to smaller vessels that may elect to deviate. Increased collision risk due to displacement is addressed in the NSRA and was found to not exceed "Broadly Acceptable."

In addition, the presence of new structures in an area previously free of fixed obstacles will present a potential allision risk to existing maritime users, both from the presence of foundation structures and the wind turbine blades. Allision risk applies both for those vessels currently transiting past the Lease Area in the TSS and those vessels that currently utilize the areas within the Lease Area. Within the NSRA an increased risk in allisions, both for powered vessels and drifting vessels was found to be "Tolerable with Mitigation" and "Broadly Acceptable" respectively for all vessel types. Appreciating the sensitivity around allisions from vessels using the TSS, Empire applied embedded mitigation to the Project in the form of a 1 nm (1.8 km) setback from the edge of the Ambrose/Nantucket TSS and the Ambrose/Hudson Canyon TSS to the edge of the "Developable Area". The 1 nm (1.8 km) setback was informed by a "Buffer Sensitivity Analysis" conducted by Anatec Limited focusing on allision risk using representative AIS data, with the 1 nm (1.8 km) setback carried forward into the NSRA for further analysis. In addition, Empire applied further embedded mitigation in the form of the Layout Rules, with straight wind farm perimeters being of relevance to allision risk. As described in the NSRA, a review of wind farm setbacks from shipping routes in operational or consented offshore wind farms in Europe was conducted, focusing on examples that are as directly applicable to the Lease Area as possible; indeed, Anatec Limited used examples where large cargo and tanker vessels regularly pass European wind farms vessels and also utilize the Port of New York and New Jersey. Effective marking and lighting and provision of structure locations on nautical chats will also lower the likelihood of an allision event. Empire proposes to implement the following measures to avoid, minimize, and mitigate these potential impacts:

- The wind turbines and offshore substation will be properly marked and lit in accordance with International Association of Marine Aids (IALA) O-139 and USCG/BOEM requirements (see **Section 3** for additional details on the proposed marking and lighting measures);
- Creation and implementation of a safety management system (SMS) (**Appendix G**);
- Project Layout Rules will be implemented, to the extent practicable, to facilitate ease of navigation in and around the wind farm to minimize allision risk;
- Project-enacted "Developable Area" will facilitate a 1 nm (1.8 km) separation distance from vessel traffic within neighboring TSS lanes;
- Facilitation of USCG SAR trials within and near the Lease Area;
- Operational SAR Procedures in place that detail how the Project will cooperate with USCG in the event of an emergency situation;

- Closed circuit television installed on certain structures within the array for the purpose of monitoring activity within the site;
- Locations of the wind farm structures will be provided directly to fishermen for the purpose of displaying the wind farm electronically via their on-board equipment;
- Information will be provided to NOAA so that charts (nautical and electronic) can be updated with the location of applicable Project infrastructure; and
- Wind turbines will have a minimum blade clearance of 85 ft (26 m) above mean higher high water.

See **Section 8.8** for additional discussion regarding potential impacts to commercial and recreational fisheries.

Long-term presence of operations and maintenance vessel traffic: The routine O&M of the Project may involve a combination of Crew Transfer Vessels (CTVs) and Service Operations Vessels (SOVs), with the maximum design scenario of the maximum number of wind turbines (147), offshore substations (2), and submarine export cables, using a CTV-only concept. The increase is negligible in comparison to the average traffic observed in the Project Area due to the presence of high traffic shipping lanes throughout the New York Bight (see **Appendix DD** for additional information). Empire's preferred O&M solution for both EW 1 and EW 2 is a SOV concept, supported by a CTV. The SOV is expected to remain offshore in the Project site for a period of approximately two weeks, returning to the O&M base every two weeks for 24-hours for refueling, re-supplying and crew changes. The SOV concept therefore significantly reduces the overall vessel transits from Project site to base, compared to the maximum design scenario of multiple CTVs making daily return trips. Therefore, under these conditions, there is a resulting reduction of vessel traffic that will reduce the risk of displacement and collision. However, Empire still requires the ability to select alternatives described in the PDE and to be assessed in the EIS should an SOV concept not be technically and commercially suitable. In addition to the potential adverse impacts, the presence of Project-related vessels is also deemed to have positive beneficial impacts, for example in the provision of trained first response to mariners in distress. The NSRA concluded that the impacts associated with the presence of Project-related vessels during operations would not exceed "Broadly Acceptable." Empire proposes to implement the following measures to avoid, minimize, and mitigate these potential impacts:

- Compliance by vessels associated with the Project with international and flag state regulations including the COLREGs and the SOLAS;
- The development and implementation of an Emergency Response Plan (ERP);
- Marine coordination for vessels associated with the Project (i.e., a central coordination hub from which all Project vessel movements will be managed, and third-party traffic will be monitored);
- Utilization of existing TSSs, maintained channels, and transit lanes by vessels associated with the Project to comply with existing uses and management of the surrounding waterway, to the extent practicable;
- The development of a marine pollution contingency plan (e.g., **Appendix F Oil Spill Response Plan**);
- The establishment of operational procedures for O&M vessels transiting to and from the Lease Area such as entry/exit points and designated routes; and
- Provision of self-help capability (i.e., any onshore or vessel/turbine-based resources or facilities available to Empire that may assist in the event of an emergency).

Long-term presence of electrical cables: The presence of buried, partially buried or surface protected Project-related electrical cables has the potential to impact on anchoring activities, either acting as a deterrent to the use of anchoring sites or presenting a potential snagging risk (e.g., anchors snagging on electrical cables and/or cable protection). Empire has to the extent feasible avoided active anchorage areas for the submarine

export cable siting corridors. This was achieved through a combination of constraint mapping, stakeholder consultation and physical surveys. A description of the submarine export cable routing efforts can be found in **Section 2**. In summary, Empire adapted the original routing of the EW 1 submarine export cable route to avoid the unofficial "Ambrose Anchorage"[13] (see **Figure 8.7-9**) following feedback from maritime stakeholders. An alternative route was re-surveyed south of the anchorage area to avoid it as much as feasible. The EW 2 submarine export cable route also deviates around this anchorage area, rather than taking the shortest route to landfall. Empire conducted extensive geophysical and geotechnical surveys along the submarine export cable routes to identify seabed characteristics that were conducive to sufficient cable burial using standard burial techniques, so that a barrier, in this case coverage of seabed, will further de-risk the likelihood of anchor snagging or the requirement of remedial surface cable protection that may present a snagging risk. However, where avoidance has not been wholly feasible, further mitigation such as deeper cable burial is applied.

Target burial depth is anticipated to be a minimum of 6 ft (1.8 m) in areas not under Federal management (i.e., outside of navigational channels and anchorages) and 15 ft (4.5 m) below the current or future authorized or existing depth, whichever is deeper, within federally managed areas. Target burial depths will be defined based on a Cable Burial Risk Assessment (CBRA), stakeholder feedback (e.g., USACE), and geotechnical conditions.

With approximately 20 active telecommunications cables landing in New Jersey and New York, there is substantial experience concerning recommended cable burial and fishing interactions in the New York Bight. The North American Submarine Cable Association is a group of more than twenty cable owners. In September 2019, North American Submarine Cable Association posted a statement outlining the history of this experience.[14] Quoting from that statement, "Submarine telecommunications cables have landed at sites along the Northeast Coast of the United States for decades. During the 1980s and 1990s, submarine telecom cables located in the Northeast United States seaboard suffered several cases of damage from hydraulic clam dredges. During that period the typical target burial depth for telecom cables in this region was 2 to 3 ft (0.6 to 0.9 m). In response to this external threat, since the year 2000, submarine cable systems have been buried to a typical target depth of 5 to 6 ft (1.5 to 1.8 m), where seabed conditions permit. Shallower burial in hard, dense sea beds has been sufficient to protect the cable. Since this change, the subsea telecom cable regional damage rates resulting from fishing and hydraulic clam dredging operations have been reduced to near zero". Empire will implement the following measures to avoid, minimize, and mitigate these potential impacts:

- Cable routing study, including geophysical and geotechnical surveys, stakeholder input and environmental and social constraints to develop submarine export cable routes that avoid or minimize interactions with anchorage areas;
- Completion of a Cable Installation Plan, detailing how cable installation will be managed to ensure disruption is minimized, in particular within port approaches, and monitored once installation is complete;
- Completion of a CBRA to identify appropriate cable burial depths and to identify any needs for additional cable protections;
- Potential real-time monitoring of Project cable assets using AIS to proactively notify vessels of potential interactions;
- Periodic monitoring of cable burial and protection measures to ensure they remain effective, with regular monitoring of protection in vicinity of areas of existing anchoring as identified within the cable burial risk assessment; and

[13] On April 1, 2021, the USCG published a notice in the Federal Register (30 CFR Part 110) requesting public comments on the potential formal establishment of this anchorage area.
[14] https://www.n-a-s-c-a.org/

- Information will be provided to NOAA so that charts (nautical and electric) can be updated with the location of applicable Project infrastructure.

Long-term impacts to marine radar/navigation instruments: Effects on navigation and communication equipment of vessels operating in the area that may arise from the structures and cables associated with the Project have been discussed within Section 9 of the NSRA (**Appendix DD**). The section assessed the following using United States and United Kingdom trials, extensive consultation, experience from existing projects and expert opinion:

- Interference with Communication Equipment–VHF Direction Finding (DF), Rescue 21, AIS, NAVTEX, GPS;
- Electromagnetic interference on magnetic compass;
- Impact of structures within the Lease Area on marine radar; and
- Impacts of noise on use of vessel sonar.

Of those identified types of navigation and communication equipment, only marine radar was found to have any quantifiable effect within 1.5 nm (2.7 km) of a structure. When considered against the proposed Lease Area, some vessels may pass within 1.5 nm (2.7 km) of the wind farm infrastructure and therefore may be subject to a minor level of radar interference. However, outputs of assessment note that any impact can be mitigated firstly by presence of sufficient sea room allowing vessels to distance themselves from peripheral turbines and, if required, by minor adjustment of marine radar controls.

The North Hoyle Wind Farm trials, a desk-based study undertaken for the Horns Rev 3 offshore wind farm in Denmark in 2014, concluded that there was not expected to be any conflict between point-to-point radio communications networks and no interference upon VHF communications (Energinet.dk 2014). Because Rescue 21 is a VHF system and because DF impacts were only seen with equipment very close to the wind farm array, it is not anticipated that Rescue 21 DF functions would be affected. Throughout the 2005 SAR trials carried out at North Hoyle, the Sea King radio homer system was tested. With the aircraft and the target vessel within the wind farm, at a range of approximately 1 nm (1.8 km), the homer system operated as expected with no apparent degradation.

Vessels navigating within the array will also be subject to a level of interference with impacts becoming significant in close proximity to the turbine (within 0.5 nm [0.9 km]). It was noted that this would require additional mitigation by any vessels including consideration of the navigational conditions (e.g., visibility) when passage planning and compliance with COLREGS will be essential. Looking at existing experience within United Kingdom and European windfarms (see **Appendix DD**), vessels do navigate safely within arrays including those with spacing significantly less than those proposed for the Project. Empire will implement the following measures to avoid, minimize, and mitigate these potential impacts:

- The wind turbines and offshore substation will be properly marked and lit in accordance with IALA O-139 and USCG/BOEM requirements (see **Section 3** for additional details on the proposed marking and lighting measures) to assist in the facilitation of safe navigation;
- Project Layout Rules will be implemented to facilitate ease of navigation in and around the wind farm to minimize allision risk;
- Project-enacted "Developable Area" will facilitate a 1-nm (1.8-km) separation distance from vessel traffic within neighboring TSS lanes to decrease radar interference with nearby the lanes; and
- Information will be provided to NOAA so that charts (nautical and electronic) can be updated with the location of applicable Project infrastructure to assist in passage planning.

For general navigation, it is noted that the intolerable effects do not block targets from being seen, but instead could create multiple echoes; however, this would need the vessel (radar scanner) and target to be within close proximity to the turbines, at which point visual observations are likely. This situation is considered similar to navigation within an enclosed waterway whereby shore-based features could interfere with radar returns. The same mitigations would apply for SAR operations.

8.7.2.5 Decommissioning

Impacts during decommissioning are expected to be similar or less than those experienced during construction, as described in Section 8.7.2.1. 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 all potential impacts will be re-evaluated at that time. For additional information on the decommissioning activities that Empire anticipates for the Project, please see **Section 3**.

8.7.3 Summary of Avoidance, Minimization, and Mitigation Measures

In order to mitigate the potential impact-producing factors described in Section 8.7.2, Empire is proposing to implement the following avoidance, minimization, and mitigation measures. In addition to the measures described below, Empire has proposed mitigation described in **Section 8.8** that reflects the installation of fewer wind turbines for EW 1 and EW 2 and that would result in reduced impacts, such as to the footprint of the Project and the duration of activity.

8.7.3.1 Construction

During construction, Empire will commit to the following avoidance, minimization, and mitigation measures to mitigate the impacts described in Section 8.7.2.1:

- Continued consultation with stakeholders, including but not limited to: the USCG, New York Vessel Traffic Service, PANYNJ, and the USACE on best practices;
- Highly visible marking and lighting of active construction sites;
- Compliance by vessels associated with the Project with international and flag state regulations including the COLREGs and the SOLAS;
- Utilization of existing TSSs, maintained channels, and transit lanes by vessels associated with the Project to comply with existing uses and management of the surrounding waterway, to the extent practicable;
- Completion of a Cable Installation Plan, detailing how cable installation will be managed to ensure disruption is minimized, in particular within port approaches;
- Completion of a Construction Method Statement, detailing specific construction logistics between New York ports and the Lease Area, inclusive of transport configuration, vessels, and schedule of transport operations;
- Inclusion by Empire of a requirement in contracts that all construction vessels be equipped with working AIS transceivers at all times;
- Marine coordination for vessels associated with the Project (i.e., a central coordination hub from which all Project vessel movements will be managed, and third-party traffic will be monitored);
- Minimum advisory safe passing distances for cable laying vessels (where feasible);
- Monitoring of third-party vessel traffic by AIS;
- The implementation of up to a 1,640-ft (500-m) safety zone around active construction sites (including partially installed wind turbines) pending agreement with USCG;
- Creation and implementation of an SMS (**Appendix G**);

- Implementation of the Layout Rules (see **Section 3**) during layout design process, most notably:
  - One nautical mile separation between wind farm and the edge of the TSS lanes;
  - Straight line edges parallel to TSS lanes (no protruding turbines); and
  - At least one line of orientation in final layout;
- Regular updates, including the positions of installed and partially installed structures, to the local marine community through social media, the USCG LNM, and active engagement with Maritime Association of the Port of New York and New Jersey Harbor Safety, Navigation, and Operations Committee;
- Ongoing consultation with stakeholders, in particular, in relation to the submarine export cable(s);
- The potential use of buoys and/or support vessels to mark temporary working areas or potential hazards (e.g., partially-installed structures);
- The operation of Project Support Vessels monitoring and communicating with vessels operating in the area;
- Regular safety zone updates to the local marine community through social media, the USCG LNM, and active engagement with Maritime Association of the Port of New York and New Jersey Harbor Safety, Navigation, and Operations Committee; and
- Dynamic construction and safety zones where feasible, focusing on sites being actively worked on, to minimize the extent of the affected area.

8.7.3.2 Operations and Maintenance

During operations, Empire will commit to the following avoidance, minimization, and mitigation measures to mitigate the impacts described in Section 8.7.2.2:

- The wind turbines and offshore substation will be properly marked and lit in accordance with IALA O-139 and USCG/BOEM requirements (see **Section 3** for additional details on the proposed marking and lighting measures);
- Project Layout Rules will be implemented, to the extent practicable, to facilitate ease of navigation in and around the wind farm to minimize allision risk;
- Project-enacted "Developable Area" will facilitate a 1-nm (1.8-km) separation distance from vessel traffic within neighboring TSS lanes;
- Information will be provided to NOAA so that charts (nautical and electronic) can be updated with the location of applicable Project infrastructure;
- Wind turbines will have a minimum blade clearance of 85 ft (26 m) above mean higher high water;
- Compliance by vessels associated with the Project with international and flag state regulations including the COLREGs and the SOLAS;
- The development and implementation of an ERP;
- Marine coordination for vessels associated with the Project (i.e., a central coordination hub from which all Project vessel movements will be managed, and third-party traffic will be monitored);
- Utilization of existing TSSs, maintained channels, and transit lanes by vessels associated with the Project to comply with existing uses and management of the surrounding waterway, to the extent practicable;
- Closed circuit television installed on certain structures within the array for the purpose of monitoring activity within the site;
- Locations of the wind farm structures will be provided directly to fishermen for the purpose of displaying the wind farm electronically via their on-board equipment;
- Facilitation of USCG SAR trials within and near the Lease Area;

- Operational SAR Procedures in place that detail how the Project will cooperate with USCG in the event of an emergency situation;
- The development of a marine pollution contingency plan (e.g., **Appendix F Oil Spill Response Plan**);
- The establishment of operational procedures for Project vessels such as entry/exit points and designated routes;
- Provision of self-help capability (i.e., any onshore or vessel/turbine-based resources or facilities available to Empire that may assist in the event of an emergency);
- Cable routing study, including geophysical and geotechnical surveys, stakeholder input and environmental and social constraints to develop submarine export cable routes that avoid or minimize interactions with anchorage areas;
- Completion of a Cable Installation Plan, detailing how cable installation will be managed to ensure disruption is minimized, in particular within port approaches, and monitored once installation is complete;
- Completion of a CBRA to identify appropriate cable burial depths and to identify any needs for additional cable protections; and
- Periodic monitoring of cable burial and protection measures to ensure they remain effective, with regular monitoring of protection in vicinity of areas of existing anchoring as identified within the cable burial risk assessment.

In addition, during operations, Empire will consider the following avoidance, minimization, and mitigation measures to mitigate the impacts described in Section 8.7.2.2:

- Potential real-time monitoring of Project cable assets using AIS to proactively notify vessels of potential interactions.

8.7.3.3 Decommissioning

Avoidance, minimization, and mitigation measures proposed to be implemented during decommissioning are expected to be similar to those implemented during construction and operations, as described above in Section 8.7.3.1 and Section 8.7.3.2. A full decommissioning plan will be approved by BOEM prior to any decommissioning activities, and all avoidance, minimization, and mitigation measures for decommissioning activities will be proposed at that time.

8.7.4 References

Table 8.7-3 Data Sources

Source	Includes	Available at	Metadata Link
BOEM	Lease Area	https://www.boem.gov/BOEM-Renewable-Energy-Geodatabase.zip	N/A
BOEM	State Territorial Waters Boundary	https://www.boem.gov/Oil-and-Gas-Energy-Program/Mapping-and-Data/ATL_SLA(3).aspx	http://metadata.boem.gov/geospatial/OCS_SubmergedLandsActBoundary_Atlantic_NAD83.xml
MARCO	2013 Mid-Atlantic Recreational Boater Survey Density	http://portal.midatlanticocean.org/static/data_manager/data-download/Zip_Files/Recreation/RecreationalBoaterSurvey_MidAtl.zip	http://portal.midatlanticocean.org/static/data_manager/metadata/html/RecBoaterSurvey_All_Activities_Pts_metadata.html

Table 8.7-3 Summary of Data Sources (continued)

Source	Includes	Available at	Metadata Link
NHD	Hudson River	https://www.usgs.gov/core-science-systems/ngp/national-hydrography/access-national-hydrography-products	N/A
NOAA	NOAA Anchorage Area	ftp://ftp.coast.noaa.gov/pub/MSP/AnchorageAreas.zip	https://inport.nmfs.noaa.gov/inport/item/48849
NOAA	Shipping: Speed Restrictions (Right Whales), Precautionary Area, Separation Zone, Traffic Lane/Fairway, Area to Be Avoided	http://encdirect.noaa.gov/theme_layers/data/shipping_lanes/shippinglanes.zip	https://inport.nmfs.noaa.gov/inport-metadata/NOAA/NOS/OCS/inport/xml/39986.xml
NOAA NCEI	Bathymetry	https://www.ngdc.noaa.gov/mgg/coastal/crm.html	N/A
Northeast Ocean Data	AIS (2017)	http://www.northeastoceandata.org/files/metadata/Themes/AIS2017_Annual.zip	http://www.northeastoceandata.org/files/metadata/Themes/AIS/AllAISVesselTransitCounts2017_Monthly.pdf
Northeast Ocean Data	2012 Northeast Recreational Boater Survey Density	http://www.northeastoceandata.org/files/metadata/Themes/Recreation.zip	http://www.northeastoceandata.org/files/metadata/Themes/Recreation/RecreationalBoaterRouteDensity.pdf
USACE	USACE Maintained Channel	http://encdirect.noaa.gov/theme_layers/data/coastal_maintained_channels/maintainedchannels.zip	https://inport.nmfs.noaa.gov/inport/item/39972
USCG	Coast Guard District Boundary	https://catalog.data.gov/dataset/u-s-coast-guard-uscg-districts	N/A

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8.8 Commercial and Recreational Fishing

This section provides an overview of the regulatory environment for commercial and recreational fishing, summarizes fisheries outreach activities, and describes the commercial and recreational fishing resources within the Project Area. Potential impacts to commercial and recreational fishing as a result of construction, operations, and decommissioning are discussed. Proposed Project-specific measures adopted by Empire as a result of outreach and engagement are also described, which are intended to avoid, minimize, and/or mitigate potential impacts to commercial and recreational fishing.

Other sections related to commercial and recreational fishing activity include:

- Physical and Oceanographic Conditions (Section 4.1.3);
- Water Quality (Section 4.2);
- Underwater Acoustics (Section 4.4.2);
- Benthic Resources and Finfish, Invertebrates, and Essential Fish Habitat (Section 5.5);
- Recreation and Tourism (Section 8.3);
- Marine Transportation and Navigation (Section 8.7);
- Essential Fish Habitat Assessment (Appendix U);
- Fisheries Mitigation Plan (Appendix V); and
- Navigation Safety Risk Assessment (Appendix DD).

As described in **Section 5.5 Benthic Resources and Finfish, Invertebrates, and Essential Fish Habitat**, NOAA Fisheries is responsible for managing marine and anadromous fisheries within the U.S. Exclusive Economic Zone (EEZ), which extends from 3 to 200 nm (5.6 to 370.4 km) off the coast of the United States. Individual states are responsible for fishery management from their coastline out to 3 nm (5.6 km). NOAA Fisheries works with federal, regional, state, and territorial agencies to promote the sustainable management of U.S. fisheries in the EEZ.

In federal waters, most fisheries resources are managed under the Magnuson-Stevens Fisheries Conservation and Management Act (MSFCMA; 16 U.S.C. §§ 1801 *et seq.*) through eight Regional Fishery Management Councils (FMCs) that develop species-specific Fisheries Management Plans (FMPs). These FMPs establish fishing quotas, seasons, and closure areas, as well as protecting EFH. The Regional FMCs work in conjunction with NOAA Fisheries to assess and predict the status of fish stocks, set catch limits, promote compliance with fisheries regulations, and reduce bycatch. The NOAA Fisheries Office of Sustainable Fisheries, Atlantic Highly Migratory Species Management Division is responsible for tunas, sharks, swordfish, billfish and other species that travel long distances across domestic and international boundaries in U.S. Atlantic Ocean, Gulf of Mexico, and Caribbean waters (NOAA Fisheries 2017a). The Highly Migratory Species Division also liaises with international agencies such as the International Commission for the Conservation of Atlantic Tunas, which is responsible for the conservation of tunas and tuna-like species in the Atlantic Ocean and adjacent seas. Some major fisheries in the Project Area occur in both the Mid-Atlantic and New England regions. To avoid redundancy and conflict, each species is managed by only one FMC (for example, the Mid-Atlantic Fishery Management Council [MAFMC] manages longfin squid, surfclam, and summer flounder while the New England Fishery Management Council [NEFMC] manages silver hake, monkfish, and herring). The FMC management areas are depicted in **Figure 8.8-1**. A complete list of managed species with EFH in the Project Area is provided in **Appendix U Essential Fish Habitat Assessment**. In addition, the Atlantic States Marine Fisheries Commission (ASMFC) contributes to the management of surfclam, striped bass, lobster, Jonah crab, and several other commercial and recreational fisheries of economic importance to Atlantic coastal states.

Congress amended the MSFCMA by enacting the Modernizing Recreational Fisheries Management Act of 2018 (S. 1520, "Modern Fish Act") to expand recreational fishing opportunities through enhanced marine fishery conservation and management. The Modern Fish Act recognizes differences between recreational and commercial fishing and directs management agencies to adopt management approaches suitable to each sector.

Within and adjacent to the Project Area, commercial and recreational fisheries are further managed by state regulatory agencies under various ocean management plans that are developed at the state level (New York, New Jersey) or at the regional level (MAFMC). Each coastal state has its own structure of agencies and plans that govern fisheries resources. In New York, the NYSDEC's Division of Marine Resources (DMR) administers all laws relating to marine fisheries (NYCRR § 6:1 Subchapter C - Fishing) and is responsible for the development and enforcement of regulations pertaining to marine fish and fisheries in New York state waters. The DMR is divided into three Bureaus: Marine Fisheries, Shellfisheries, and Marine Habitat. In New Jersey, the NJDEP's Bureau of Marine Fisheries administers all laws relating to marine fisheries (§ 7:25, Subchapter 18 – Marine Fisheries) and is responsible for the development and enforcement of state and federal regulations pertaining to marine fish and fisheries in New Jersey state waters, including the management of diadromous species (e.g., American eel, striped bass, river herring, sturgeon).

The NYSDEC DMR and NJDEP also work in cooperation with adjoining states and federal agencies concerning marine fisheries regulations through the ASMFC, a formally recognized embodiment of the interstate cooperative principle. The NYSDEC DMR and NJDEP Bureau of Marine Fisheries leverage a team of experienced fisheries management professionals who initiate, evaluate, select, and implement fisheries management policy and regulations. The ASMFC also manages the lobster fishery within inter-state waters (ASMFC 2019a). This fishery is currently managed under Amendment 3, Addenda I through XXVI to the Interstate FMP for American Lobster. Since 2015, the ASMFC has also managed the Jonah crab fishery within this same range under the Interstate FMP and Addenda I through III (ASMFC 2019b). Under the Jonah crab FMP, only lobster permit holders can participate in the directed fishery for this species. Lobsters are managed under three separate stocks: Gulf of Maine, Georges Bank, and Southern New England, divided into seven management areas. The Project Area is located entirely within the Southern New England Stock and spans Management Area 4. The New York and New Jersey Coastal Zone Management (CZM) programs are primarily concerned with impacts to coastal habitat, including fish habitat, and work closely with the NYSDEC DMR and NJDEP.

The New York Ocean Action Plan was published in 2016. This plan serves as the blueprint for protection and sustainable use of the state's marine waters. The plan has four interconnected goals that include: (1) Ensure the ecological integrity of the ocean ecosystem, (2) Promote economic growth, coastal development, and human use of the ocean in a manner that is sustainable and consistent with maintaining ecosystem integrity, (3) Increase resilience of ocean resources to impacts associated with climate change, and (4) Empower the public to actively participate in decision-making and ocean stewardship. In New York waters, the DMR is charged with oversight of marine habitat and fisheries and with implementing the Ocean Action Plan within the framework of existing regulations.

The New Jersey Offshore Wind Strategic Plan was published in 2020. This plan is intended to serve as a roadmap for successful implementation of New Jersey's offshore wind energy goals, with a focus on the following areas of analysis, (1) Environmental and natural resource protection, (2) Commercial and recreational fisheries, (3) Supply chain and workforce development, (4) Ports and harbors, and (5) Energy markets and transmission.

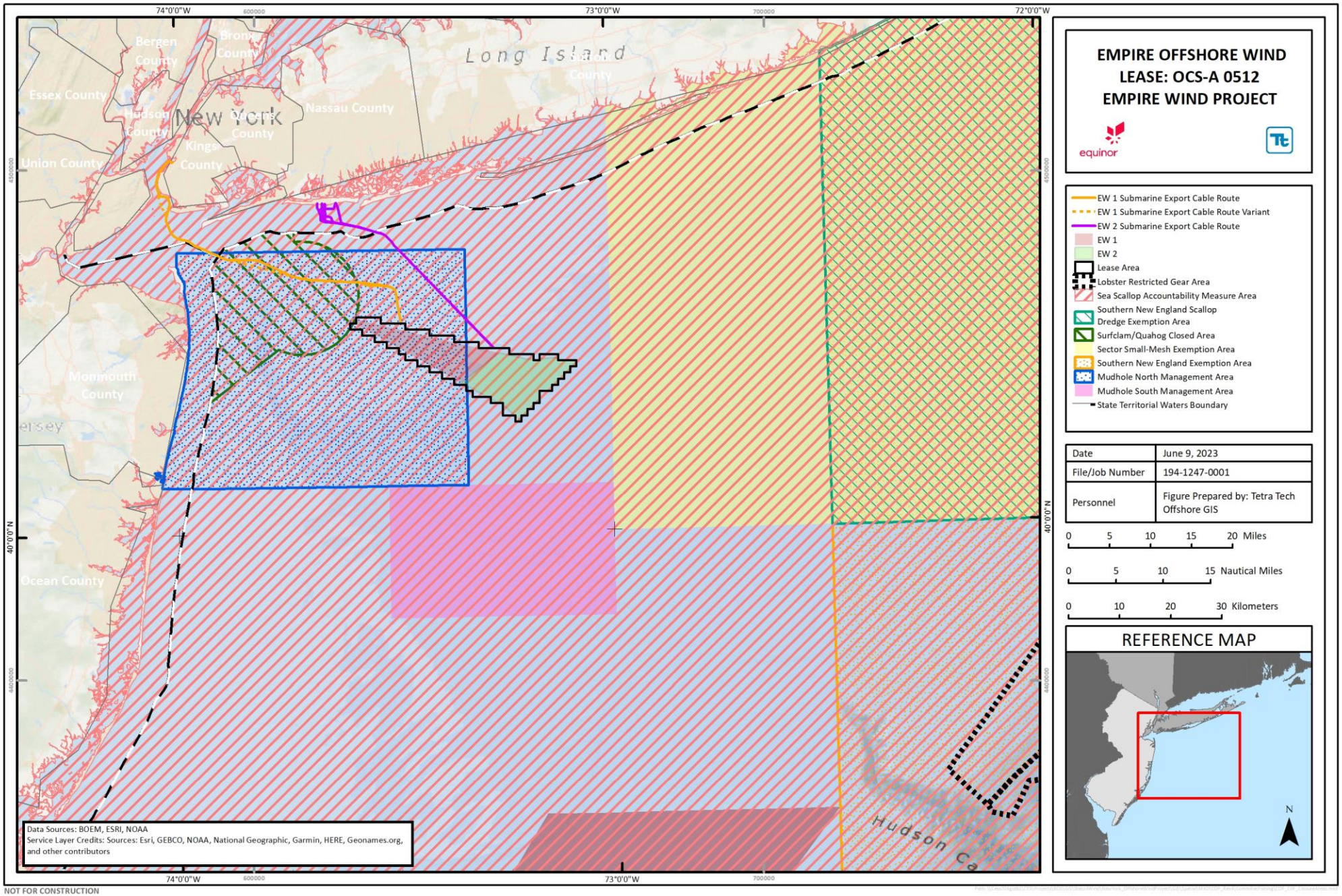


Figure 8.8-1 Fishery Management Area Overlap within and adjacent to the Project Area

At the regional level, the Mid-Atlantic Regional Ocean Action Plan was developed in 2016 (Mid-Atlantic Regional Planning Body 2016). Both New York and New Jersey participated in the Mid-Atlantic Regional Ocean Council (MARCO) during the plans' development to ensure that it would include a management framework designed to be implemented within the existing regulatory structure, with the relevant agencies coordinating review and approval of proposed ocean projects.

8.8.1 Data Relied Upon and Studies Completed

8.8.1.1 Fishing Vessel Monitoring Systems

NOAA Fisheries uses a VMS to keep track of some fisheries under its jurisdiction (50 CFR § 660.14). Many types of commercial fishing vessels are monitored with installed equipment, which provides position and activity information while operating. Data from the monitoring systems are relayed to the regulatory agencies (e.g., NOAA Fisheries) in order to provide input to management decisions that affect the fishery. Publicly available data from several monitoring systems were evaluated and incorporated into this document to help characterize fishing activities in the Project Area, as described in **Table 8.8-1** and in the following sections.

Table 8.8-1 Monitoring Systems Used in the GARFO Region

Monitoring System	Vessel Size	Fisheries Monitoring System Requirements in the Greater Atlantic Region Fisheries Office (GARFO) Region
VMS	All sizes	• Regularly records/reports location via satellite transmitter • Required under the following federal permits: o full-time or part-time limited access scallop, or limited access general category scallop permit o occasional limited access scallop permit when fishing under the scallop area access program o limited access monkfish, occasional scallop, or combination permit electing to provide VMS notifications o limited access multispecies permit when fishing on a category A or B day at sea o surfclam or ocean quahog open access permit o Maine mahogany quahog limited access permit o limited access monkfish vessel electing to fish in the Offshore Fishery Program o limited access herring permit o open access herring Areas 2 and 3 permit o limited access mackerel permit o longfin squid/butterfish moratorium permit

Table 8.8-1 Monitoring Systems Used in the GARFO Region (continued)

Monitoring System	Vessel Size	Fisheries Monitoring System Requirements in the Greater Atlantic Region Fisheries Office (GARFO) Region
Vessel Trip Reports (VTR)	All sizes	• Required of all operators of NOAA Fisheries GARFO-permitted-vessels (except for those vessels that possess only a commercial lobster permit) • Single, self-reported latitude/longitude location, with no required interval (multiple tows can be included in a single VTR) • VTR must be issued for each change in fishing area or fishing gear type, and must include the haul back location • Vessels are only required to have an additional VTR if they move outside a NOAA grid block or switch gear type
AIS	> 65 ft. (20 m)	• Only required for vessels > 65 ft (20 m) length, within 12 nm (22 km) of coastline • Signal transmitted every 30 seconds or 3 minutes • Some fishing vessels classify themselves as "other" so AIS data for fishing may underrepresent the actual fishing effort across some FMPs

Several fisheries stakeholders have questioned the accuracy of agency vessel monitoring data in that it may not adequately represent what is occurring in each fishery. To address this potential data gap, Empire utilized stakeholder feedback and local fisheries-specific knowledge in its assessments, in addition to the agency data, which provides additional context and understanding of the available data. While no single dataset is ideal for mapping activity independently, each provides initial indications for further research regarding specific fisheries and their geospatial locations. The MARCO and the Northeast Ocean Data Portal's VMS and VTR data density maps for commercial fishing provide several data limitation disclaimers, including the inability to distinguish among fishing activity, vessel transit, and other vessel activities in density grid products. Although industry input was used to indicate the speed threshold best correlated with actual fishing, the maps likely include some non-fishing activities that occur at low speeds, such as processing catch, sorting, drifting, or idling. The most accurate interpretation of these map products is relative vessel presence related to fishing activity.

Vessel Monitoring System

The VMS is a satellite surveillance tracking system primarily used to monitor the location and movement of commercial fishing vessels in the U.S. EEZ. The system uses satellite-based communications from onboard transceiver units, which certain vessels described in this section are required to carry. The transceiver units send position reports that include vessel identification, time, date, and location, and are mapped and displayed on the end user's computer screen (NOAA Fisheries 2018a). The publicly available heat maps of VMS datasets broadly characterize commercial fishing vessel activity in the Northeast and Mid-Atlantic U.S. regions based on VMS data from 2006 through 2018 (full calendar years). The relative amount of vessel activity is indicated qualitatively from high (red) to low (blue) (MARCO 2019). VMS data is one way to obtain spatial and temporal information and indications of intensity regarding commercial fishing. Vessels typically send VMS positions once per hour, but the interval may be shorter in some cases. This provides valuable information for fisheries management, but the intervals between signals make tracking less precise than that achieved by the Automatic Identification System (AIS).

According to available NOAA VMS data, for the years 2011 through 2018, moderate to high levels of fishing vessel activity (transits and fishing, depicted in **Figure 8.8-2**) existed within portions of the Lease Area and/or

submarine export cable siting corridors for species regulated under some FMPs, while the activity within the Lease Area and/or submarine export cable siting corridor for other FMPs has been quite low or non-existent in recent years. Maps that infer fishing activity by filtering out vessel speeds less than 4 to 5 knots (7.4 to 9 km/h) are included for each of the FMPs in **Section 8.8.3.2**. Commercially harvested species are caught using a variety of gear types within the Project Area, several of which are described in **Section 8.8.3.2**. Maps of collective annual VMS data for all fisheries combined (transits and activity), compiled from 2011 through 2018, are shown in **Figure 8.8-2**. In this figure, it should be noted that not all fisheries require VMS and the implementation of that requirement within each fishery varies. As such, these data are not representative of all fishing activity.

Vessel Trip Reports

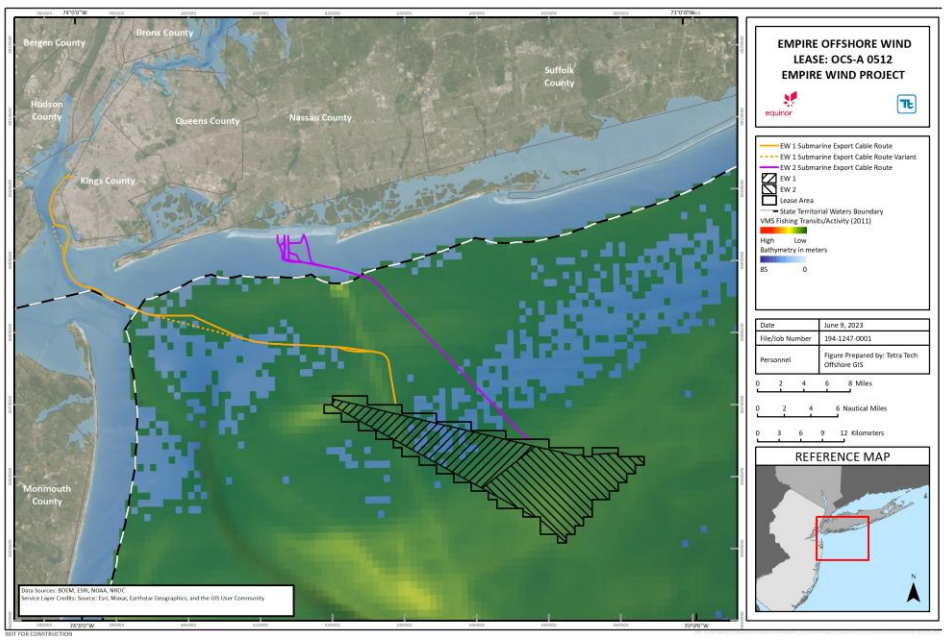
Vessel Trip Reports are required of all operators of NOAA Fisheries Greater Atlantic Region Fisheries Office (GARFO)-permitted vessels (except for those vessels that possess only a commercial lobster permit) and are required for every fishing trip regardless of where the fishing occurred or what species are targeted. In general, a VTR includes information regarding what type of commercial trip occurred (head boat, charter boat, commercial operation), one set of coordinates per chart area where the catch occurred, and details regarding the owner and operator of the vessel.

Unlike VMS, which continuously monitors vessels, VTRs include a single, self-reported latitude/longitude location based on where a vessel began to haul back their gear. These locations are identified within an established 3-digit NOAA Fisheries chart area. For a given trip, an additional VTR is required only if the vessel moves their fishing location to a new chart area or changes the type of gear, mesh size, or ring size they are using (NOAA Fisheries 2018b). VTR data may therefore be more indicative of a general location where a vessel is fishing, compared to more continuous monitoring methods such as VMS or AIS.

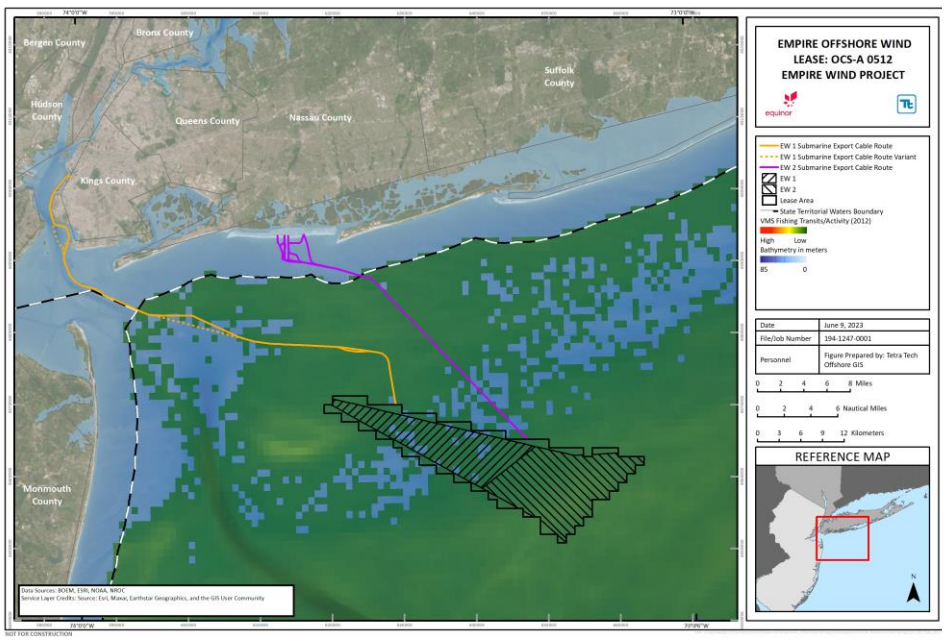
Automatic Identification System

The AIS is an automated, autonomous tracking system that is used extensively in the maritime world for the exchange of navigational information between AIS-equipped terminals. Static and dynamic vessel information can be electronically exchanged between AIS receiving stations (onboard, ashore, or satellite). Since December 2004, the IMO requires all passenger vessels, as well as all commercial vessels over 299 gross tons that travel internationally, to carry a Class A AIS transponder. Smaller vessels, including many U.S. fishing boats, can also be equipped with a Class B AIS transponder.

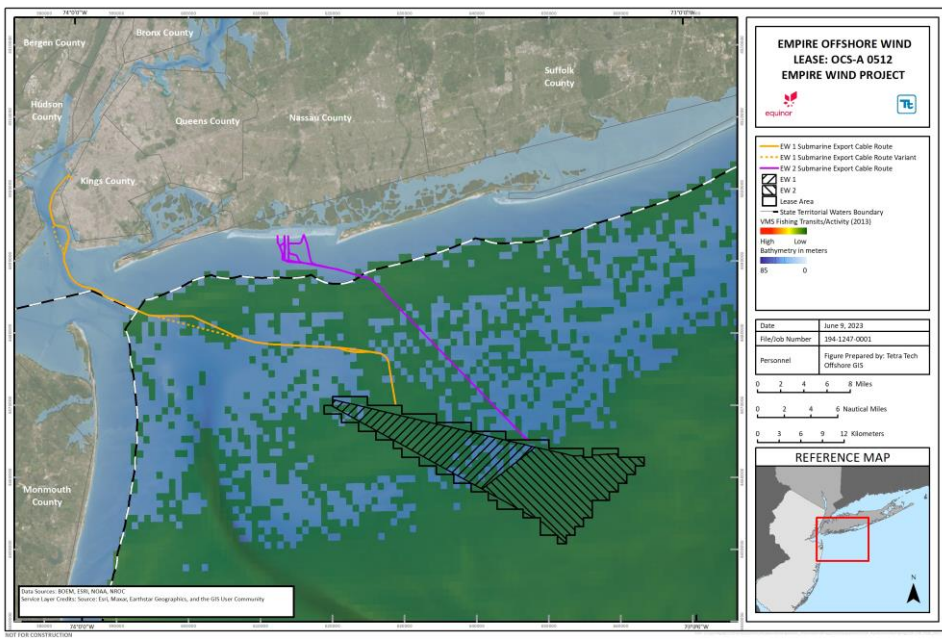
As a system originally designed in large measure to support collision avoidance, in many areas AIS enables very precise vessel tracking. One advantage of AIS over VMS is that AIS signals are sent by a vessel at intervals ranging from a few seconds to three minutes. This can enable precise tracking of individual vessels, with identification, position, speed, heading, and other data. These VHF radio signals are public, received by antennas of other vessels as well as coastal receivers. Where sufficient data quality and software are available, history tracks of vessels using different fishing gear types can be recorded and measured with a high degree of precision, to show fishing grounds, towing speeds, patterns and maneuverability. Since 2016, U.S. commercial fishing vessels over 65 ft (20 m) long have been required to carry AIS but are only required to transmit within 12 nm (22 km) of the coast. Networks of coastal antennas and satellite antennas have made real-time and historic data available for detailed analysis. A significant part of the fishing fleet does not broadcast AIS, but the vessels that do broadcast provide valid and valuable information. In addition, they enhance the safety of all vessels in the area—collision avoidance was a fundamental motivation for development of AIS. **Figure 8.8-3** shows a sample daily image.



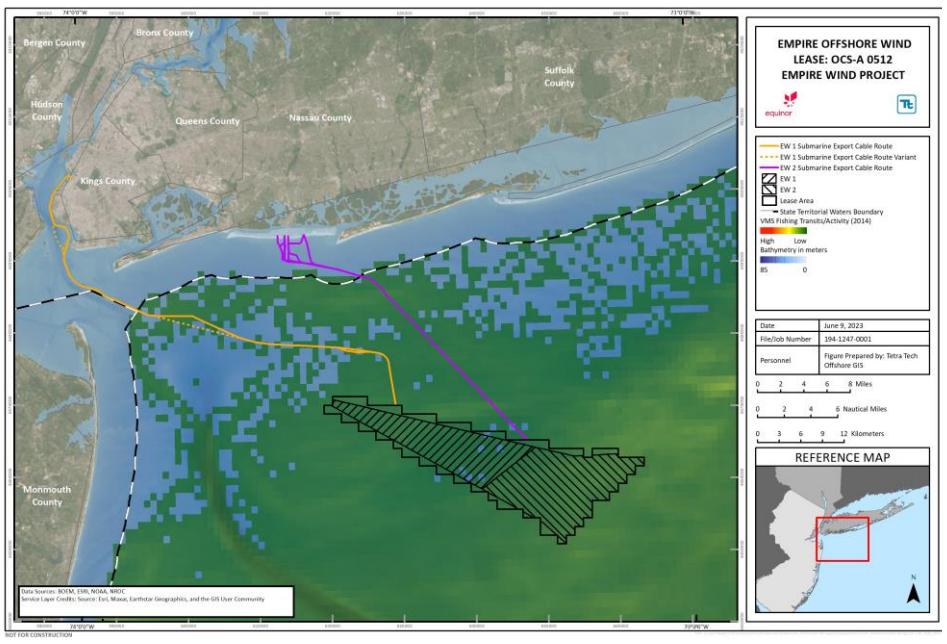
2011



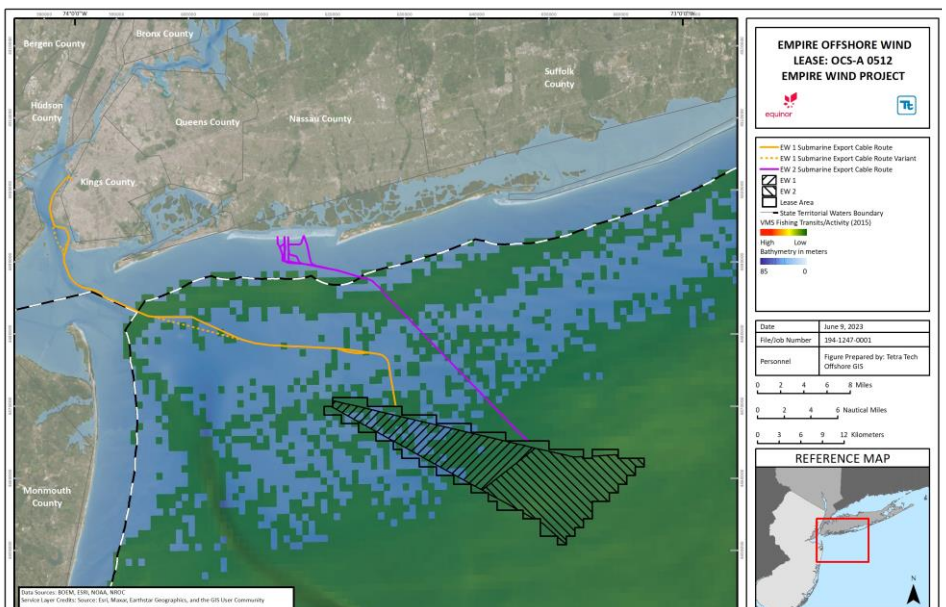
2012



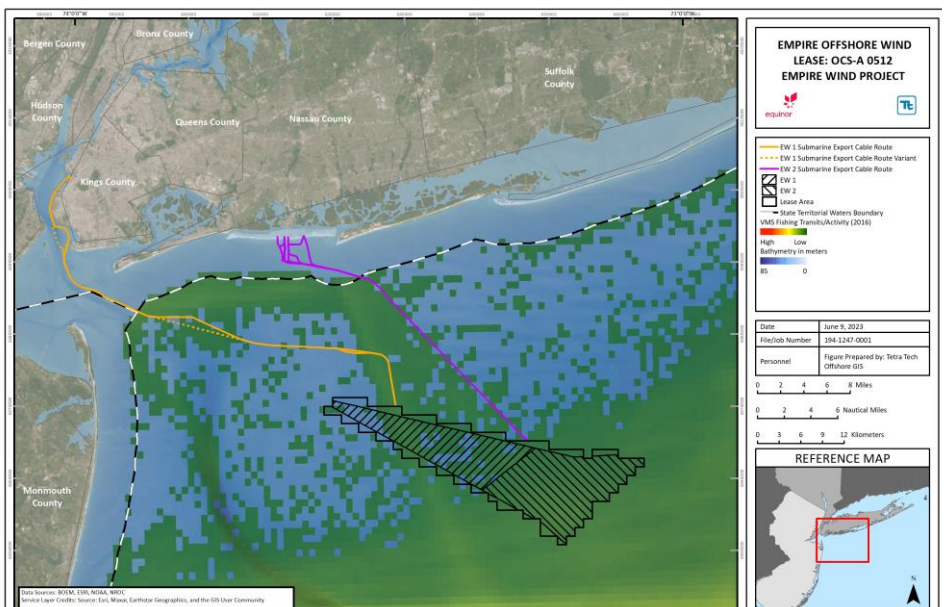
2013



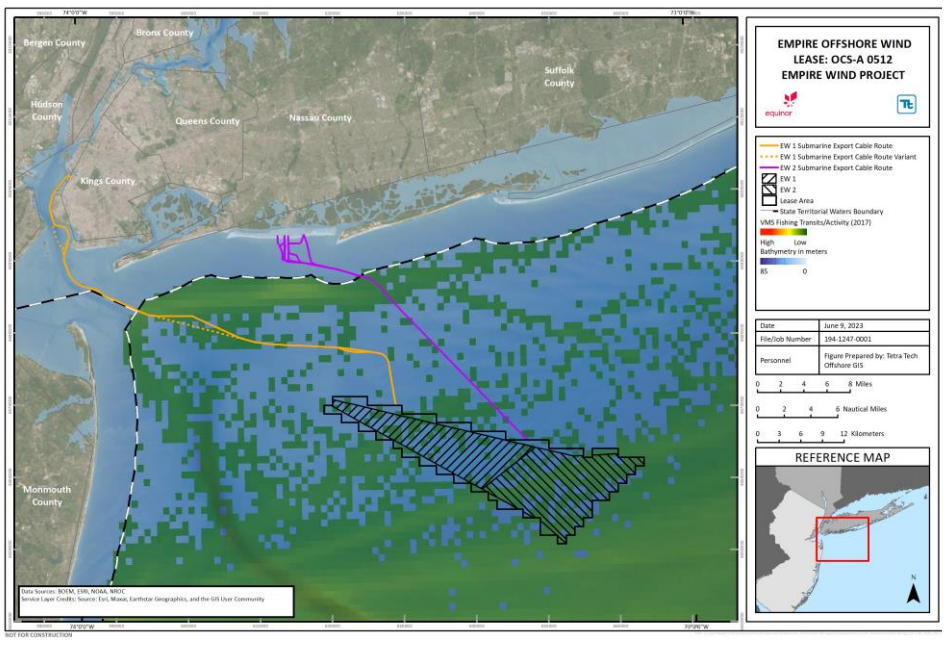
2014



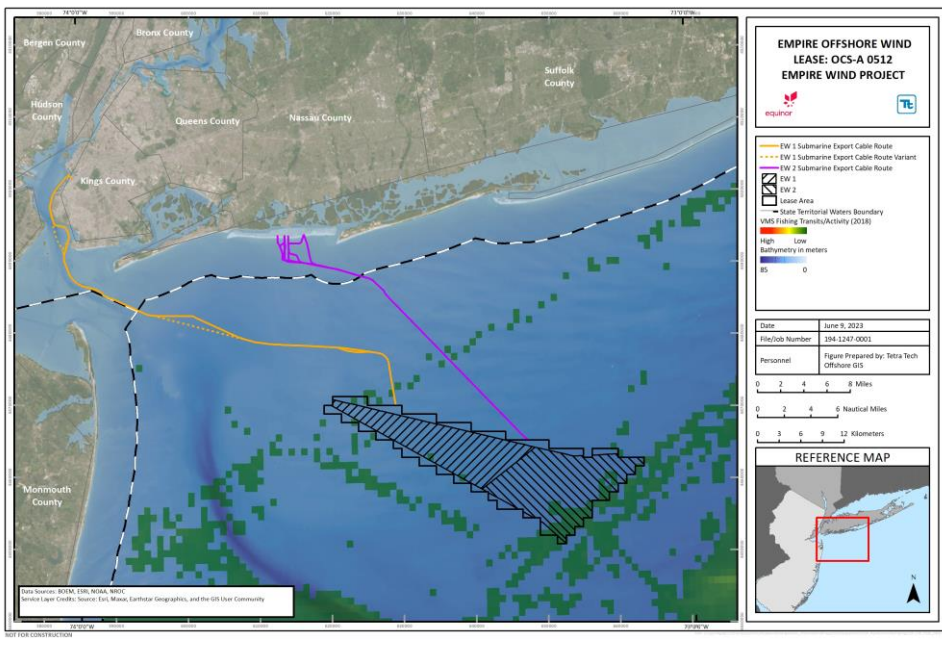
2015



2016



2017



2018

Figure 8.8-2 Annual VMS Data Indicating Fishing Vessel Transits and Activity within and adjacent to the Project Area (NOAA 2018)

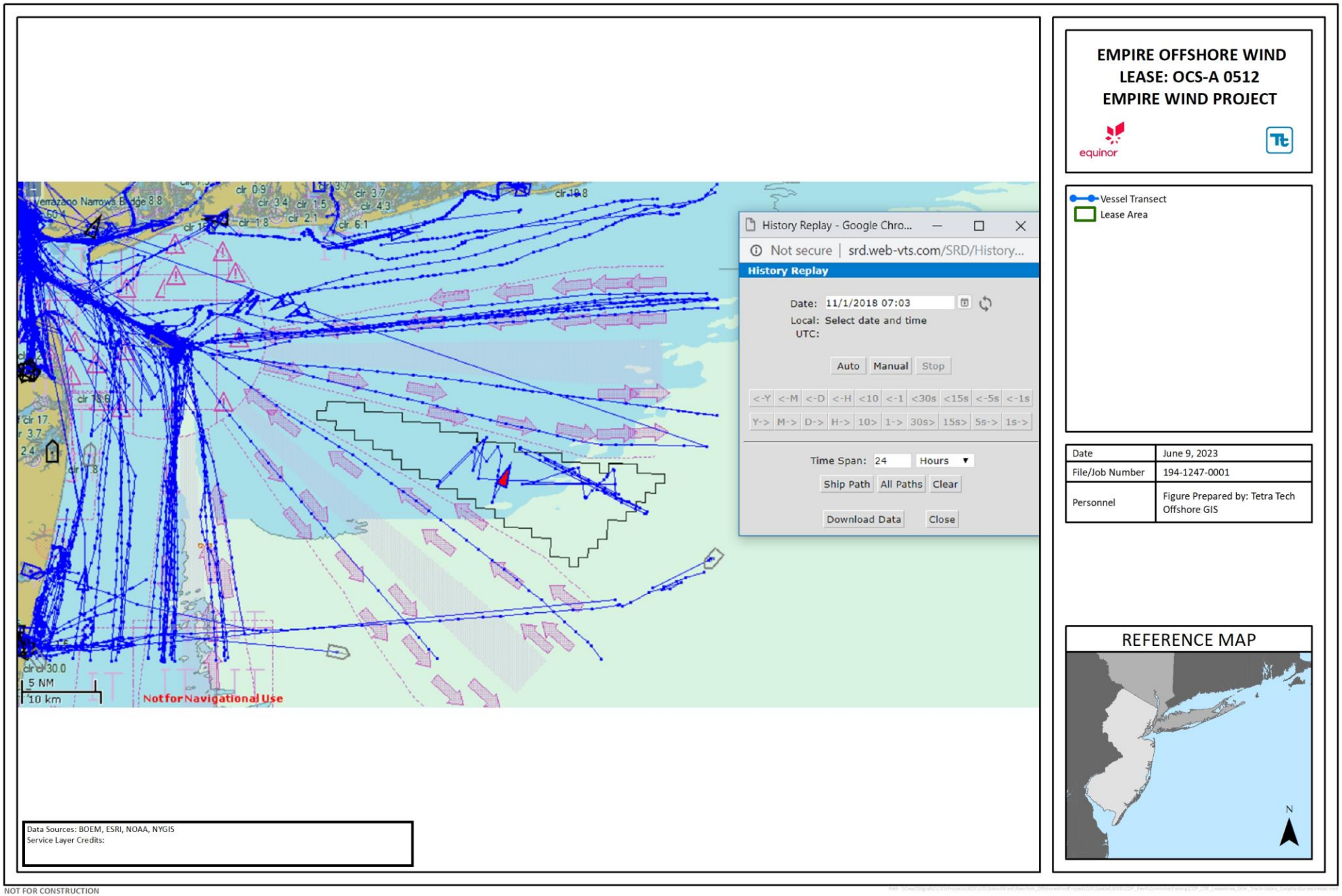


Figure 8.8-3 Example of one 24-hour track history of Project Area.

Note: Tracks in the Lease Area are from Empire's geophysical survey vessel (shown here in red)

8.8.1.2 Fishing Activity Survey

In addition to the datasets described above, and in order to better understand the level of commercial and recreational fishing effort that takes place within the Lease Area, Empire initiated a Fishing Activity Survey in 2018 consisting of observations from the Offshore Fisheries Liaison Representative (OFLR) during the geophysical survey to document fishing activity within the Lease Area during survey activities. The survey vessel included OFLRs, selected from a pool of commercial fishermen, to report on fishing activities observed. To help avoid potential conflicts during surveys, Empire Fisheries Liaison Officers (FLOs) conducted extensive pre-survey outreach to commercial fishermen candidates, including mass e-mail updates, phone calls, and dock visits.

OFLRs were present on vessels that conducting geophysical surveys on behalf of Empire for offshore wind-related activities. The main purpose was to ensure good communications with fishing vessels encountered on site, such as disseminating information, responding to queries from fishing vessels and acting as a conduit for information offshore between the FLO and fisheries stakeholders within or near the site. The primary responsibilities of the OFLR were:

1) To maintain daily contact with, and keep records of, fishing vessels observed to be within the vicinity of the work areas of wind farm related vessels;

2) To keep the masters and watch officers of wind farm-related vessels informed of fishing vessels in the vicinity of their working area, and the gears and modes of operation of such fishing vessels;

3) To keep fishing vessels advised of the wind farm vessels' locations, operations, schedules, safety zones, and health and safety restrictions; and

4) To provide on-site ad-hoc assistance and advice to wind farm related vessel officers with the objective of minimizing hindrance to fishing activities, avoid conflicts, and ensure the commitments in the fisheries communication plan are adhered to.

On survey vessels, OFLRs provided information on seabed characteristics and fishing grounds, based on their experience and subject to confidentiality of fishermen's operations. This information helped to identify areas with minimal interactions with fishing. A top priority is to safeguard the confidentiality of information considered sensitive by individual fishermen and/or groups of fishermen. OFLRs typically provide non-confidential information that is common knowledge among area fishermen, but not otherwise available to the general public.

During the 2018 and 2019 geophysical surveys, Empire monitored AIS data continuously in and around the Project Area. Empire understands that many fishing vessels in the region do not broadcast AIS; however, a substantial number do. This provides Empire the potential to identify a fleet that may be approaching or working along submarine export cable siting corridors, which the surveys may come into conflict with. Empire's standing orders to survey vessels include that the survey should avoid any interference with active fishing and static gear. To accomplish this, survey vessels were provided all available information about local fishing, including daily 24-hour history of area AIS tracks. **Figure 8.8-3** shows a sample daily image. No negative interaction with fishing vessels has been reported on any surveys to date, apart from gear that appears to have been abandoned or lost and considered derelict. Occasional contact with GARFO for non-confidential, general fleet information provided another source of timely fleet movement data. These sources, coupled with onboard radar and visual watch by fishermen representatives, have provided a comprehensive picture of fishing activity in the Project Area for the duration of marine surveys to date.

As part of the OFLR program, Empire had nine different commercial fishermen serve as OFLRs aboard survey vessels working in the Lease Area and along submarine export cable siting corridors. Empire determined this to be an important part of fisheries outreach, both to avoid potential conflicts between surveys and fishermen at sea, and to enable fishermen from different ports to understand the Project first-hand. Through Project engagement efforts during these survey periods, local fishermen were expected to become increasingly familiar with Project staff, Project outreach efforts, and the measures taken to gather detailed information about the Project Area. Empire actively recruited OFLRs from fishermen's organizations and companies spanning from New Jersey to Massachusetts. Of that group, three fishermen from New Jersey and six from Rhode Island have served aboard Empire survey vessels.

In areas where Empire has reason to expect concentrations of static fishing gear, such as lobster pots and gillnets, Empire has also chartered a fishing vessel as a scout boat to examine the area prior to survey arrival. The duties of such a vessel may include identifying gear set in the survey area, reporting its location, helping to determine whether it is likely to interact with planned activities, informing Empire and/or the survey vessel, and possibly contacting the gear owner to consider a request to move the gear temporarily.

The effectiveness of such measures was demonstrated when the 2018 survey encountered a high concentration of lobster pots during geophysical surveys. The survey at that location was suspended until the May 2019 Lobster Area 4 closure, when it was expected there would be no fixed gear in the water during the closure. At that point, towed sensor survey activities resumed. As this survey extended into the period of the area's re-opening, a scout boat was again retained to ensure that geotechnical sampling could be conducted in areas that avoided fixed gear. Frequent dialogue with area lobstermen allowed completion of programmed activities. Prudent measures such as the above have enabled Empire to avoid any gear or fishing conflicts to date, since the commencement of survey activities in 2018.

8.8.1.3 Outreach and Engagement

Since obtaining the Lease in 2017, Empire has coordinated with stakeholders with an interest in commercial and recreational fishing. Agency outreach is detailed in **Appendix B Summary of Agency Engagement**. Project-specific fisheries stakeholder outreach initiatives are summarized in **Table 8.8-2**, and detailed in **Appendix V Fisheries Mitigation Plan** and Empire's regularly updated Fisheries Communication Plan.[15] A partial list of organizations and agencies the Project has engaged is provided in **Table 8.8-2**.

Fishing and Offshore Wind Coexistence

Empire's approach and philosophy to project development is premised on the belief that the fishing industry and offshore wind energy developments can coexist. Empire believes that coexistence can be promoted by carefully evaluating existing uses of the Lease Area, avoiding impacts where feasible, or reducing impacts through mitigation. Marine users will not be restricted from fishing or transiting throughout the operational wind farm areas. Restrictions, if applicable, will likely be limited to the application of standard safety zones during the construction phase, and operational safety zones around manned or sensitive offshore platforms, or in some cases, access points to turbines (as discussed in Section 8.8.4). The objective of coexistence can be realized through avoiding impacts where feasible and, where this is not feasible, reducing impacts through mitigation. Achieving this objective will require open and regular communication between Empire and the fishing industry starting with the development and survey phase, leading up to permitting and construction, through construction, operation, and decommissioning of the wind farm(s).

[15] https://www.equinor.com/en/what-we-do/empirewind.html

Empire Fisheries Liaison Officers (FLOs) have more than 50 years' combined experience working with fisheries in the Northeast. The FLOs coordinated with fisheries stakeholders to facilitate access to regional and local fishing data that helped inform the description of the Affected Environment (Section 8.8.3). Openness is a cornerstone of Empire's core values and will form the basis of Empire's fisheries liaison philosophy. Regular, open consultation will be key to ensuring all parties are well informed, are able to contribute to the discussions, and can work towards the objective of coexistence. The identification of potential impacts on the fishing industry may change if Project wind farm design and installation methodology changes or becomes more detailed during the various phases of development. The function of the FLOs is designed to coordinate activities appropriate to the life cycle of the wind farm throughout the permitting, construction, operation, and decommissioning phases, where the requirements and potential impacts may vary in each of these phases. Liaison activities are primarily based on best practice guidance and feedback from the fishing industry through consultation. The FLOs also draw on consultation with fisheries bodies, regulators, ports and harbors, and legislation, as well as the previous experience of Empire with fisheries liaison work in the offshore wind, oil, and gas industries. The best practice guidance will include, but not be limited to:

- Development of Mitigation Measures to Address Potential Use Conflicts between Commercial Wind Energy Lessees/Grantees and Commercial Fishermen on the Atlantic Outer Continental Shelf (BOEM 2014);
- Best Practice Guidance for Offshore Renewables Developments: Recommendations for Fisheries Liaison - Fishing Liaison with Offshore Wind and Wet Renewables Group (FLOWW), UK;
- Fishing and Submarine Cables Working Together – published by the International Cable Protection Committee; and
- Offshore Wind Best Management Practices Workshop (MAFMC 2014).

Effective dialogue and consultation have been facilitated by the establishment of a comprehensive contact database for local and regional fisheries associations, societies, groups, individual fishermen, and industry organizations. This database is maintained and regularly updated by the FLOs in conjunction with Empire. It should be noted that the fishing industry database will be used solely for the purposes of Empire's fisheries liaison activities and will not be made available to any individual or group outside of Empire's specific requirements. It is acknowledged and appreciated that some fisheries information, such as fishing sites, can be commercially sensitive. In these circumstances, Empire will work with the individual fishing organization/fisherman to establish confidentiality agreements for the purpose of sharing information with the objective of using it to work towards the objective of coexistence.

Fisheries Liaison Officers

Empire has contracted FLOs with the appropriate level of knowledge and first-hand experience in the fishing industry of the region to aid in communication with, and the dissemination and gathering of information between, Empire and the fishing industry. The FLOs will also support Empire in the identification of potential impacts, potential mitigation measures, and support with data gathering to inform the environmental and social impact assessments related to commercial and recreational fishing. The FLOs will be acting on Empire's behalf throughout all development stages, including during surveys and the operation and decommissioning phases. The primary roles and responsibilities of the FLOs are:

- To serve as the primary point of contact between the Project and the fleets;
- To log all interactions between the Project and fisheries representatives accurately and in a way that can be shared by Empire;

- To maintain a fisheries stakeholder database and contacts list for all identified fisheries operating within the vicinity of the offshore wind Lease Area and submarine export cable siting corridor throughout all stages the Project, covering the following details:
    - Vessel names, owners, registrations, and base ports;
    - Vessel radio call sign;
    - Dominant method(s) of fishing and any new technology developing within the fisheries;
    - Static gear surface marker details where applicable;
    - Target species as well as key by-catch species;
    - Fishing grounds relevant to the Project;
    - Fishing periods and operating practices of each key fishery; and
    - Feedback, comments and concerns voiced within consultations;
- To arrange meetings with the fishing industry throughout all stages of Project development, with frequency, timings, and method of communication appropriate to the level of activity at the time;
- To consult the relevant Fishing Industry Representatives;
- To maintain regular liaison with relevant fishermen's associations, individual skippers and vessel owners, NEFMC, MAFMC, and any relevant fisheries regulatory bodies as appropriate;
- To disseminate Project-related activities that could potentially interact with fisheries stakeholders, which will include:
    - A description of the survey activity or other works to be undertaken;
    - The location and timing of survey activities;
    - The coordinates of partially and/or fully installed infrastructure;
    - A preview of the schedule of works, where available;
    - Details of the vessels involved in the works, including the vessels contact details;
    - Survey and installation vessel transit routes to and from site;
    - The locations and timings of safety exclusion zones that may be required during installation or maintenance activities;
    - Health & Safety standards and COLREGS obligations;
    - Contractor obligations towards fisheries stakeholders; and
    - Conflict avoidance response procedures and reporting procedures;
- To be available to receive and relay back to Empire all relevant concerns from the fisheries stakeholders in respect of the various activities associated with the Project;
- To keep fisheries stakeholders updated of any changes in Project design or scheduling;
- To assess and advise Empire on the need for, and subsequently support Empire in organizing, safety vessels and OFLRs;
- To monitor fishing activity within the wind farm site and submarine export cable siting corridor during both EW 1 and EW 2, including during survey activities, to minimize disruption to fishing activities;
- To support Empire in making wind farm survey, installation, and operations and maintenance contractors aware of relevant fishing activities, including any relevant fishermen's sensitivities, and procedures for communicating with fishing vessels at sea; and
- To advise and support Empire on the procurement of OFLRs to be present offshore during survey activity.

Local/Regional Direct Outreach

This Section focuses on outreach within the fishing industry, with an emphasis on local/regional vessels and ports nearest to the Project Area, as well as both local and regional fishing activities based in ports that use the Project Area for harvest or transits. For the purpose of this analysis, the Project reviewed activity associated

with ports in New York, New Jersey, Connecticut, Rhode Island, and Massachusetts. These ports were selected based on observations, outreach, and published studies, including but not limited to the following:

- Initial outreach during 2017 to various stakeholders prior to the designation of a FLO, including several fleet owners, individual vessel operators, and other organizations;
- The presence and activities of vessels observed by qualified field personnel and industry representatives fishing in, and transiting through, the Project Area since 2017, as described in Section 8.8.2.2; and
- Empire outreach, especially through the FLO, to gather input from fishing community leaders and associations. Outreach efforts have included dock visits, written and spoken correspondence, open houses, attendance at council meetings, and participation in transit workshops.

Input from fishermen has played, and will continue to play an important role in the development of the Lease Area, particularly in designing spatial planning, marking, and lighting, and has provided guidance regarding:

- Dimensions of bottom trawl gear, gillnets, scallop dredges, and clam dredges;
- Primary and historically productive fishing grounds;
- Spatial and temporal use of Lease Area;
- Seabed characteristics of the Lease Area;
- Preferred tow headings by fishery;
- Duration and speed of tows by fishery;
- Common methods and local characteristics of squid, scallop, clam, monkfish, and recreational fisheries;
- Dynamics of interactions among mobile and static gear fishermen in the area;
- Main home ports of different fleets;
- Concerns and possible constraints on fishing within the Lease Area;
- Recreational fishing areas and methods;
- Concerns about efficient transit from both commercial and recreational fishermen; and
- Potential solutions to improve coexistence and mitigate possible impacts.

Since 2017, fisheries outreach has included more than 1,000 individuals, associations, companies, and agencies from Massachusetts to Maryland. Empire plans to continue to expand these efforts for the life of the Project. Commercial fishing interests across the region have been engaged through outreach to fishing companies, fleet managers, vessel owners, crewmen, agencies, and fishermen's associations. Recreational fishermen have also been engaged extensively, through presentations to fishermen's associations, trade shows, and meetings with small groups and individuals. The Empire FLOs have networked with prominent leaders in commercial ports. These networks continue to expand to reach as many interested parties as feasible. Finally, Empire representatives, including FLOs, are regular attendees at New England and Mid-Atlantic Fisheries Management Council meetings, taking the opportunity to present Project updates and use the events to solicit feedback with relevant stakeholders.

A summary list of fisheries stakeholders contacted by Empire since 2017 is provided in **Table 8.8-2**. Individual fishermen and vessel owners are excluded from the list to maintain privacy.

Table 8.8-2 Fisheries Outreach Conducted to-date, by Organization/Stakeholder

Contact	Regional	NY	NJ	RI	MA	CT
American Waterways Operators Tug and Barge		✔				
Americas Gleaned Seafood			✔			
Anglers Conservation Network			✔			
Anglers for Offshore Wind	✔					
Atlantic Capes Fisheries			✔			
Atlantic Red Crab Company					✔	
Atlantic Shellfish Inc			✔		✔	
Belford Seafood Coop			✔			
Blount Boats				✔		
Blue Harvest Fisheries					✔	
Boston Harbor Cruises					✔	
Captain Al Charters		✔				
Captain Lou Charters		✔				
Changing Tide Film					✔	
Codfather Fishing Charters		✔				
Commercial Fisheries Center of Rhode Island				✔		
Commercial Fisheries Research Foundation				✔		
Commercial Marine Expo	✔					
Cornell Cooperative Extension		✔				
East Hampton Board of Trustees Harbor Committee		✔				
Eastern Fisheries					✔	
Empire Fisheries						✔
Fisheries Survival Fund Council	✔					
Fishermen's Dock Cooperative			✔			
Fishermen's Voice	✔					
Freeport Tuna Club		✔				
Garden State Seafood Association			✔			
GARFO Policy Analysts and Reporting Specialists	✔					
Jersey Coast Anglers Association			✔			
Lamonica Fine Foods			✔			
Long Island Commercial Fishermen’s Association		✔				

Table 8.8-2 Fisheries Outreach Conducted to-date, by Organization/Stakeholder (continued)

Contact	Regional	NY	NJ	RI	MA	CT
Long Island Traditions		✔				
Lund's Fisheries			✔			
MADMF Fisheries Working Group					✔	
MAFMC Advisory Panels	✔					
Mass Maritime					✔	
Massachusetts Division of Marine Fisheries					✔	
Massachusetts Lobstermen's Association	✔					
McAllister Towing		✔				
Mid-Atlantic Ocean Forum	✔					
National Wildlife Federation	✔					
NEFMC	✔					
New Bedford Port Authority					✔	
New York Harbor Safety Committee		✔				
Nick's Point Tuna Club		✔				
NOAA Fisheries	✔					
NOAA GARFO	✔					
North American Submarine Cable Association (NASCA)	✔					
Northeast Regional Ocean Council	✔					
NY Sport Fishing Federation		✔				
NYSDEC Marine Fisheries		✔				
NYSERDA		✔				
Operation SPLASH		✔				
Point Lobster			✔			
Point Lookout Fishermen's Club		✔				
Point Pleasant Fishermen's Dock Cooperative			✔			
Responsible Offshore Development Alliance (RODA)	✔					
Rhode Island Coastal Resources Management Council				✔		
Rhode Island Commercial Fisheries Center				✔		
Rhode Island Fishermen's Association President				✔		
RIDEM Marine Fisheries Division				✔		
RODA Joint Industry Task Force	✔					

Table 8.8-2 Fisheries Outreach Conducted to-date, by Organization/Stakeholder (continued)

Contact	Regional	NY	NJ	RI	MA	CT
Rutgers University Center for Ocean Observing Leadership (RUCOOL)			✔			
Sandy Hook Pilots Association		✔	✔			
Sea Freeze Ltd				✔		
Sea Fresh/ Handrigan Seafood				✔		
Sea Watch International	✔					
Southampton Town Council Member		✔				
State of New Jersey Board of Public Utilities meeting			✔			
Surfside Foods			✔			
Town Dock				✔		
Viking Fleet		✔				
Viking Village			✔			

During 2018 and 2019 Empire attended more than 20 meetings with FMCs, state agencies, USCG, Harbor Safety Committees, and other groups. At several of these Empire gave presentations. For more in-depth discussions regarding fishermen's concerns, coexistence, technical issues, and practical solutions, individual and small group meetings were conducted at vessels, docks, and fishing companies, as these were deemed to be more productive.

In 2018 and 2019 Empire hosted booths at the Commercial Marine Expo and the New England Saltwater Fishing Show in Providence, Rhode Island, as well as hosting booths for multiple years at the New York Sportfishing Federation show on Long Island, New York. These provided many opportunities for disseminating information, addressing questions, and gathering information from fishermen. Due to the COVID pandemic in 2020 and 2021 outreach events such as fishing expos and presentations were cancelled. In 2022, Empire hosted booths at the New England Saltwater Show in Providence, Rhode Island, and the New Jersey Fishing Show in Edison, New Jersey. Empire also held regular "port hours" monthly in New Bedford, Massachusetts, Point Judith, Rhode Island, Stonington, Connecticut, and Montauk, New York. Empire continues hosting booths at such events annually, and plans to continue to do so up to and during the wind farm construction period, and into the operations phase.

Empire has made Project introductions, updates, and calls for information presentations at the following venues and/or to the following groups:

- NEFMC;
- American Fisheries Society;
- The Responsible Offshore Development Alliance (RODA);
- Mid Atlantic Ocean Forum MARCO Portal Panel;
- Recreational Anglers and Offshore Wind Forum, Toms River, New Jersey;
- Freeport Tuna Club, New York;
- Commercial Fisheries Center of Rhode Island;

- Massachusetts Lobsterman's Association;
- New York Sport Fishing Federation;
- New Bedford Port Authority;
- Point Lookout Fishing Club, New York;
- Anglers for Offshore Wind Power Forum, New Jersey;
- NYSDEC Marine Fisheries Section;
- NJDEP Marine Fisheries Section;
- Rhode Island Department of Environmental Management Fisheries Specialists;
- Massachusetts Division of Marine Fisheries OSW Working Group;
- New York Fisheries Technical Working Group (F-TWG);
- Massachusetts (Fisheries Working Group (F-WG);
- BOEM Task Force meetings; and
- New York Harbor Safety Committee.

Empire has made contacts from New Jersey to Massachusetts. The most intensive recreational fisheries liaison outreach has been conducted within the areas of northern New Jersey and Long Island, focusing on nearby ports whose fishermen are more likely to fish in proximity to the Lease Area. Empire has participated in two fishing trips to the Block Island Wind Farm, organized by the National Wildlife Federation and Anglers for Offshore Wind, to glean additional information from regional recreational anglers.

Empire endorses the fishermen's stated intention that decisions should be made based on science and evidence. Experience has shown that technical approaches to such concerns, developed jointly by project developers, project engineers/scientists, and fishermen, can lead to the best outcomes when all parties keep in mind the goal of coexistence. In this context, much of the information below will focus on the technical aspects of fishing, which Empire sees as key factors in coexistence with the fishing industry.

Empire continues to seek all feasible opportunities to engage with fishermen in outreach. These efforts have been sensitive to stakeholder fatigue and use organized forums to communicate consistently across the various fishing interests.

8.8.1.4 Additional Data Input

In addition to the fishing VMS, fishing activity survey, and outreach/engagement, the following documents provide meaningful input into the assessment of potential impacts of the Project on commercial and recreational fishing:

- NYSERDA's Offshore Wind Master Plan (2017);
- Spatiotemporal and Economic Analysis of Vessel Monitoring System Data Within Wind Energy Areas in the Greater North Atlantic (RIDEM 2018);
- Economic Impact of Rhode Island's Fisheries and Seafood Sector (CFRF 2018); and
- *Socio-Economic Impact of Outer Continental Shelf Wind Energy Development on Fisheries in the U.S. Atlantic* (Kirkpatrick et al. 2017), funded by BOEM to analyze the potential impact of offshore wind farms on fisheries and ports.

8.8.2 Baseline Characterization

The affected environment is defined as the coastal and offshore areas where recreational and commercial fishing occur and have the potential to be directly or indirectly affected by the construction, operations, and

decommissioning of the Project. Where possible, the most recently available full-calendar year data (through 2019) was evaluated to avoid partial year data that may be subject to later revisions. The Project is located within the New York Bight, which is the area of continental shelf that lies between Cape May, New Jersey, and Montauk, New York. New York Bight is part of the broader Northeast Continental Shelf Large Marine Ecosystem, with more than 300 marine fish species that utilize the highly productive area for feeding, growth, and reproduction (Aquarone and Adams 2009; Froese and Pauly 2019). The biology and life history of fish and invertebrate species that are commercially and recreationally fished in this region is fully described in **Section 5.5**.

8.8.2.1 Recreational Fishing

New York and New Jersey recreational saltwater anglers fish in or traverse the grounds in and around the Lease Area and submarine export cable siting corridors while targeting several different fisheries. Recreational fishing in the Lease Area and submarine export cable siting corridors is accessed by privately owned recreational boats, for-hire boats including charter boats, and "head boats," from various ports and inlets located on the south coast of Long Island and the coast of New Jersey.

Economic Overview

The economic value associated with recreational saltwater fishing is driven by angler expenditures. In 2019, there were a total of 13.4 million recreational saltwater angler trips in New York, and 13.3 million recreational saltwater angler trips in New Jersey, with shore fishing representing the majority (more than half) of those trips in both states, followed by private boats (**Figure 8.8-4** and **Figure 8.8-5**) (NOAA Fisheries 2020a). Total expenditures for these New York and New Jersey trips for marine recreational saltwater fishing were an estimated $2.7 billion in 2017 (NOAA Fisheries 2020c).

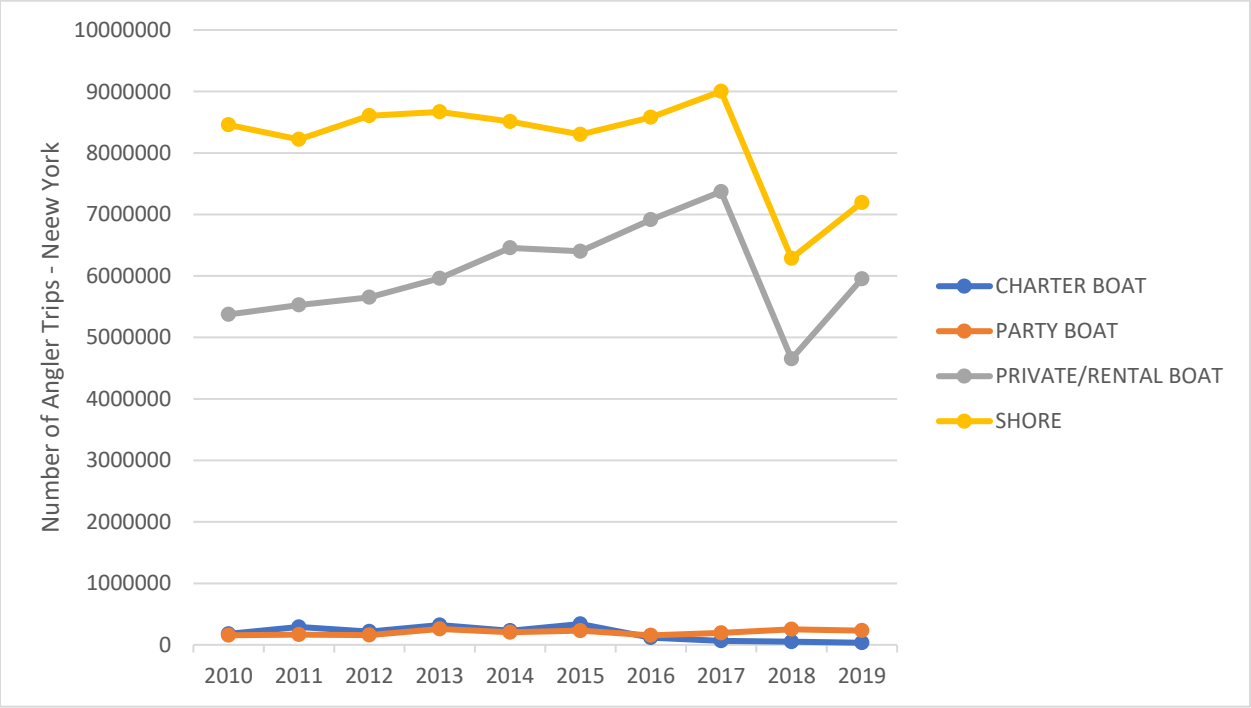


Figure 8.8-4 Recreational Saltwater Angler Trips in New York, 2010 to 2019 (data from NOAA Fisheries 2020a)

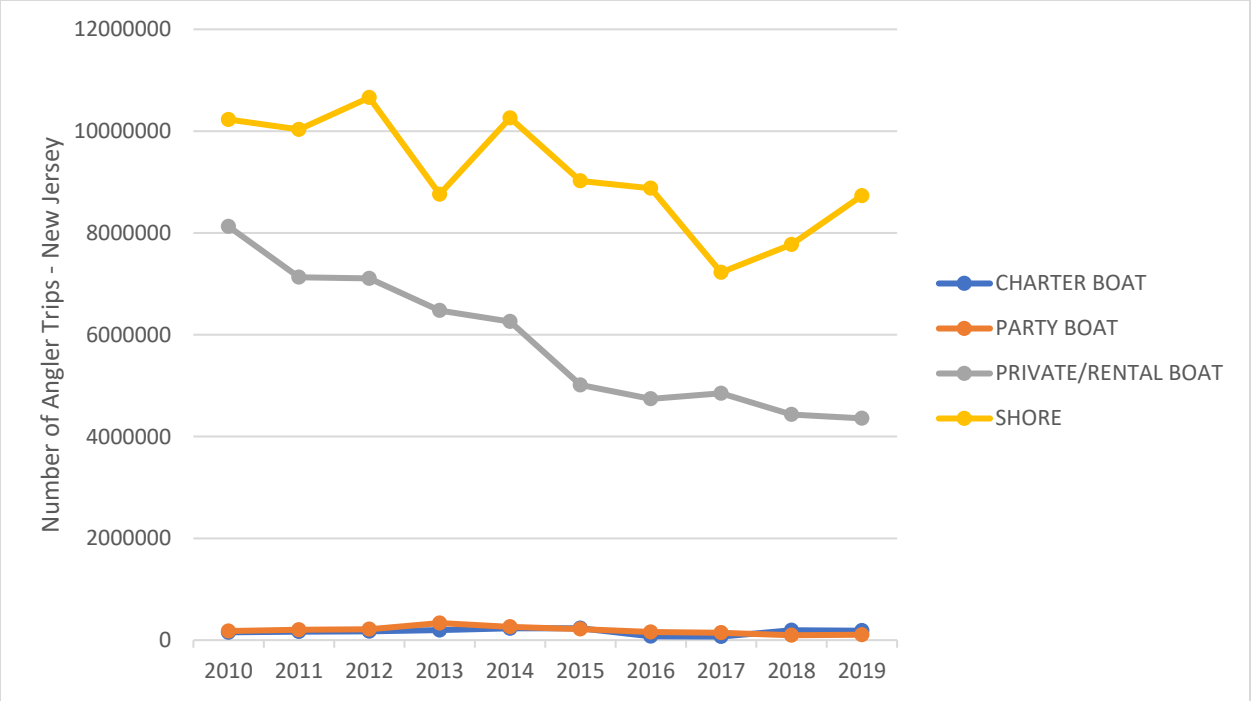


Figure 8.8-5 Recreational Saltwater Angler Trips in New Jersey, 2010 to 2019 (data from NOAA Fisheries 2020a)

Recreational saltwater fishermen travel from within, and outside of, New York and New Jersey to fish. Recreational saltwater fishing in this analysis includes tournaments and individual trips on pleasure boats, charter boats, or head boats, as well as surf casting and shore fishing. The trends in recreational saltwater fishing at the regional level are like those observed at the local level in New York and New Jersey. In 2019, recreational fishing for the Mid-Atlantic region was comprised primarily of shore-based fishing (60 percent), followed by private vessels/rentals (38 percent). Party/charter trips comprised 2 percent of recreational saltwater fishing activities (NOAA Fisheries 2020a). Recreational saltwater fishing in the region occurs year-round but is most intensive from April through November, with a peak in the months of May and June (NOAA Fisheries 2020a).

Target Species

The most highly targeted species for recreational saltwater fishing activities in the Project Area include, but are not limited to: Atlantic bonito, Atlantic herring, Atlantic menhaden, black sea bass, bluefish, cownose ray, dolphinfish, red hake, scup, striped bass, striped sea robin, summer flounder, and tautog, as shown in **Table 8.8-3**. Other targeted species with less frequent catch numbers include: sharks, tunas, wahoo, and northern kingfish. Recreational shell fishing also occurs (predominantly in state waters) and commonly targets species such as blue crabs, scallops, quahogs, Atlantic surfclam, and softshell clams (steamers). See **Section 5.5** for a discussion of habitat and potential impacts for these species.

Table 8.8-3 Recreational Saltwater Catch for New York and New Jersey During 2018

Species	Total Catch (Pounds)	Species	Total Catch (Pounds)
New York		**New Jersey**	
Striped Bass	7,072,422	Striped Bass	6,674,370
Scup	6,970,950	Summer Flounder	3,229,094
Bluefish	3,521,471	Bluefish	1,660,226
Black Sea Bass	3,126,508	Black Sea Bass	1,117,670
Tautog	2,455,863	Tautog	908,881
Summer Flounder	2,441,758	Dolphinfish	805,032
Atlantic Herring	1,493,666	Cownose Ray	329,724
Striped Sea robin	543,808	Atlantic Menhaden	310,590
Dolphinfish	372,194	Red Hake	284,791
Red Hake	267,004	Atlantic Bonito	228,776
All Other Species	929,037	All Other Species	1,408,156
Total	**29,194,681**	**Total**	**16,957,310**

New York and New Jersey host dozens of annual saltwater fishing tournaments that target a variety of species, including black sea bass, bluefish, striped bass, summer flounder (fluke), tautog (blackfish), tuna, and shark in the waters of the New York Bight. There are several known sport fishing areas near the Lease Area (**Figure 8.8-6**), including Cholera Bank and Angler's Bank, just northwest of the Lease Area. There are also several locations where artificial reefs, comprised of vessels, retired subway cars, concrete/rock debris, or pre-fabricated structures, have been established as productive sport fishing areas; all located outside of the Lease Area and submarine export cable siting corridors. The NJDEP maintains 17 artificial reef sites, located 2 to 25 mi (3 to 40 km) off the coast (NJDEP 2019). The NYSDEC has established 12 artificial reef sites, including eight along the south shore of Long Island (NYSDEC 2019). While none of these areas are located within the Lease Area or within the submarine export cable siting corridors, fishermen targeting these areas for sportfish may transit through or fish within the Project Area.

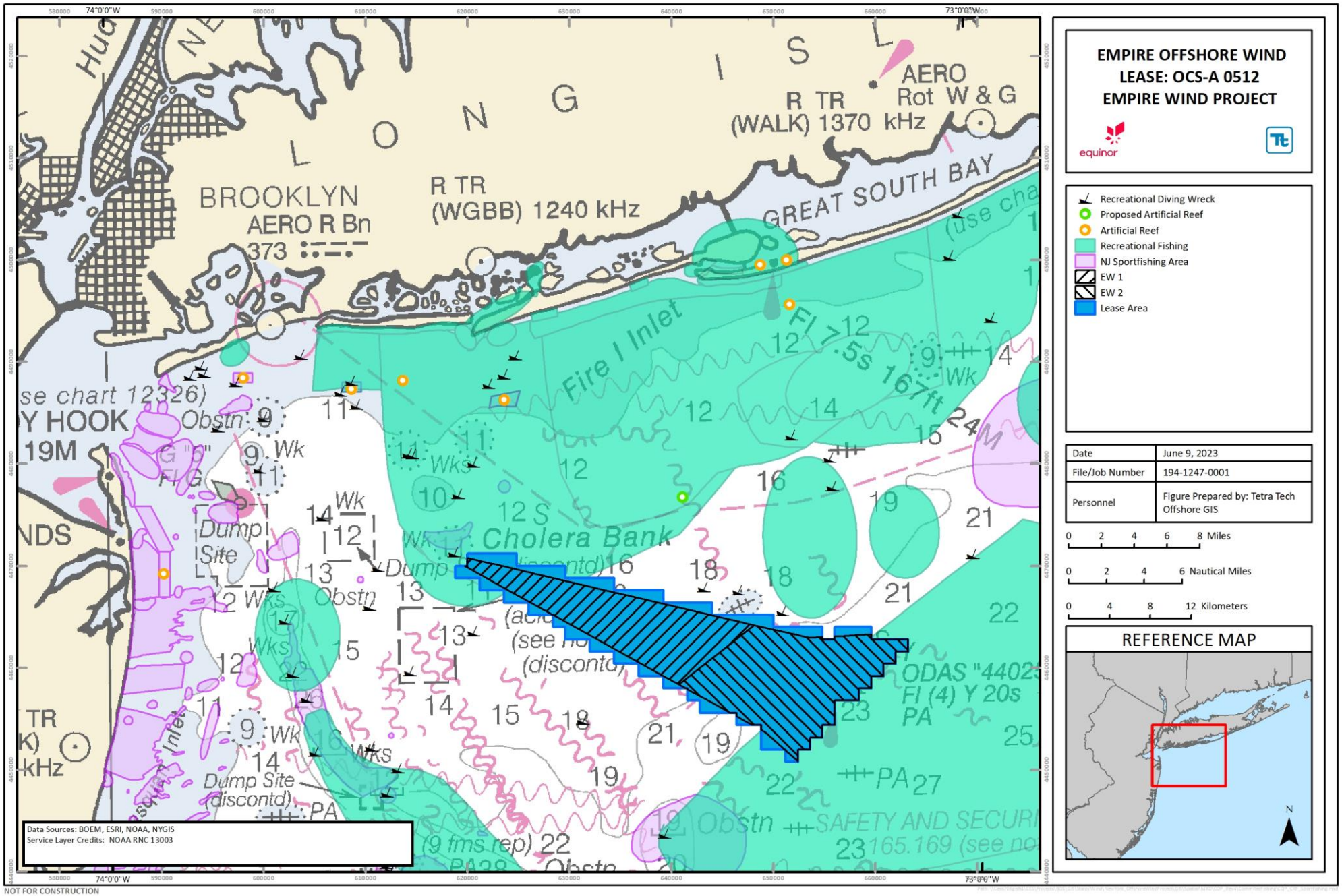


Figure 8.8-6 Offshore and Coastal Features Associated with Sport Fishing (MARCO)

Fishing Techniques

Most saltwater recreational fishing involves the use of hook and line (rod and reel), either from a boat, or from a shoreline access point (beach, jetty, pier, bulkhead, etc.). Recreational hook and line techniques generally fall into the following categories:

- Bait fishing – live or cut bait set at a specific depth, on the seafloor or adrift, using a combination of terminal tackle (hooks, weights, spoons, swivels, leaders, etc.);
- Bottom jigging – weighted lure set on/near the seafloor; often used to target groundfish and flounder species;
- Casting lures – topwater (floating), metal (sinking) or diving lures with "action" designed to mimic baitfish, for targeting pelagic species;
- Fly fishing – similar to casting lures, but smaller and lighter lures (flies) used with a fly rod and fly line;
- Trolling – using either gunnel-mounted rod holders, a downrigger, or outriggers to set a lure or bait at a particular depth or location, while fishing from a boat moving at slow speeds (3 to 8 knots [5 to 15 km/h]). This setup is designed such that the line releases from the downrigger/outrigger upon strike, so that the line can be reeled in by rod/reel;
- Spearfishing – using a spear, harpoon, or other missile while completely submerged in the marine waters of the state for any species, generally excluding lobster; and
- Shellfishing – using crab pots for blue crab, or hand digging tools for "clamming" (hard and soft clams, oysters, surf clams, bay scallops and mussels).

8.8.2.2 Commercial Fishing

New York Bight commercial fisheries include groundfish, pelagic species, and a variety of macroinvertebrates including lobster and scallop. These stocks attract commercial and recreational fishermen from New York, New Jersey, Rhode Island, Massachusetts, and other locations.

Regional Economic Overview

Commercial and recreational fishing are important to the economies of the states immediately surrounding the Project Area. In 2019, two of the top U.S. fishing ports (by weight and dollar value landed) were located within a 200-km (124-mi) radius of the Project Area (New Bedford, Massachusetts and Cape May-Wildwood, New Jersey), with other important fishing ports located in New Jersey, New York, Rhode Island, and Massachusetts. The top regional ports by landing value and weight are provided in **Table 8.8-4**. Note that as these ports are located in the greater North Atlantic region; these landings may not have been caught in the Lease Area.

Table 8.8-4 Top Regional Fishing Ports in 2019 (NY, NJ, RI, MA) by Total Landing Value and Weight; Catches from all Waters (data from NOAA Fisheries 2020b)

Top Regional Ports by Landing Value			Top Regional Ports by Landing Weight		
U.S. Rank	Name of Port	$ (MM)	U.S. Rank	Name of Port	Pounds (MM)
1	New Bedford, MA	450.8	13	New Bedford, MA	115.8
9	Cape May-Wildwood, NJ	90	14	Cape May-Wildwood, NJ	94.5
19	Point Judith, RI	65.9	20	Gloucester, MA	50.2
22	Gloucester, MA	56.6	23	Point Judith, RI	48.1
33	Point Pleasant, NJ	35.4	26	Point Pleasant, NJ	37.3
34	Provincetown-Chatham, MA	32	31	Atlantic City, NJ	23.5
46	Long Beach-Barnegat, NJ	24.9	32	North Kingstown, RI	19.2
57	Boston, MA	19.3	35	Provincetown-Chatham, MA	18.8
58	Montauk, NY	17.8	44	Boston, MA	18.8
59	Atlantic City, NJ	17.2	55	Montauk, NY	11.5
66	North Kingstown, RI	14.1	65	Long Beach-Barnegat, NJ	7
83	Fairhaven, MA	10.9	66	Newport, RI	4.9
95	Newport, RI	7.8	82	Fairhaven, MA	4.9
109	Hampton Bay-Shinnecock, NY	5.7	98	Belford, NJ	4.3
122	Little Compton, RI	3.4	106	Hampton Bay-Shinnecock, NY	4
131	Belford, NJ	2	132	Little Compton, RI	3.9

NOAA Fisheries data from 2010 to 2019 (NOAA Fisheries 2020b) reported total landings for Massachusetts, New Jersey, New York, and Rhode Island, as shown in **Figure 8.8-7** (pounds) and **Figure 8.8-8** (value). For this same time period (2010 to 2019), the top commercial fish species by weight are listed in **Table 8.8-5**, which included scup and longfin squid in New York; menhaden and shortfin squid in New Jersey; shortfin squid and longfin squid in Rhode Island; and sea scallops and haddock in Massachusetts. The predominant species based on landings value during the same period (also listed in **Table 8.8-5**) was dominated by longfin squid and northern quahogs in New York; sea scallop and menhaden in New Jersey; sea scallops and longfin squid in Rhode Island; and sea scallops and American lobster in Massachusetts (NOAA Fisheries 2020b).

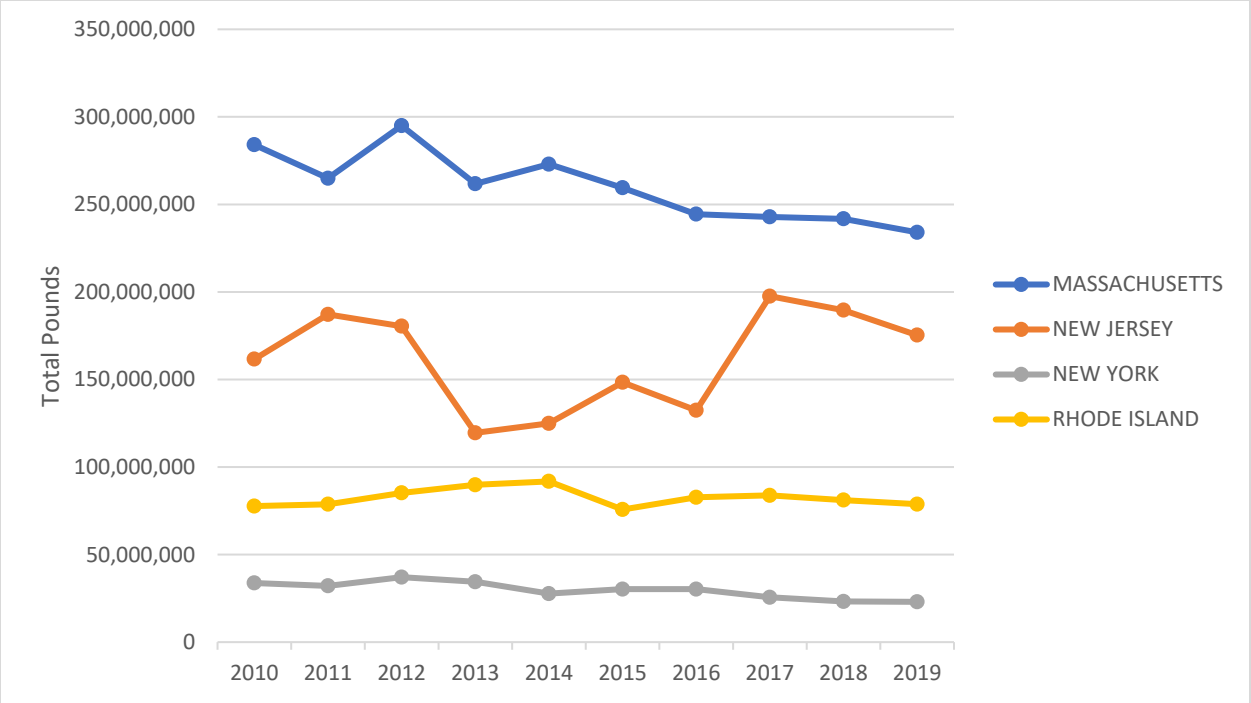


Figure 8.8-7 Total Pounds Landed from all Waters by State for All Species, 2010 to 2019 (data from NOAA Fisheries 2020b)

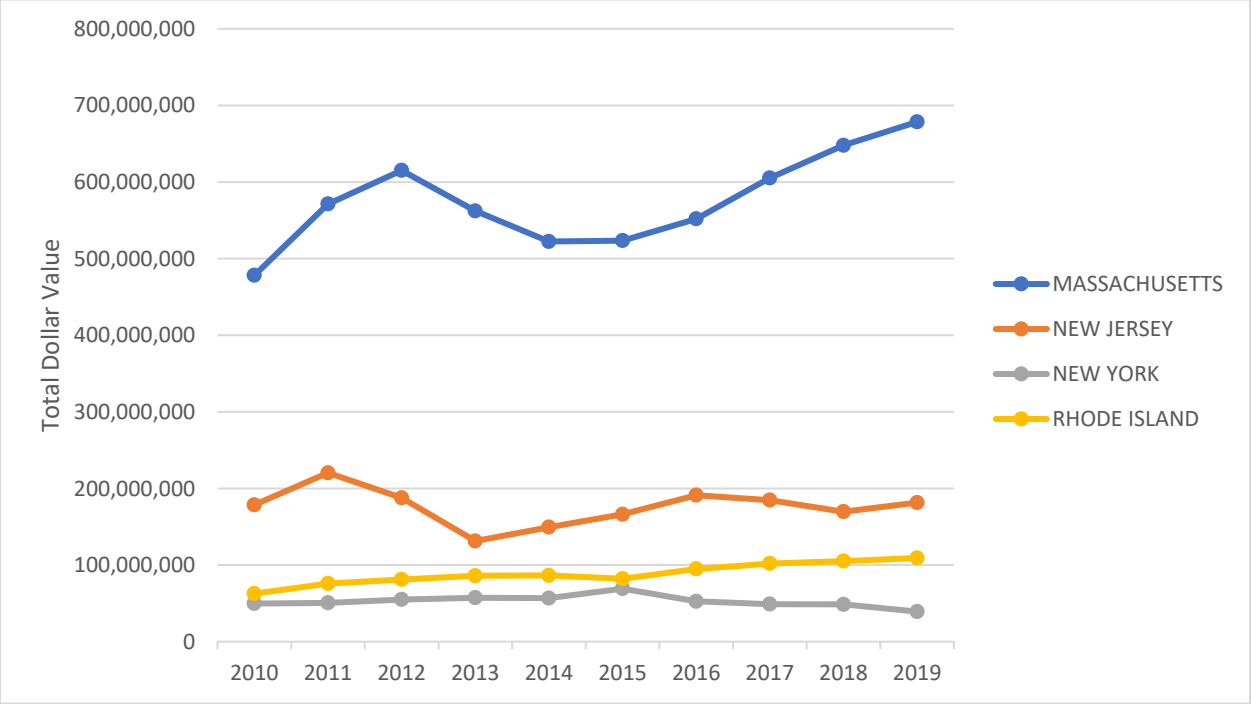


Figure 8.8-8 Total Dollar Value from all Waters by State for All Species, 2010 to 2019 (data from NOAA Fisheries 2020b)

Target Species

The top ten species by weight and by value for New York, New Jersey, Rhode Island, and Massachusetts for the most recent year available are listed in **Table 8.8-5**.

Table 8.8-5 Top Commercial Fish Species in Massachusetts, New York, New Jersey, and Rhode Island, Ranked by Weight and by Value for 2019 (data from NOAA Fisheries 2020b)

Rank	Species	Weight (lbs.)	Species	Value ($)
New York				
1	Scup	4,070,217	Longfin Squid	6,800,847
2	Longfin Squid	4,031,225	Northern Quahog	6,090,839
3	Goosefish	1,527,297	Golden Tilefish	4,049,856
4	Northern Quahog	1,481,296	Summer Flounder	3,508,801
5	Silver Hake	1,407,483	Scup	3,204,337
6	Golden Tilefish	1,122,384	Eastern Oyster	1,420,012
7	Atlantic Surf Clam	1,049,654	Silver Hake	1,269,265
8	Menhaden	973,926	Black Sea Bass	1,191,754
9	Winter Skate	966,781	Tautog	1,080,041
10	Summer Flounder	875,330	Goosefish	1,032,212
New Jersey				
1	Menhaden	77,991,508	Sea Scallop	96,379,715
2	Shortfin Squid	21,593,662	Menhaden	14,343,892
3	Atlantic Surf Clam	17,573,087	Atlantic Surf Clam	11,910,084
4	Sea Scallop	10,463,117	Shortfin Squid	9,207,456
5	Atlantic Mackerel	5,513,642	Blue Crab	8,093,750
6	Blue Crab	5,314,466	Longfin Squid	7,165,964
7	Longfin Squid	4,865,587	Summer Flounder	5,066,745
8	Goosefish	1,894,435	Black Sea Bass	2,673,796
9	Scup	1,834,309	American Lobster	1,701,392
10	Winter Skate	1,773,395	Bigeye Tuna	1,615,942
Rhode Island				
1	Shortfin Squid	18,695,754	Sea Scallop	24,516,679
2	Longfin Squid	13,314,282	Longfin Squid	20,161,884
3	Butterfish	6,546,875	American Lobster	10,975,831
4	Silver Hake	5,712,600	Shortfin Squid	10,908,240
5	Little Skate	5,586,895	Eastern Oyster	5,728,941
6	Scup	4,583,917	Summer Flounder	5,621,656
7	Winter Skate	4,343,749	Northern Quahog	5,365,200
8	Jonah Crab	4,220,872	Butterfish	4,808,116

Table 8.8-5 Top Commercial Fish Species in Massachusetts, New York, New Jersey, and Rhode Island, Ranked by Weight and by Value for 2019 (data from NOAA Fisheries 2020b) (continued)

Rank	Species	Weight (lbs.)	Species	Value ($)
9	Goosefish	3,159,048	Silver Hake	3,455,376
10	Sea Scallop	2,714,022	Jonah Crab	3,391,499
Massachusetts				
1	Sea Scallop	41,840,340	Sea Scallop	397,097,791
2	Haddock	18,728,143	American Lobster	93,122,838
3	Shortfin Squid	17,906,382	Eastern Oyster	30,140,622
4	American Lobster	16,688,233	Haddock	18,258,987
5	Atlantic Surf Clam	15,739,550	Atlantic Surf Clam	16,616,040
6	Goosefish	14,024,887	Ocean Quahog	8,233,267
7	Acadian Redfish	11,624,678	Jonah Crab	8,137,653
8	Ocean Quahog	11,070,125	Goosefish	8,100,894
9	Winter Skate	10,046,012	Shortfin Squid	7,200,085
10	Atlantic Herring	9,873,088	Softshell Clam	6,542,633

Lease Area Exposure

Recent efforts have been made to isolate the magnitude of catches originating within the Lease Area from all catches originating along the greater Atlantic Coast. The Rhode Island Department of Environmental Management (2017) reported landings originating from the Lease Area between 2011 to 2016, based on an analysis of VMS data. The dollar value of landings that originated from within the Lease Area during this period was highest in New Bedford, Massachusetts, followed by Cape May, New Jersey. Point Pleasant, New Jersey; Montauk, New York; and Point Judith, Rhode Island also had regular landings that originated from the Lease Area (RIDEM 2017). However, since exact fishing locations and densities cannot be provided from this confidential data source, actual calculations of values and densities must be developed by the federal and state agencies responsible for maintaining the VMS data specific to each fishery (RIDEM 2017). In a similar effort, Kirkpatrick et al. (2017) evaluated exposure of fisheries to wind farm development and associated impacts within the Lease Area (New York Wind Energy Area [WEA]). In this context, "exposure" describes "the individuals and groups likely to be affected by WEA development," while "impacts" describe "the magnitude and direction (gain or loss) of the WEA's impact on those potentially affected individuals and groups". In this analysis, the three ports most "exposed" to development within the Lease Area are the ports of New Bedford, Massachusetts; Cape May, New Jersey; and Point Pleasant, New Jersey, primarily associated with sea scallop landings (Kirkpatrick et al. 2017). The authors also note that the eastern portion of the Lease Area contains valuable sea scallop grounds but is not as productive as other areas in the Mid-Atlantic or Georges Bank (Kirkpatrick et al. 2017).

Fishing Techniques

Commercial fishing activity has both seasonal and interannual variation based on individual fishing preferences, vessel types, target species, regulatory restrictions, market demands, and weather. Fishing activity also varies in location and intensity throughout the year as fishermen follow target species along seasonal migration routes and adhere to regulatory closures.

Commercial fishing occurring within the Project Area can generally be categorized as either mobile or fixed-gear fishing. Mobile commercial fishing gear utilized in the Project Area includes otter trawls, mid-water trawls, purse seines, dredges, and rod and reel trolling. The most commonly deployed fixed fishing gear types within the Project Area include lobster pots, crab pots, whelk pots, fish pots, and demersal gillnets. The data sources above and discussions with the fishing industry have helped identify the extent of fishing activity and the various gear types used in the Project Area, including trawls, dredges, traps, gillnets, and others, as described within this section. **Table 8.8-6** summarizes the gear types known to be used across the Project Area.

Each species-specific subsection below includes a description of the main fishing methods employed, spatial and temporal occurrence in the Project Area, and a summary of feedback from commercial and recreational fishermen related to these species. All fisheries data will continue to be carefully evaluated for quality and completeness, and discussions with fisheries stakeholders will continue for the life of the Project.

Table 8.8-6 Regional Gear Types and Target Species Relevant to the Project Area

Gear Type	Season(s)	Target Species	
Mobile Gear		monkfish	Swordfish
Otter Trawl	Year-round	longfin squid	shortfin mako shark
Mid-water Trawl	Year-round, May/June through December for herring	scup	thresher shark
Pair Trawl	Year-round, May/June through December for herring	winter skate	porbeagle shark
Scallop Dredge	Year-round, first Monday in November through March 31 in NY state waters	little skate	American lobster
Hydraulic Clam Dredge	Year-round	summer flounder	soft shell clam
Rod and Reel	Year-round, increases intensity April through November	yellowtail flounder	Atlantic surfclam
Green Stick	Year-round, increases intensity in July through September for tuna	black sea bass	blue crabs
Fixed Gear		silver hake	horseshoe crabs
Demersal Gillnet	Year-round	Atlantic herring	blue mussel
Lobster Trap	Year-round, June 1 through April 29 in NY state waters	Atlantic mackerel	bay scallops
Crab trap	Year-round	butterfish	conch (whelk)
Fish/Whelk Pots	Year-round	spiny dogfish	eastern oyster
		bluefish	northern quahog clam
		striped bass	sea scallop
		bluefin tuna	red hake
		yellowfin tuna	tautog
		bigeye tuna	spiny dogfish
		mahi-mahi	Atlantic cod

Multispecies (Groundfish) Otter Trawling

Methodology

Otter trawling is the act of towing a net along the seabed with trawl doors (i.e., otter boards) using hydrodynamic forces to open the net horizontally and a buoyant head rope and weighted foot rope (sweep) designed to hold the net open vertically (see **Figure 8.8-9**). Gear is designed specifically to capture the target species for each

trawl fishery (e.g., various mesh sizes, often different within various panels of the same net; different panel configurations; various sizes and designs; and varied doors and door spreads). Modern trawling operations may employ sensors to monitor that the gear is properly deployed and fishing effectively as it is towed.

Occurrence in the Project Area

The otter trawl ground fishery (mobile gear) in and around the Project Area targets a variety of species, including but not limited to butterfish, squid, yellowtail flounder, scup, summer flounder, silver hake, monkfish, and winter flounder. Otter trawling is used to catch a variety of species under many different regulatory regimes and management tools, with target species overlapping with other fishing methods (gillnets are also used to capture some of the same species). Also, annual periods for various regulations do not always start at the beginning of a calendar quarter on January 1. Instead, each annual period for fisheries management coincides with the most appropriate starting point for an individual species or fishery, often driven by the life history or migratory patterns of target species.

Figure 8.8-10 shows otter trawling fishing activity (fishing assumed at <4 knot [7.4 km/h] speeds) during 2015 to 2016, which is the most recent publicly available multispecies trawl dataset available on the MARCO portal (raw VMS data for all fisheries/vessels is subject to confidentiality restrictions, therefore the MARCO portal is the most up-to-date and consistent data source available for all of the maps in Section 8.8.3.2). Bottom trawling occurs throughout the year and is present in low to moderate levels throughout the Project Area based on NOAA Fisheries VMS data published by MARCO. Squid trawling is the most common variety of otter trawling in and around the Project Area and is discussed separately in the section below.

Empire will avoid, minimize, or mitigate construction, operation, and decommissioning impacts on the fisheries that utilize otter trawling methods, as discussed in Sections 8.8.3 and 8.8.4.

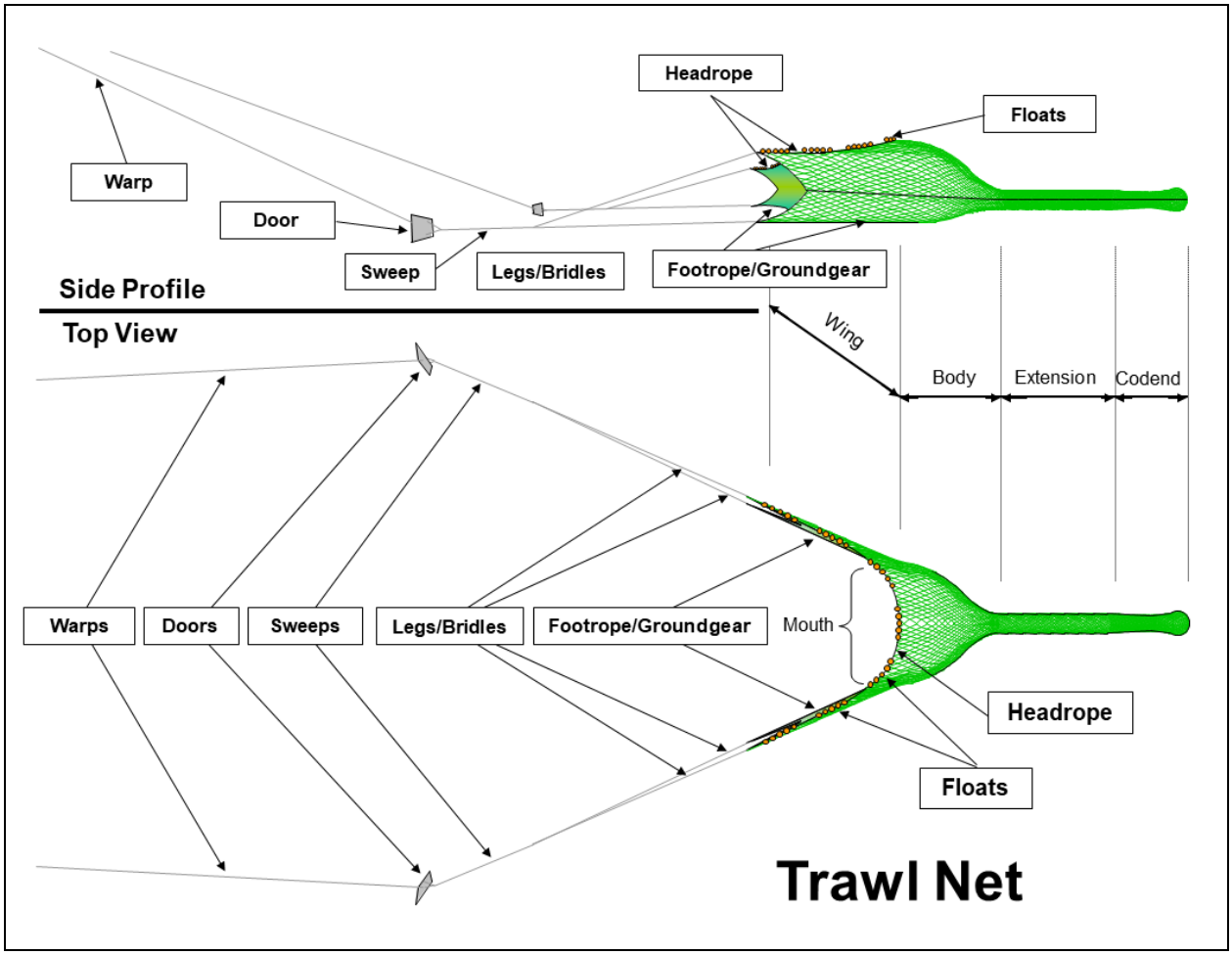
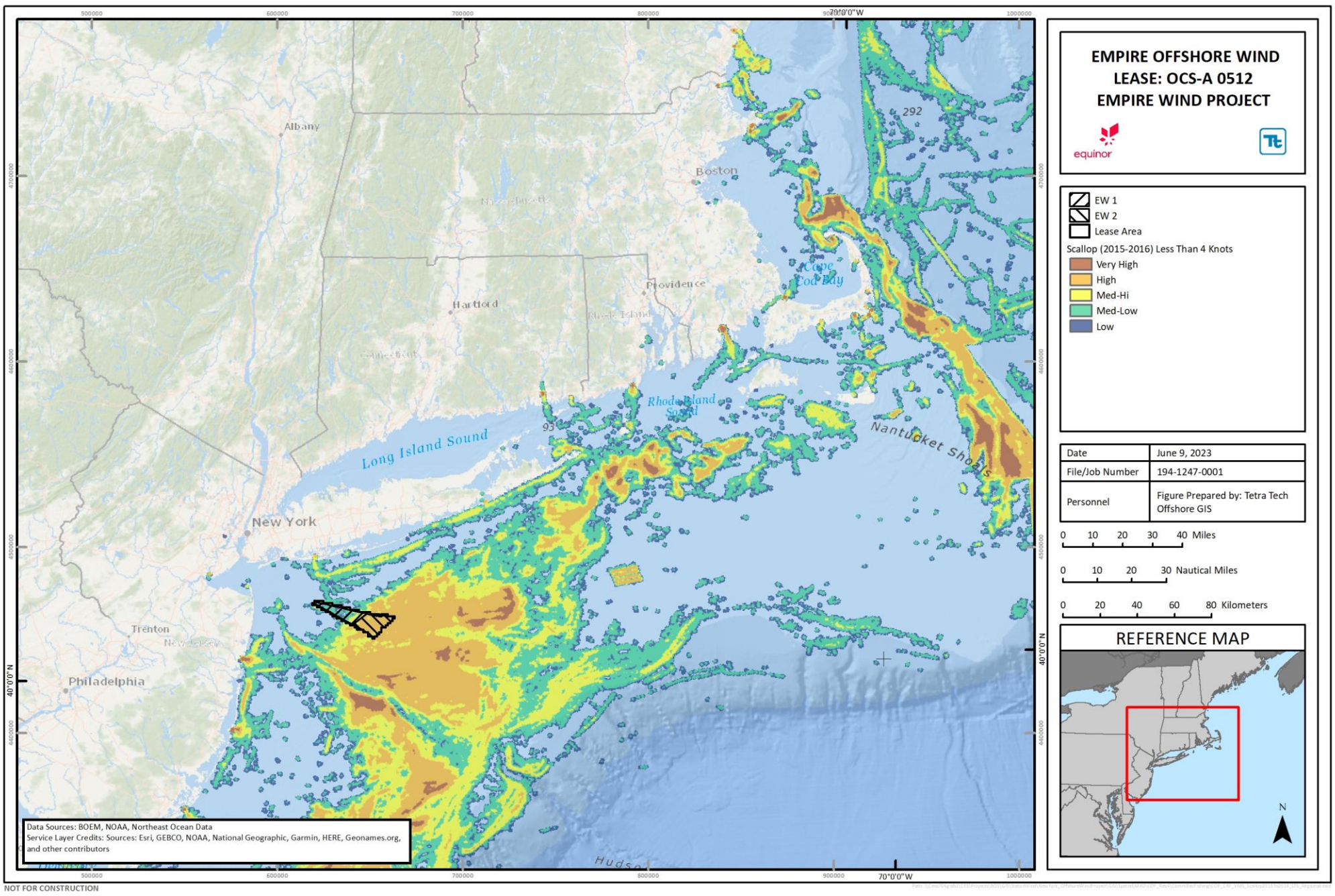


Figure 8.8-9 Otter Trawl Net Diagram (top); Typical Dragger Vessel (bottom) (NOAA 2017)



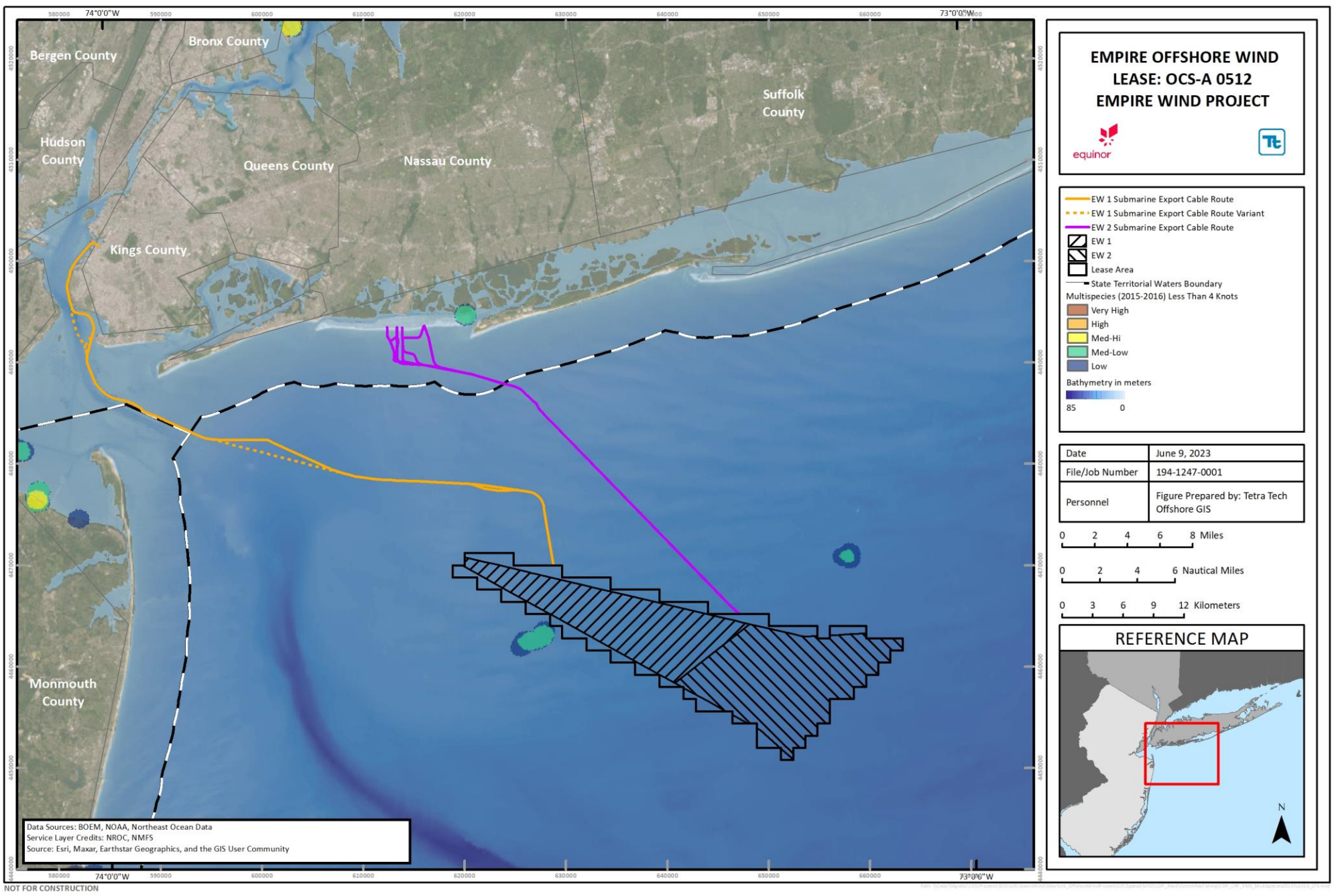


Figure 8.8-10 Multi-species Groundfish Otter Trawling at < 4 knots (7.4 km/h), 2015-2016 VMS Data (MARCO), shown at the regional scale (upper panel), and Project Area scale (lower panel)

Information Acquired Through Outreach

Trawl fishermen engaged by Empire were concerned about whether offshore obstructions (wind turbines, submarine export and interarray cables, and offshore substations) would interfere with their ability to operate efficiently within the multiple fisheries that exist and operate in the Project Area. No two trawl fishermen engaged were alike, in that most participated in several different fisheries in several different locations at various times of year to assemble their annual revenue. Depending on the target species, bottom type, time of year and regulations, trawl fishermen may be found within the Project Area in various locations. These mobile gear fishermen shared many of the same concerns as the squid trawlers (see below) in that they tend to target depth contours where commercially viable densities of mobile fish species can more often be captured efficiently. Another issue raised by this fleet is the potential increased possibility of gear snags due to scour protection around wind turbine and offshore substation foundations or on cable protection, e.g., mattressing, at cable crossings or areas where cable protection might be used. Concerns from these fisheries were centered around development of a wind farm layout that would allow for continued access and safe fishing. Based on the available VMS data and outreach to fishermen, the Lease Area is not a comparatively productive trawl ground for any trawl fishery in the region compared to other fishing grounds outside the Lease Area, except for certain years of squid aggregations that have been targeted in the western portions of the Lease Area (see next subsection).

It should be noted that not all trawl FMPs require VMS reporting. For example, vessels that target squid during the day (and are reporting through VMS), may target other species at night such as whiting or scup, for which FMPs do not require VMS use. Trawl fishermen expressed concern that complex fisheries such as these are not adequately captured in data on fishery distribution or economic analyses and, therefore the importance of the diverse mix of fisheries occurring in the Project Area is not fully captured in the published data.

The most recent agency-published public catch and effort data available are from 2016. Anecdotal information indicates that trawl and scallop fishing and production from the Lease Area may have declined since then. This is consistent with observations from OFLRs on Project-related survey vessels. During March-November 2018, Empire survey vessels spent more than 160 days in the Lease Area and along potential submarine export cable routes. The OFLR responsibilities included reporting any fishing activity and transits observed. Radar, visual observation, and AIS were used to detect and locate fishing activity. Trawl fishing was reported within the Lease Area on fewer than 15 days during that 160-day period. On a few occasions, trawlers towed in the Lease Area, but left after a few hours of towing; suggesting these were trial tows.

In areas closer to Long Island during July 2018, up to about 15 trawlers were observed in areas 5 to 15 nm (9 to 28 km) north of the Lease Area. Not all OFLRs reported whether fishing vessels sighted were in or out of the Lease Area.

During 2019, in over 100 combined days of survey by two different vessels during May-July, OFLRs reported only one trawler actively fishing in the Lease Area on one day. Transits by commercial fishing vessels continued, as did transits and fishing by recreational vessels.

Squid Trawling

Methodology

In general, squid trawling methods used in the New York Bight conform to the otter trawling methods described in Multispecies (Groundfish) Otter Trawling. Squid trawling uses a wide trawl door spread to create a herding effect to capture this extremely mobile target. The distance between doors represents the widest spread of the gear while towing. During outreach, squid captains using typical trawls reported door spreads of 40-54 fathoms (73-99 m). Due to the generally small and flexible anatomy of local shortfin and longfin squid, squid trawling requires smaller mesh sizes. Technological advancements used in the squid trawl fishery include separator trawls (a trawl net with a horizontal panel of mesh dividing the net vertically into upper and lower), which allow fish to escape towards the bottom and squid to be captured on the top. Similarly, trawls with raised footropes can allow fish to escape a small-mesh squid net while fishermen remain effective in capturing the target species. Typical squid trawl vessels are shown in **Figure 8.8-11**.

Figure 8.8-11 Squid trawlers in Pt. Judith, Rhode Island fish in the New York Bight as well as closer to Rhode Island (NOAA 2017)

Size and Configuration

In order to inform discussion of the feasibility of squid trawling among operational wind turbines, Empire commissioned a scale drawing of a typical otter trawler used in the squid fishery and gear operating among wind turbines at an indicative spacing of 0.71 nm (1.31 km) and maximum Lease Area water depth of 23 fathoms (42 m). Fishing captains, fleet managers and trawl makers were consulted to ascertain typical dimensions of vessels and gear, and review draft drawings. Dimensions of vessels and gear vary according to the captain's preference, target species, fishing conditions and other factors. Additionally, it is understood that weather, visibility, currents, congestion, seabed obstacles and other factors may influence a captain's decision of whether to fish in an offshore wind area. The dimensions in **Table 8.8-7** were supported by several sources and draft review, with the result shown in **Figure 8.8-12**.

A working squid trawler towing gear has a much larger footprint than a scallop or clam dredger (described below). Tow speeds generally range around 3 knots (5.6 km/h). Turns can be made with the gear on the seabed, or partially or fully hauled back. During a turn, the trawl generally catches less efficiently than when towing straight as the net's geometry is impacted by the irregular forces on the two trawl warps, ground gear and trawl doors. Moreover, trawler turns take time. With competitive fishing often regulated, in part, by time at sea, it is reported that an increasing number of vessels are likely to haul the gear and turn sharply, rather than turn more slowly with the gear on the seabed. This also helps the boat to stay on or near a previous tow track to repeat a productive tow, or stay on a steep edge, near hard bottom banks or other features such as a specific depth contour. As previously discussed, fishing data and feedback indicates squid trawling will mainly follow bathymetric contours; however due to the highly mobile nature of the squid species, trawl direction may vary for a number of reasons.

Table 8.8-7 Typical Squid Trawl Size and Configuration

Parameter	Value
Vessel length	87 ft (26.5 m)
Towing wire ratio	5.43:1
Typical wire out	125 fathoms (228.6 m)
Ground cables and legs	80 fathoms (146.3 m)
Door Spread	55 fathoms (100.5 m) (fishermen's responses ranged from 40-54 fathoms)
Net length	240 ft (73.2 m)
Total (bow to cod end)	1,562 ft (476 m)

Squid Trawling Practice – Examples and Measurement of Tows with AIS

The measurement of AIS tracks from actual commercial fishing tows can help inform decisions regarding possible wind turbine spacing and wind farm layouts that will support future trawling in wind farms. **Figure 8.8-13** through **Figure 8.8-16** show tracks of typical squid trawlers from multiple tows made by bottom trawlers in the New York Bight during 2018-2019, with measurements of tow length and total swath width of multiple tows. AIS data and specialized software (SiiTech® *Web VTS Professional Plus Live*) developed for vessel traffic control and subsea cable protection enabled these images and measurements.

In these figures, each dot on a track represents a single, time-stamped, AIS signal. The focus is generally on tracks relatively close to shore, where time intervals are 2-10 minutes, indicating high data quality and precise tracks. (Data from greater distances may also be of high quality but larger time intervals between signals received may produce less precise tracks.) Fishing methods are identified by vessel speed, area, and individual vessel identifiers present in the raw data but removed by Empire from public documents. Each parallel line is counted as one tow, although a trawler will often tow to the end of the area it wants to cover, turn while towing, return to its starting point, then haul the gear to complete what it considers one tow. A distance scale is found in the lower left corner of each image. Orange flags show measurements of swath length and width.

These images are intended as only one set of objective data, to provide a small component of the broad range of information needed to consider wind farm layouts that will support coexistence. Whereas the use of AIS for observing fishing practices is a useful tool, it is acknowledged that fishermen are likely to fish differently and require different spacing requirements with the presence of fixed structures in an operational wind farm.

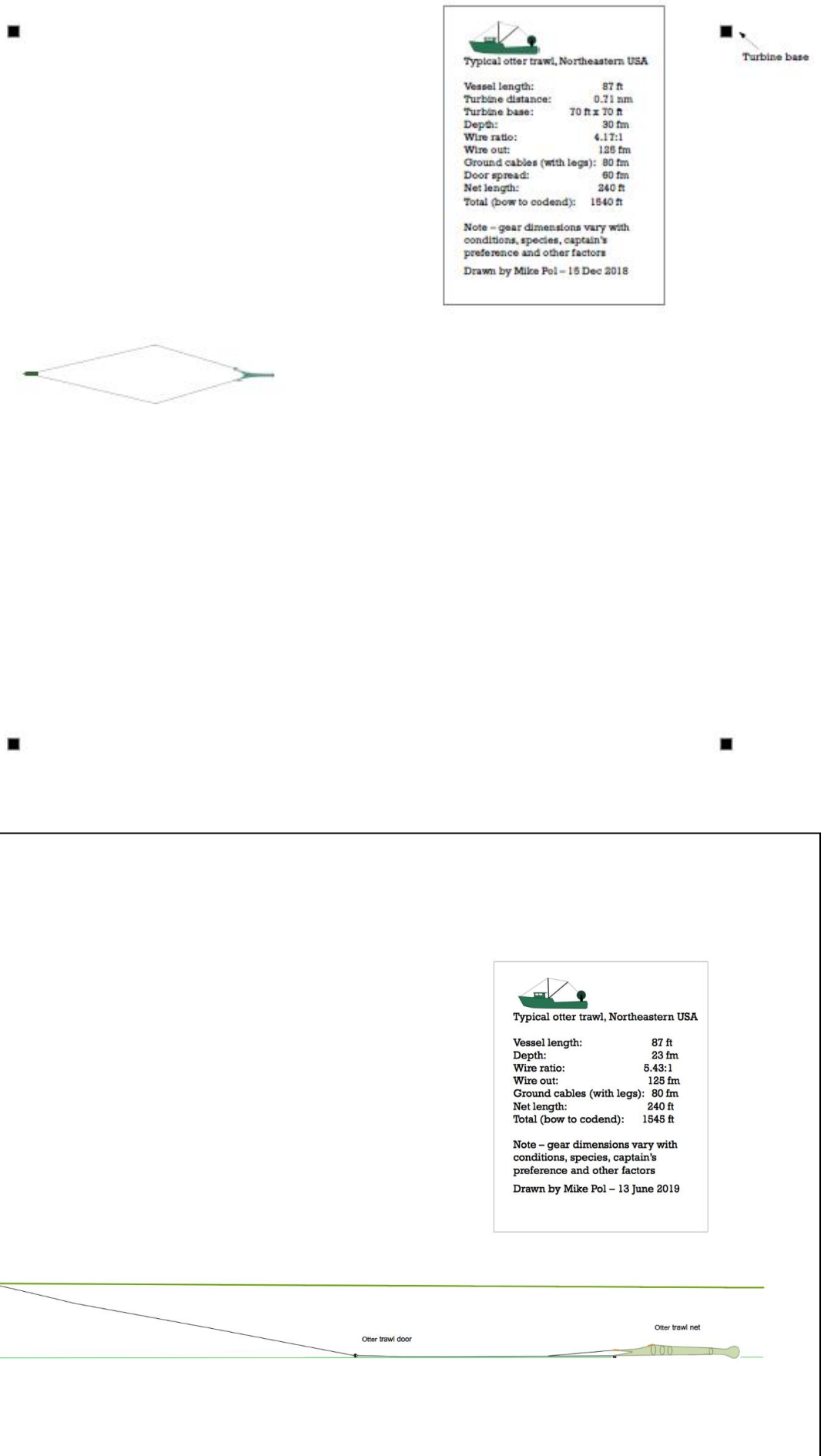


Figure 8.8-12 Scale drawing of typical regional otter trawler targeting squid, showing the plan view (upper panel) and section view (lower panel) among wind turbines spaced at 0.71 nm (1.31 km)

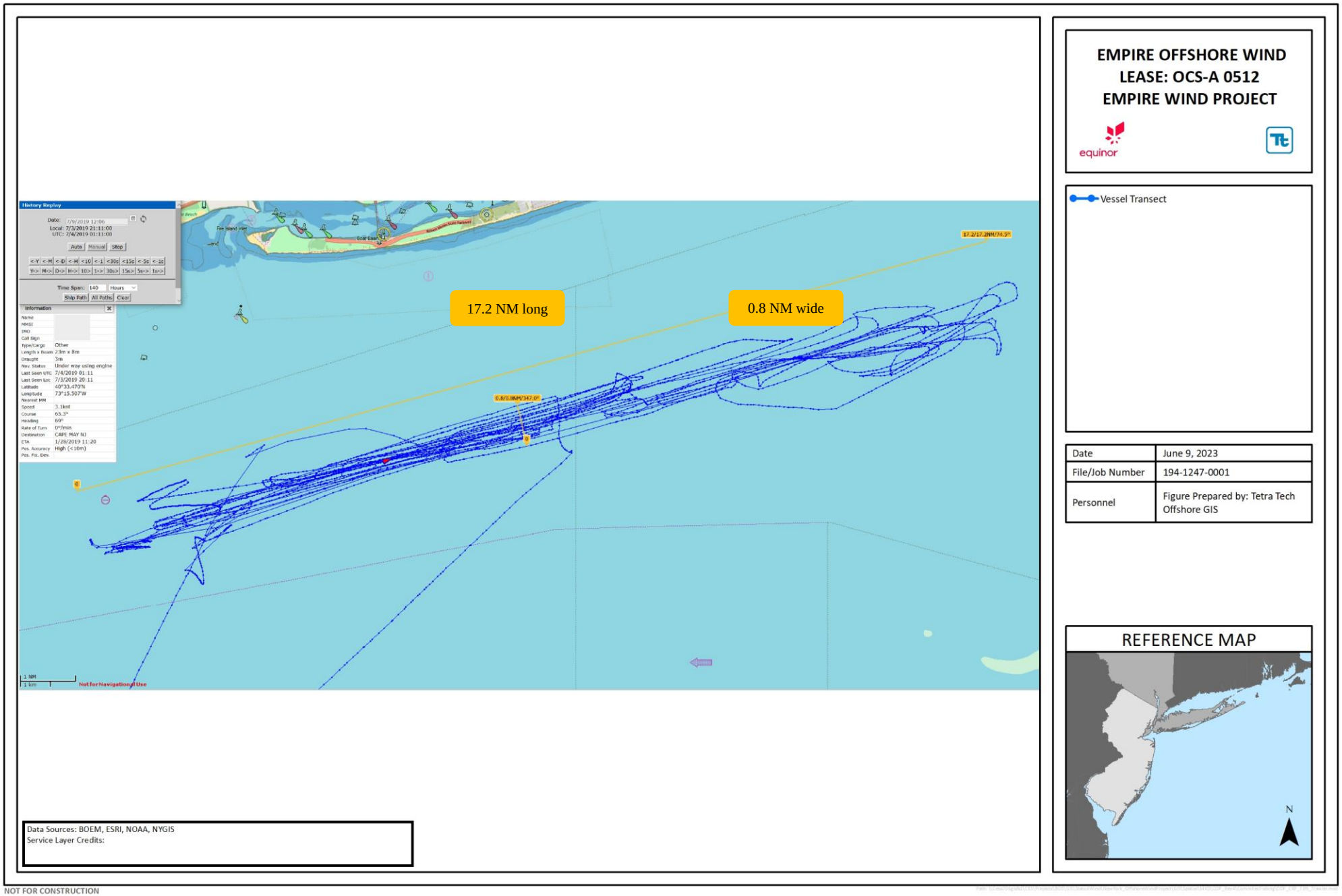


Figure 8.8-13 During a 4-5 day trip this 73-ft squid trawler (red triangle) made approximately 21 tows in a swath approximately 17.2 nm (31.9 km) long. Most of those tows were focused within a strip 0.8 nm (1.5 km) wide.

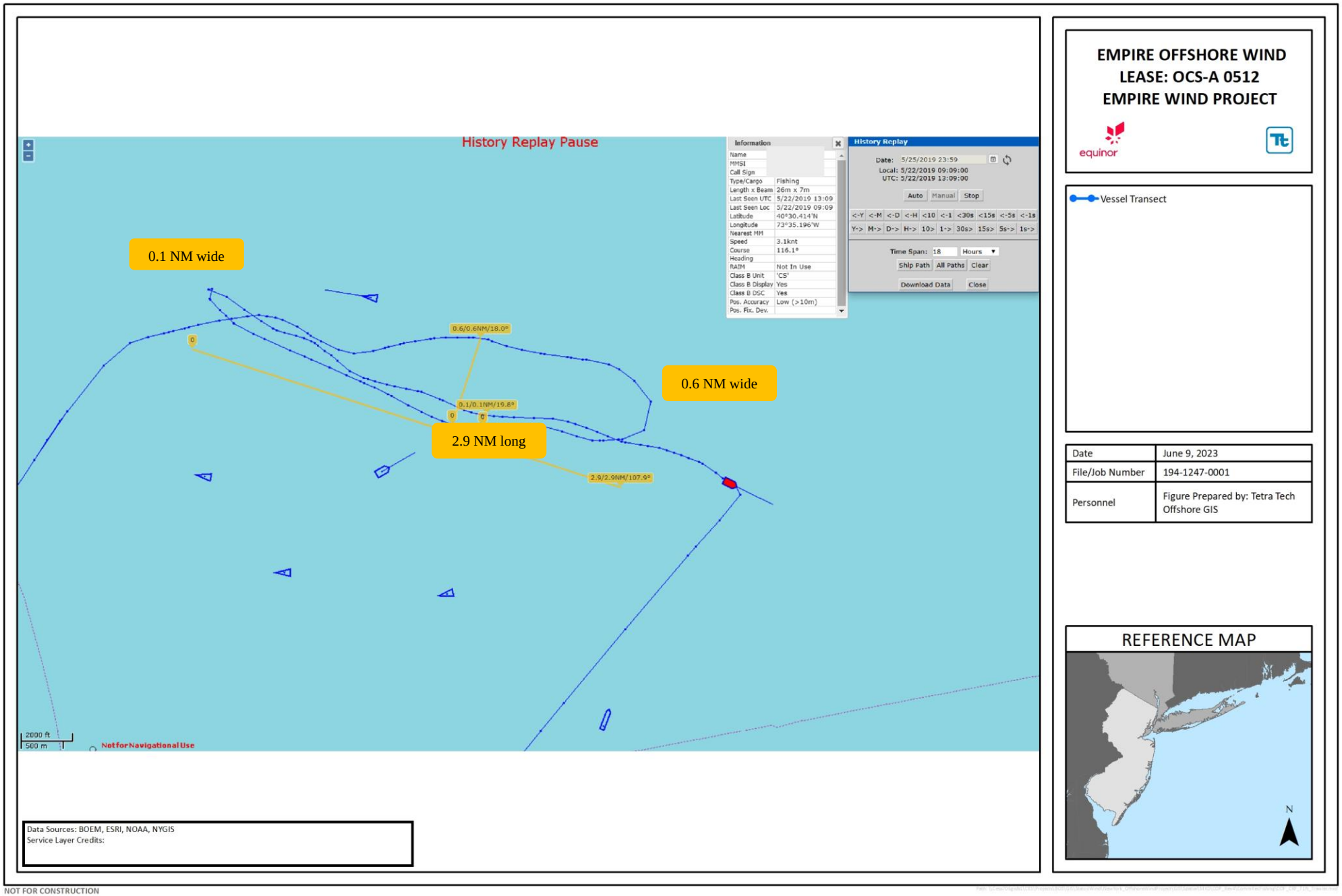


Figure 8.8-14 This 71-ft (21.6-m) squid trawler made two tows in a swath less than 0.25 nm (0.46 km) wide, with one wide turn spreading to 0.6 nm (1.1 km).

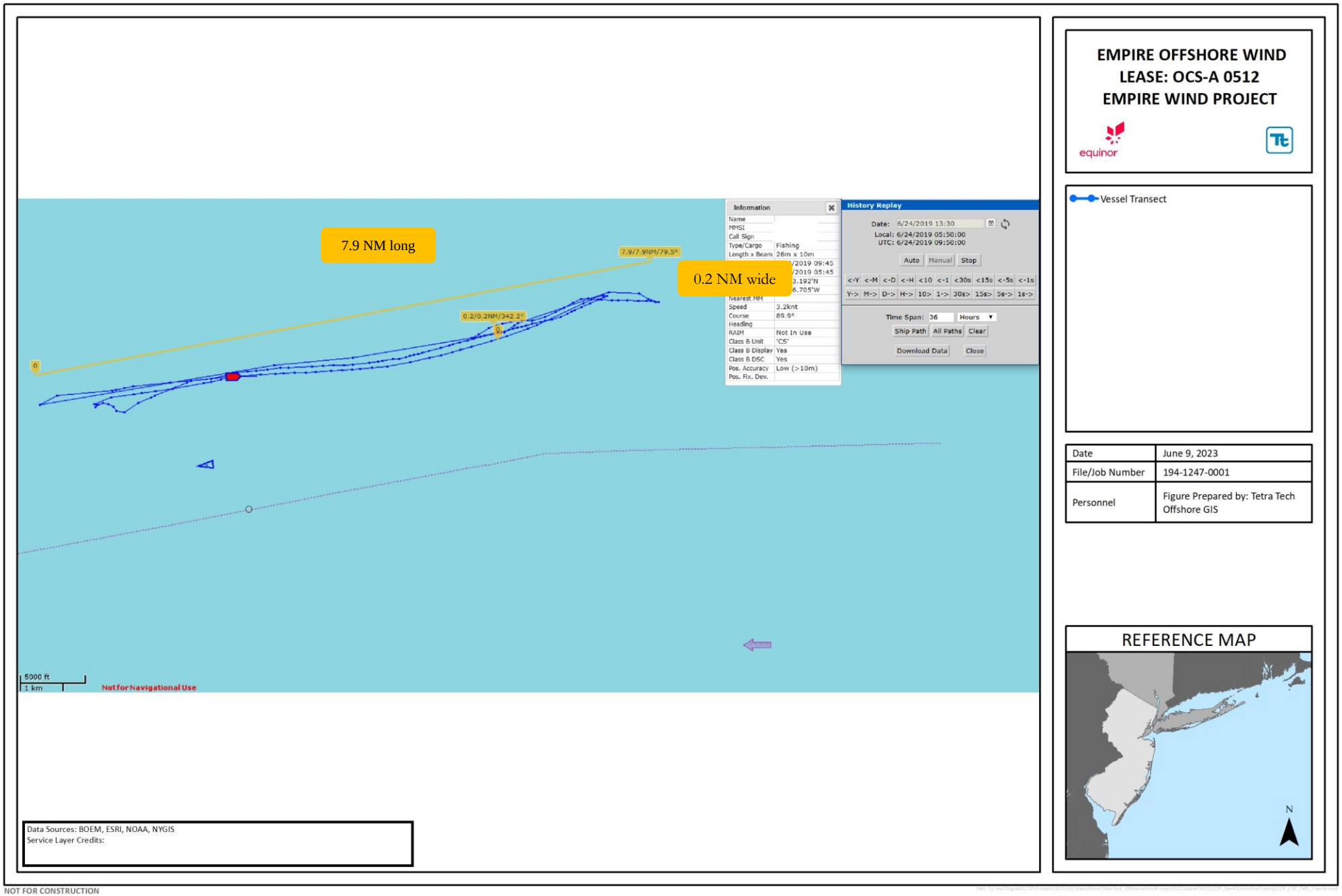


Figure 8.8-15 This 78-ft (23.8-m) squid trawler made four tows in a swath approximately 0.2 nm (0.4 km) wide.

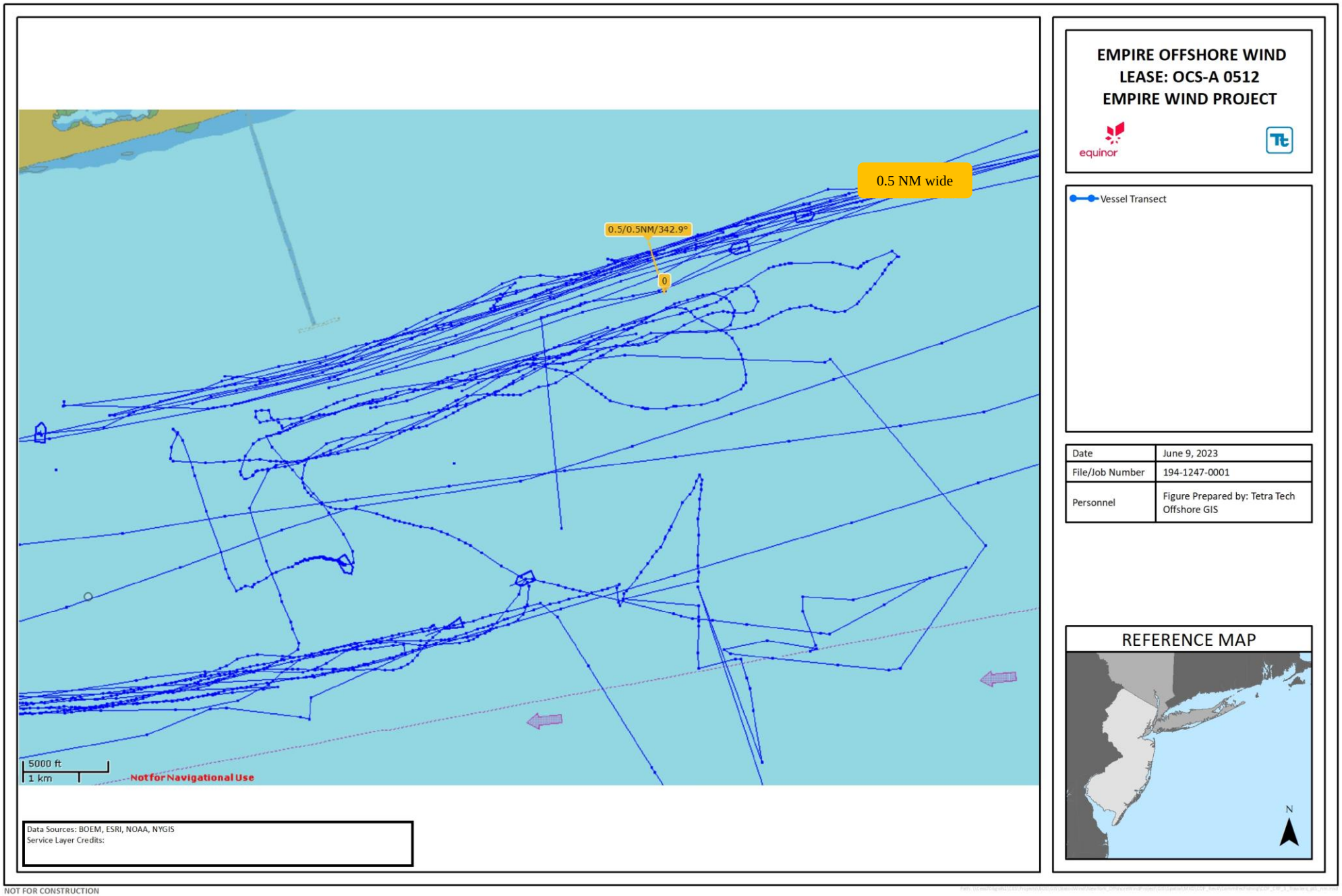


Figure 8.8-16 Three squid trawlers working in a swath approximately 0.5 nm (0.9 km) wide

Occurrence in the Project Area

Squid species comprise two of the major target species in the region, supporting trawlers based in ports from Massachusetts to New Jersey and beyond. Commercial squid trawling comprises a significant percentage both by value and by weight of commercial catch landed in the State of Rhode Island (as well as other states, though to a lesser degree; **Table 8.8-5**) (Liberman 2017). Squid are captured by trawling in either a directed fishery or a mixed species fishery, often with mackerel and/or butterfish.

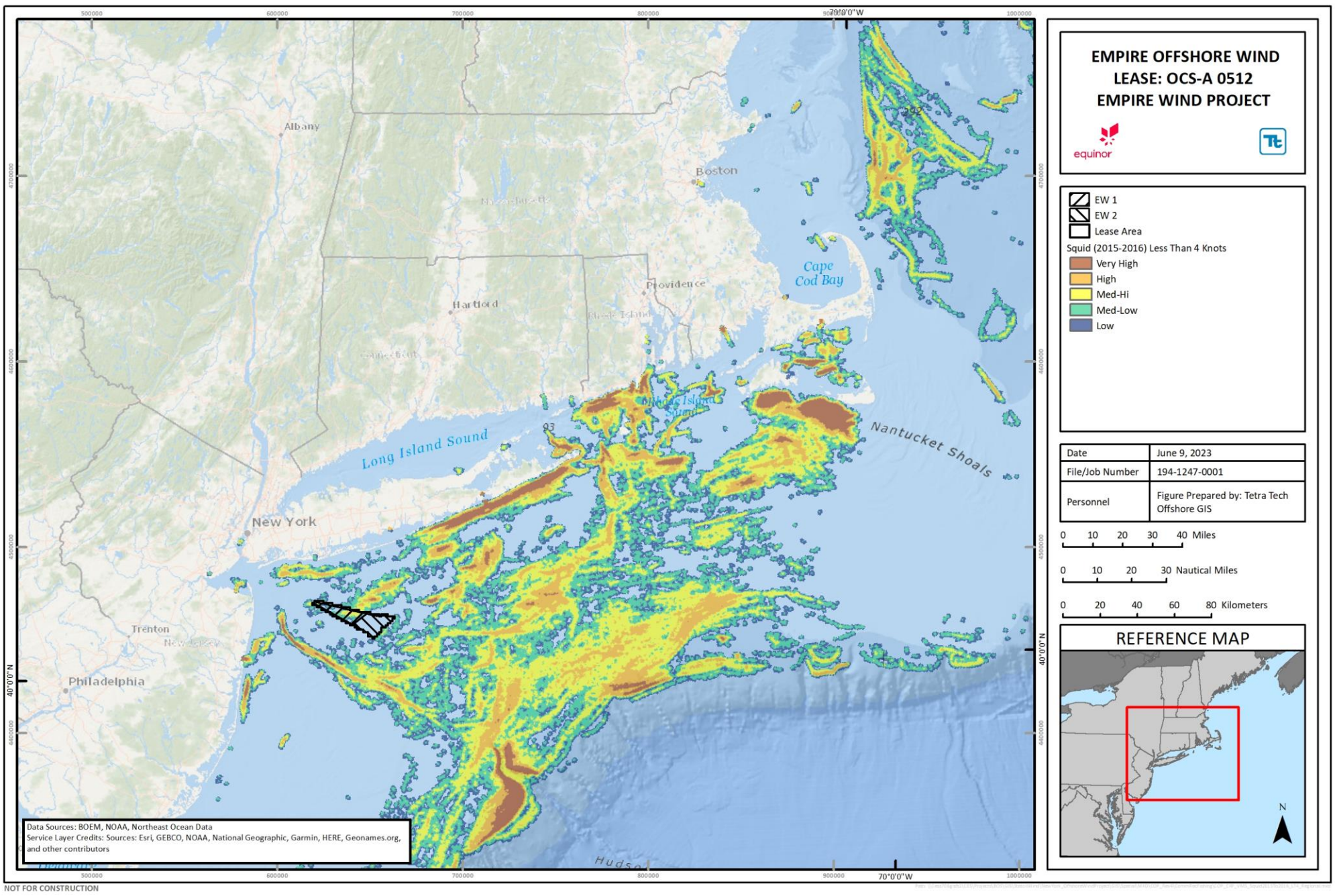
Squid trawling within the Project Area generally occurs in areas of federal waters, as well as waters of New York State, as shown in **Figure 8.8-17**, which depict squid trawling data from 2015 and 2016 using VMS data combined from those years. However, squid assemblages vary year to year. Both shortfin and longfin squid live for just a single year, therefore squid assemblage locations are generally not predictable from previous seasons (NOAA Fisheries 2017b). In the southern New England, New York Bight, and Mid-Atlantic region, squid tend to appear in large quantities in locations that may shift substantially from one year to the next. A few key squid grounds include the south shore of Long Island, the continental shelf break, deeper areas east of New Jersey (the Mud Hole), south of Nantucket, and Cholera Bank. During certain years when squid appear in abundance near Cholera Bank, substantial trawling extends across the northwestern end of the Lease Area, as reported by fishermen and VMS data (e.g., **Figure 8.8-17**). The Lease Area has been modified in recognition of the importance of Cholera Bank; BOEM removed several aliquots from the northwest end of the Lease Area before the Lease Sale in 2016. Following the environmental assessment completed prior to the lease sale, BOEM removed five aliquots (about 1,780 ac [720 ha]) from the WEA due to environmental concerns over sensitive habitat on Cholera Bank, as identified in a comment letter by NOAA Fisheries. As a result of this removal, the revised lease area was approximately two percent smaller than the original lease area considered in the initial environmental assessment and Proposed Sale Notice (FR 81:75438).

Empire will avoid, minimize or mitigate construction, operations, and decommissioning impacts on the squid fishery, as discussed in Sections 8.8.3 and 8.8.4.

Information Acquired Through Outreach

In discussions with fishermen, the greatest concerns expressed by squid trawlers relate to access and feasibility of trawling among wind turbines, particularly during certain years when large quantities of squid may appear around Cholera Bank or within the Lease Area. Trawl size and technology, wind turbine spacing, and wind farm layouts are key concerns for these fishermen to ensure continued safe access to squid during wind farm operations. Empire's approach to avoid, minimize and/or mitigate these impacts is described in Section 8.8.5.

Squid fishermen engaged by Empire stated that squid have historically exhibited fidelity to discrete areas and depth contours that vary year on year and even within a given season, as shown in **Figure 8.8-17**. Similar patterns can be identified in these figures away from the Project Area (south of Long Island and eastward to Nantucket). In addition, the data in these figures closely align with the details provided by fishermen. Due to the unpredictable nature of squid assemblages, this fishing effort is quite widespread throughout the waters south of Long Island and east to Nantucket; alternative areas outside of the Project Area.



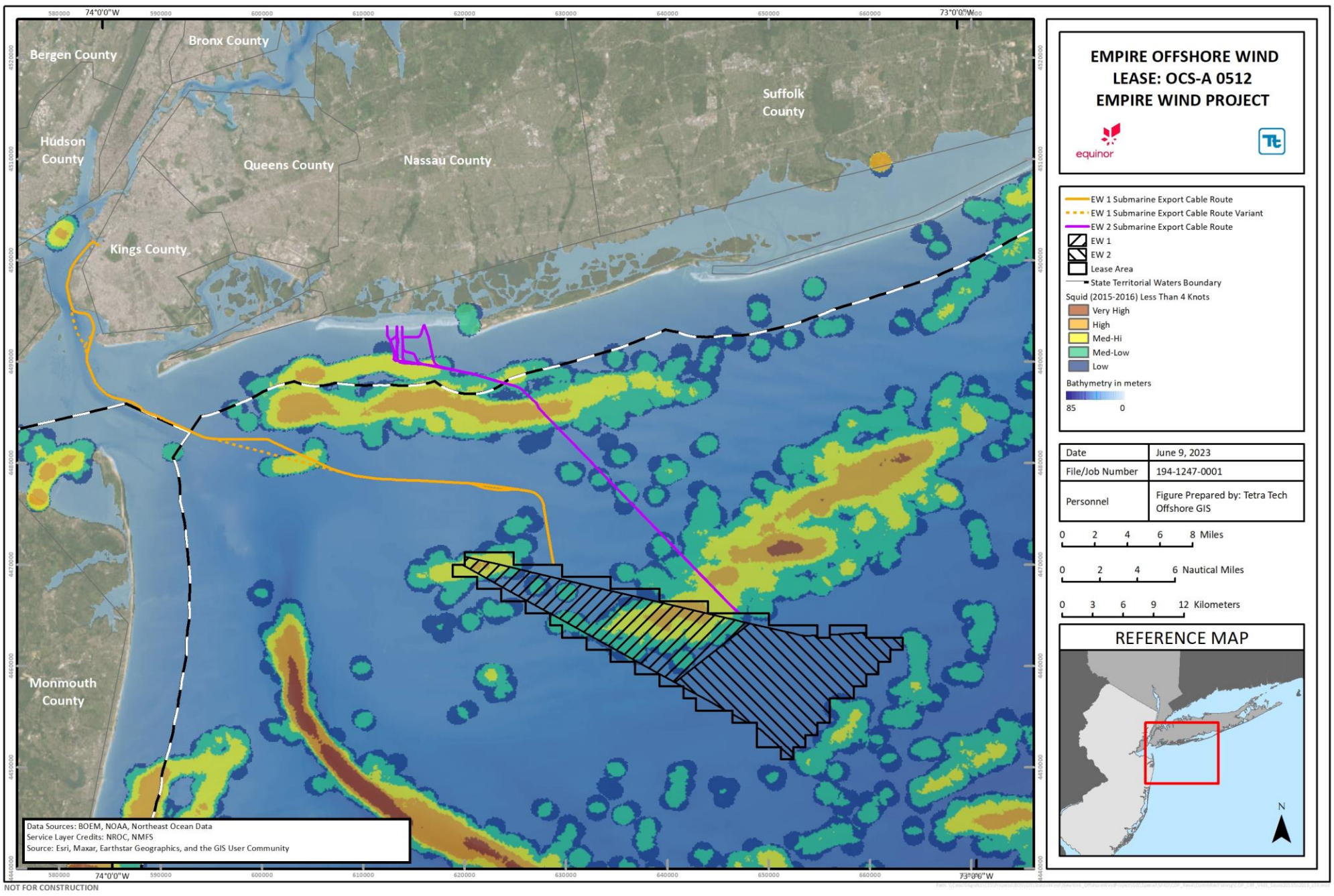


Figure 8.8-17 Squid Trawling at < 4 knots (7.4 km/h), 2015-2016 VMS Data (MARCO), shown at the Regional Scale (upper panel), and Project Area Scale (lower panel)

Information from squid fishermen has been a valuable source of input in Empire's development of the Layout Rules, which determine wind turbine orientation, alignment, and spacing, among other layout details. Most squid trawlers in the region tow a single net behind one boat. The horizontal spread of the gear is maintained by two trawl doors also called otter boards. These are normally in contact with the seabed, along with the ground cables and the footrope of the net. Significant seabed penetration is avoided because it can decrease catch and increase costs. Regional squid fishermen and gear makers have indicated that typical door spread is 40-54 fathoms (73.2 to 98.8 m). To be conservative, the scale drawing of the trawl in **Figure 8.8-12** shows a working trawler with door spread of 55 fathoms (100.6 m). During outreach, squid fishermen indicated that the density of vessels concentrated in small areas where the squid are aggregated, reinforces the notion of ensuring that the wind farm layout provide adequate space between wind turbines to allow for this activity to occur.

Scallop Dredging

Methodology

Scallop harvesters can generally be divided into two different groups; the trip boat fleet and the dayboat fleet. Day boats are usually smaller vessels that fish day trips closer to shore, while trip boats are usually larger vessels that may remain offshore for a week or more and fish in distant locations such as the Hudson Canyon Scallop Access Area, other rotational scallop access areas, and other open areas offshore.

In the northwest Atlantic, scallop vessels often range from 80 to 120 ft (24.4 to 36.6 m) in length. A large commercial scallop dredge is made of steel with an opening approximately 15 ft (3 m) wide and is towed along the seabed to collect scallops sitting on, but not buried within, the seabed substrate (**Figure 8.8-18**). Day boats may tow smaller dredges and some harvest scallops with otter trawls. Larger vessels operating in the region typically tow two dredges at once, up to 31 ft (9 m) in combined width, to cover more ground per tow. The ratio of towing wire to water depth is reported to be typically 3.4:1. At a maximum 130-ft (39.6-m) depth of the Lease Area, wire out would be on the order of 442 ft (134.7 m). Towing speeds typically range from 4.5 to 5.5 knots (8.3 to 10.2 km/h). Major ports for sea scallop operations include New Bedford/Fairhaven, Massachusetts and Cape May and Point Pleasant, New Jersey. These ports are equipped with the necessary infrastructure required to purchase, process, and ship scallops as well as the ancillary supply chain to make necessary purchases or repairs.

Figure 8.8-18 Commercial Scallop Dredge (Coonamessett Farm Foundation 2008)

Size and Configuration

The dimensions in **Table 8.8-8** were supported by several sources and draft review, with the resulting configuration shown in **Figure 8.8-19**.

Table 8.8-8 Typical Scallop Dredge Size and Configuration

Parameter	Value
Vessel length	87 ft (26.5 m)
Towing wire ratio	3.4:1
Typical wire out	78 fathoms (142.6 m)
Width of each dredge	15 ft (4.6 m)
Length of each dredge	37.5 ft (11.4 m)
Number of dredges	2
Total (bow to club stick)	559 ft (170.4 m)

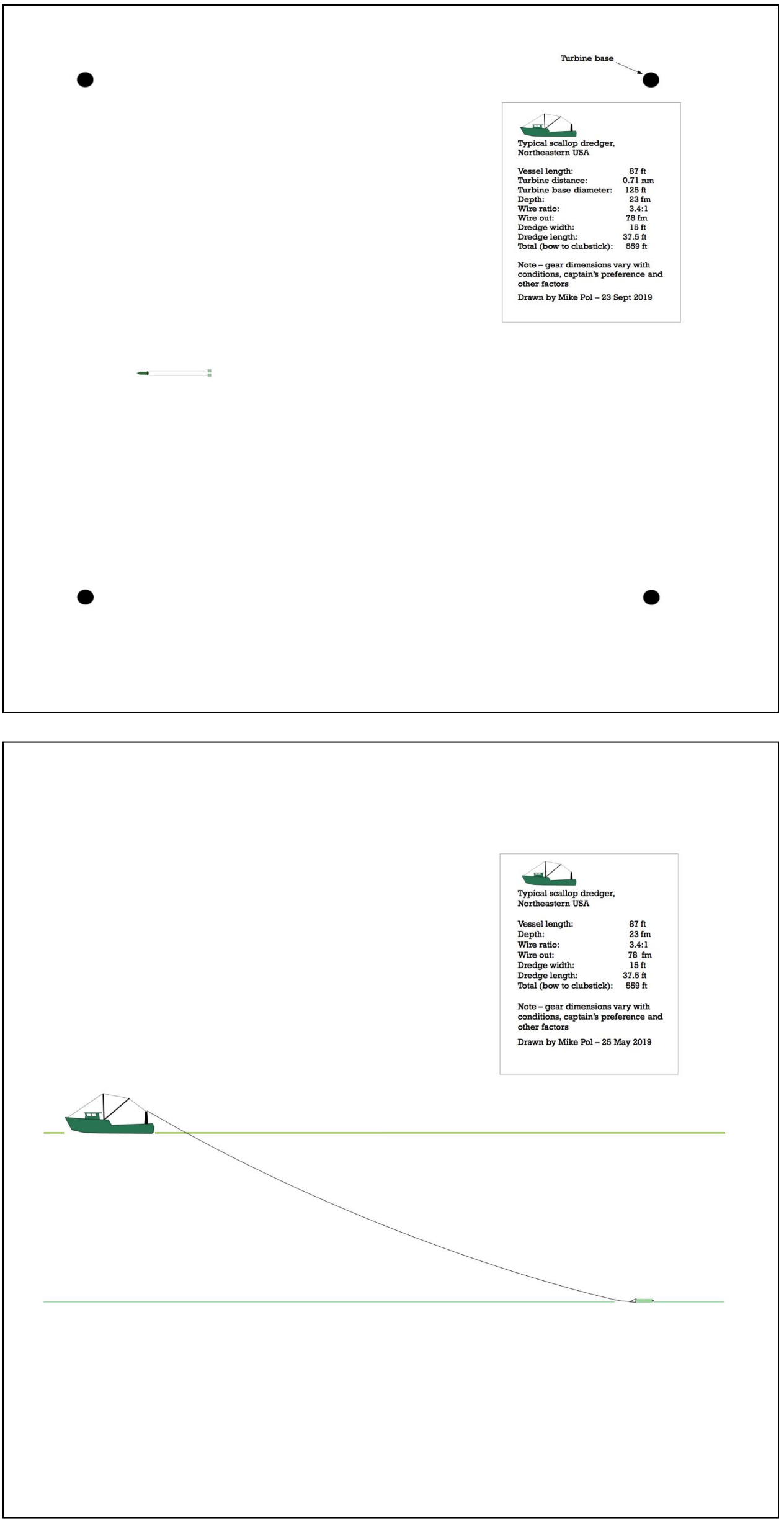


Figure 8.8-19 Scale drawing of typical regional scallop dredger, showing the plan view (upper panel) and section view (lower panel) among wind turbines spaced at 0.71 nm (1.31 km)

Scallop Dredging Practice – Examples and Measurement of Tows with AIS

Figure 8.8-20 through **Figure 8.8-23** show tracks of typical scallop dredgers from multiple tows made in the New York Bight during 2018-2019, with measurements of tow length and total swath width of multiple tows, as examples of real-time observations of fishing activity. Scallop dredging was reported from Project activities within the Lease Area on fewer than 15 days during survey activities. On a few occasions, scallopers towed in the Lease Area, but left after a few hours of towing; suggesting these were trial tows. However, scallop dredging was often observed 5 to 10 mi (8 to 16 km) south of the Lease Area.

Towing speeds of large scallop dredges are often 4 to 5.5 knots (7.4 to 10.2 km/h). Scallopers generally tow faster and are more maneuverable than other regional commercial mobile gear types. Their footprint is much smaller than that of an otter trawl, and haul back and set are relatively fast. At the end of the desired tow length, they may haul back, empty the catch, turn sharply and set in, or they may turn while towing the dredges on the seabed, a process that is easier for scallopers than otter trawlers. It should be noted that a low number of vessels (fewer than 20) are permitted to harvest scallops with otter trawls in the New York Bight. Although scallop fishermen have similar technical concerns as otter trawl fishermen (e.g., maneuverability, safety), there are some special characteristics of scallop gear as they tow (e.g., small dredge size, no doors, single tow cable per dredge, and shorter tow cable length) which lead to different access requirements in this fishery compared to otter trawling (see scaled drawings in **Figure 8.8-12** and **Figure 8.8-19**).

Occurrence in the Project Area

Scallop grounds are widespread from the Mid-Atlantic through Georges Bank (**Figure 8.8-24**). The preferred water depths for larger scallop vessels generally range from 25 to 55 fathoms (46 to 101 m). The water depth of the Lease Area ranges from approximately 11 to 22 fathoms (20 to 40 m). However, scallop vessels are reported to work in the Lease Area during rough weather, with a focus in the southeast portion of the Lease Area, closer to their preferred depths and grounds yet less exposed to offshore weather and likely closer to their home ports. Empire recognizes this is subject to change if a commercially viable number of scallops appear in the shallower depths of the Lease Area – thus Empire's continuing interest in planning and installing arrays that allow safe and productive commercial scalloping (as well as trawling and clam dredging). The recent and unique recruitment events that have caused increased landings in the scallop fishery have also been examined (Bethoney et al. 2016). The data below; however, shows that while some high densities of scallop fishing activity occurs in the southeast portion of the Lease Area, the majority of the scallop harvest in recent years occurs outside of the Lease Area. Also of note was the lack of substantial evidence of scallop beds in the Lease Area at present, based on the results of the benthic survey (see **Section 5.5**).

As reported to Empire, the scallop fishery community generally agrees that VMS is used routinely within the scallop dredging industry, and therefore, its fishing areas are well understood and represented. In addition, research has been executed within and on behalf of the scallop fishery due to a unique funding set-aside program. Research set-aside programs are unique to federal fisheries in the Greater Atlantic Region. No federal funds are provided to support the research; instead, research funds are generated through the sale of set-aside allocations for quota managed or days-at-sea managed fisheries. There are active research set-aside programs established under the Atlantic Sea Scallop, Atlantic Herring, and Monkfish Fishery Management Plans (NOAA Fisheries 2018c). For the scallop research set-aside program, the NEFMC reserves 1.25 million pounds of scallops per year. This generates approximately $15 million; of which approximately $3 million supports research projects that are designed to benefit the fishery (NOAA Fisheries 2018c).

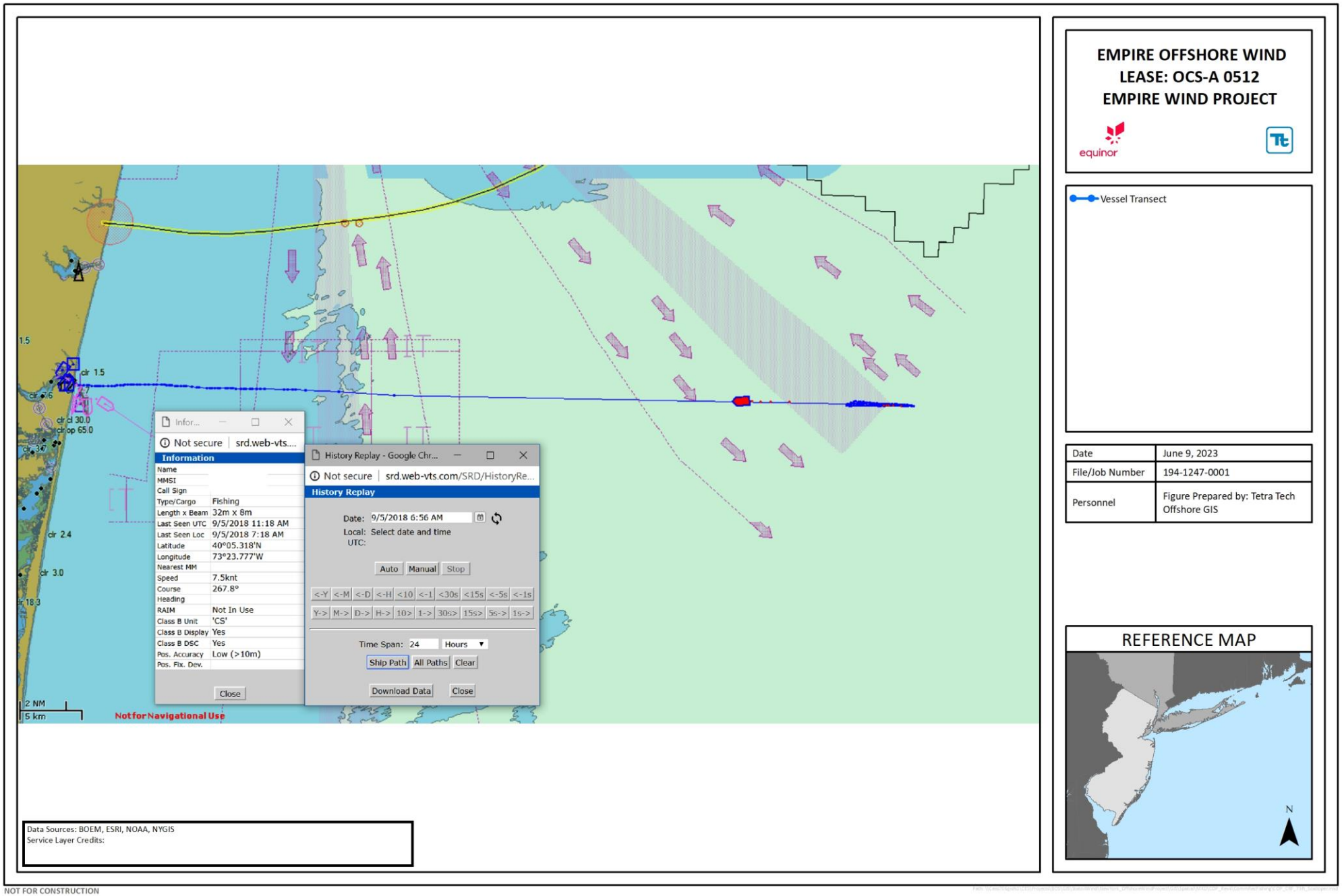


Figure 8.8-20 This 75-ft (22.9-m) scalloper left New Jersey, made nine tows and then headed back to port

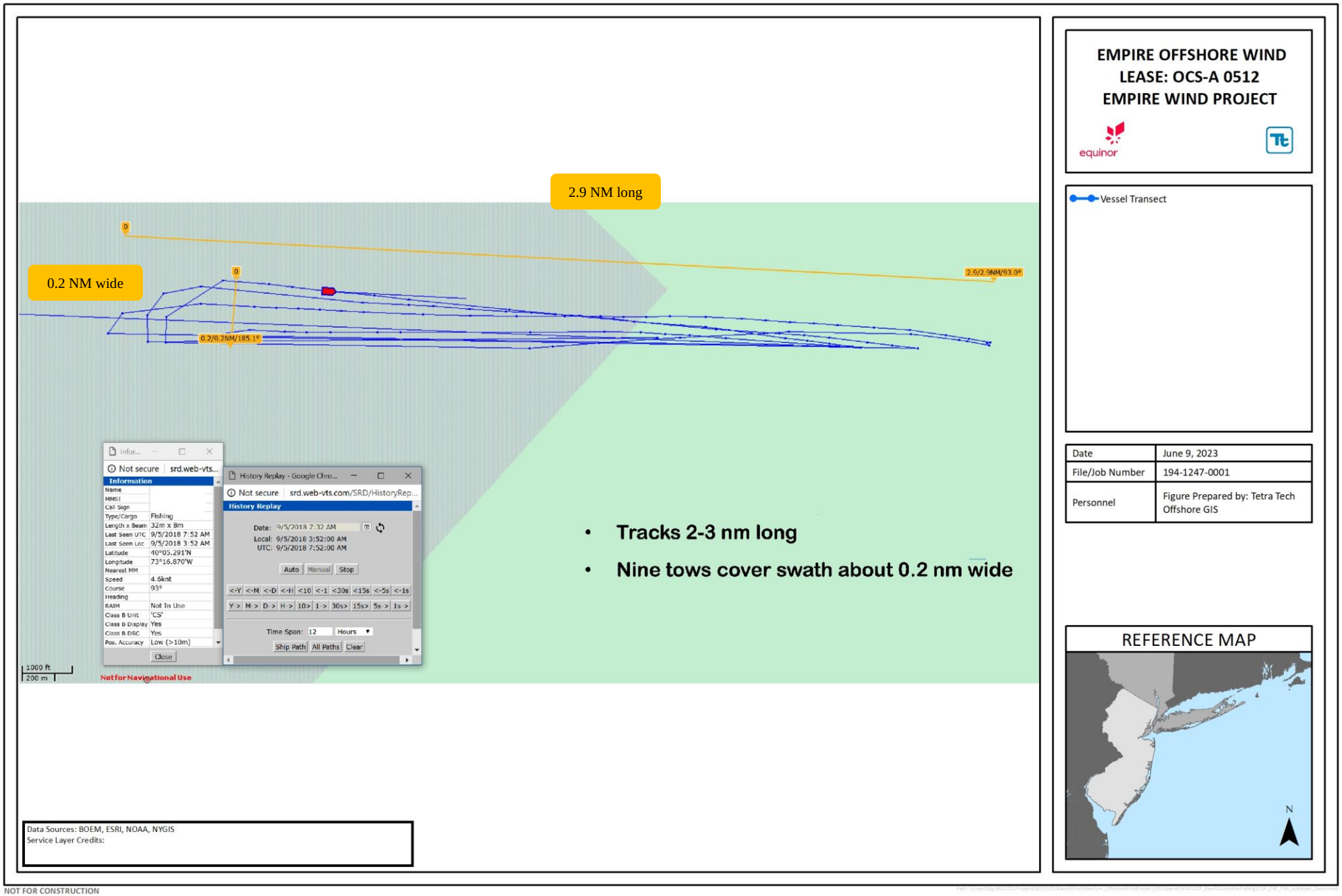


Figure 8.8-21 A closeup of this trip shows nine tows covering a swath about 0.2 nm (0.4 km) wide. The vessel may have towed the gear in a turn at the west end of each track, but hauled back on the east end, making tighter and faster turns.

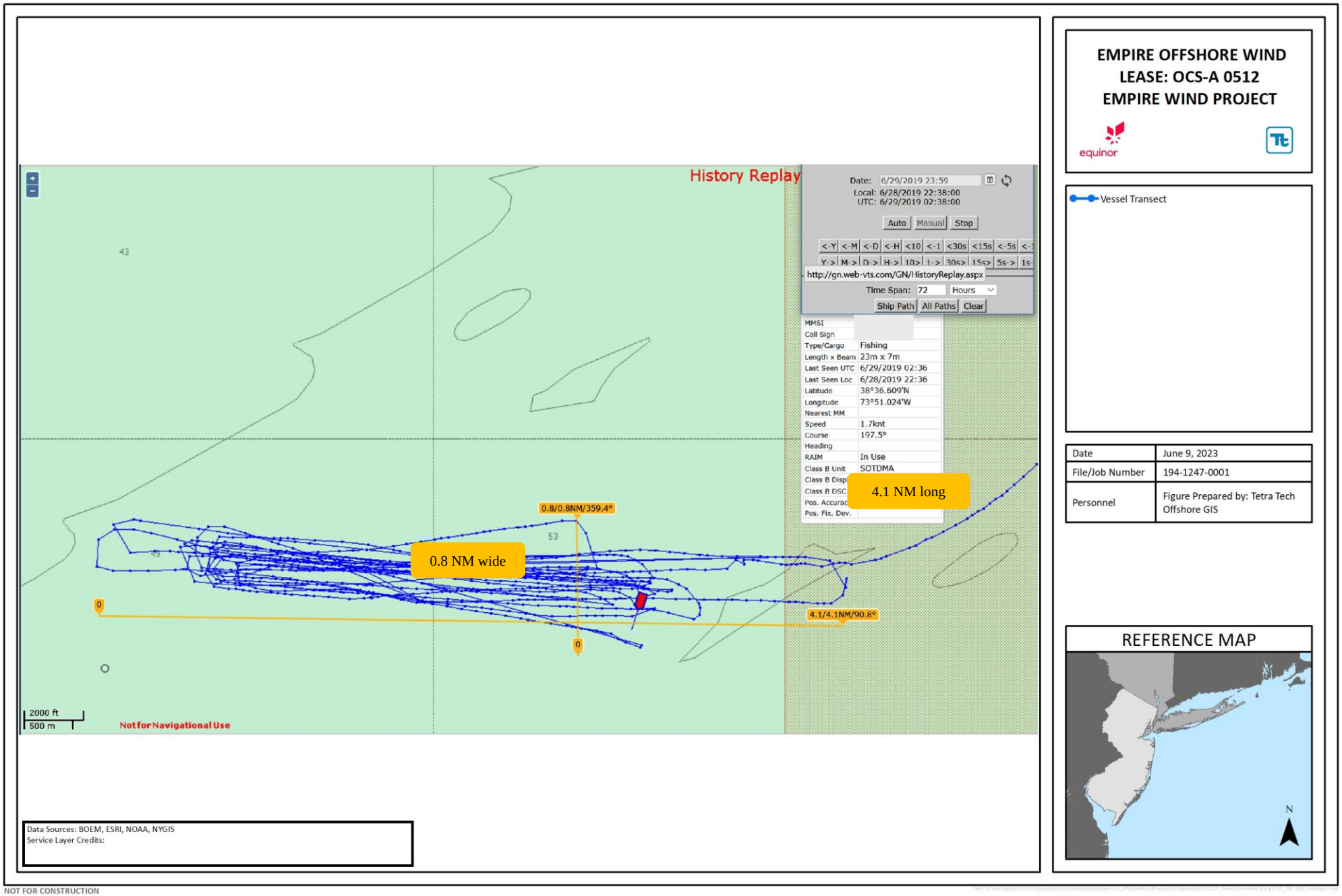


Figure 8.8-22 This 68-ft (20.7-m) scalloper made approximately 24 tows in a swath with total width 0.8 nm (1.5 km) and length 4.1 nm (7.6 km).

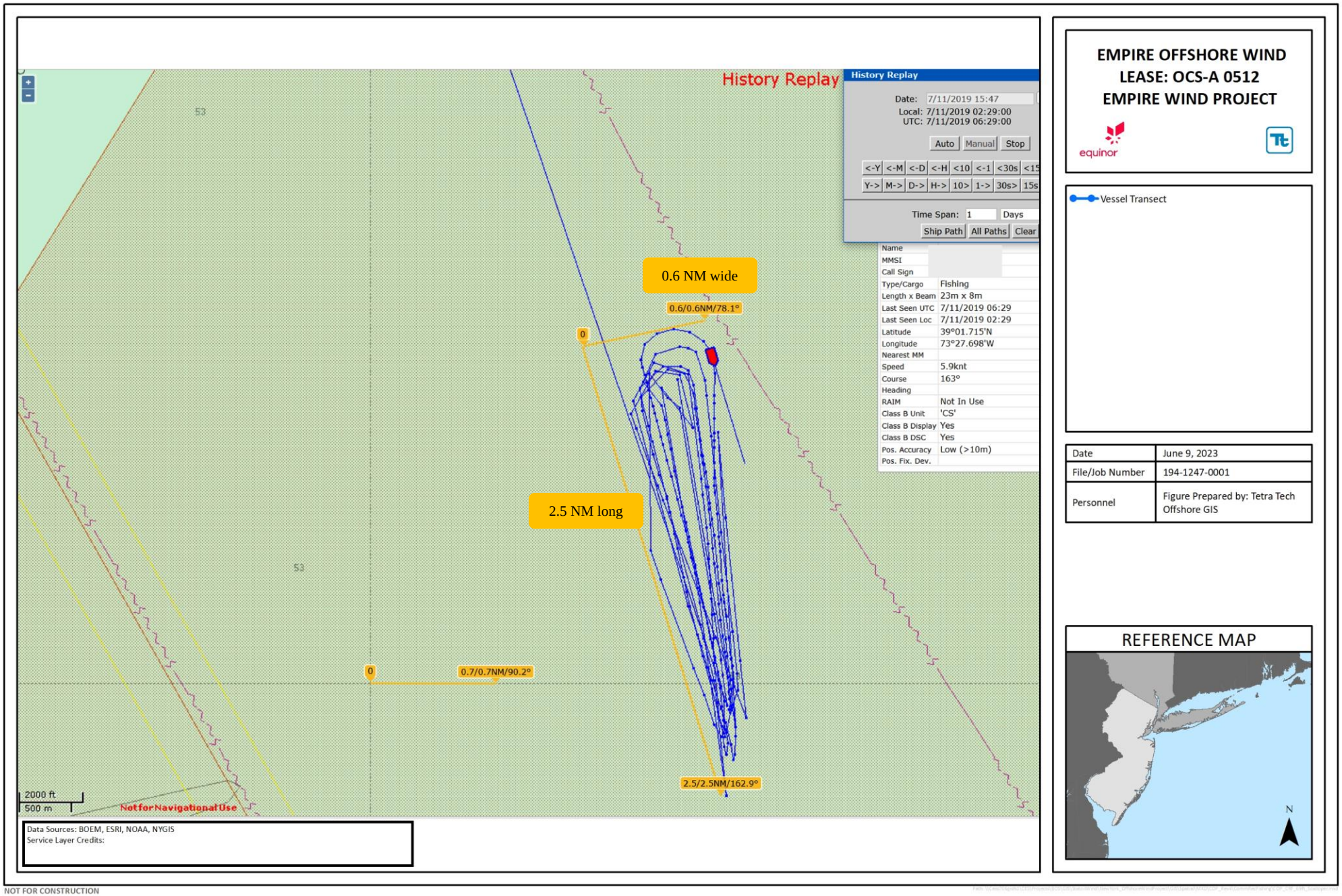
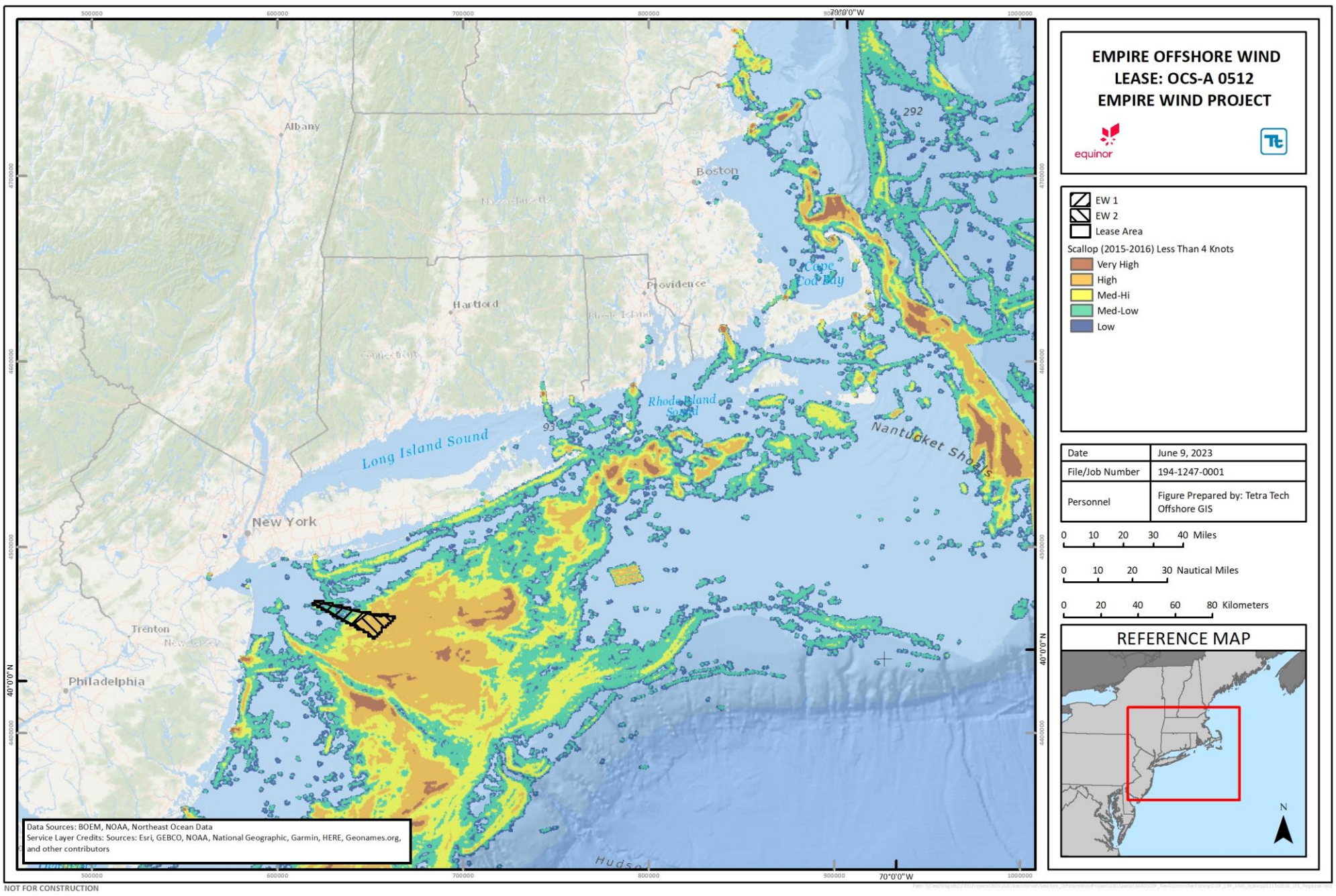


Figure 8.8-23 This 69-ft (21-m) scalloper made 18 tows in a swath width 2.5 nm (4.6 km) long by 0.6 nm (1.1 km) wide.



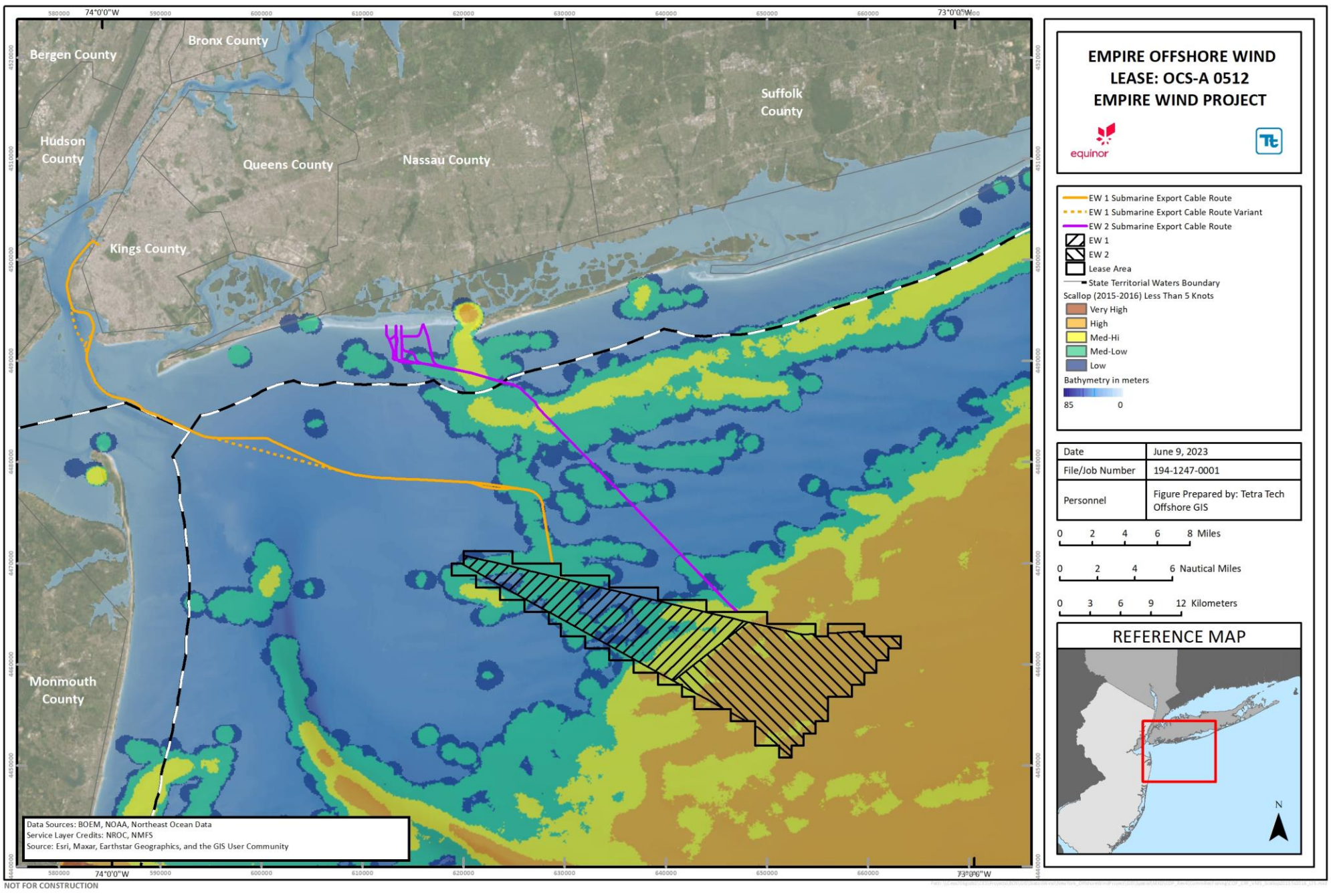


Figure 8.8-24 Scallop fishing activity at < 5 knots (9.3 km/h), 2015-2016 VMS Data (MARCO), shown at the regional scale (upper panel), and Project Area scale (lower panel)

The inclusion of scallop grounds within the Lease Area, and preservation of the ability to fish there, remain important considerations as there is substantial scallop harvest activity within waters of the Project Area (**Figure 8.8-24**). Furthermore, the scallop fishery has significant regional socioeconomic importance due to the comparatively large revenue generated by this fishery as compared to most others.

Empire will avoid, minimize, or mitigate construction, operations, and decommissioning impacts on the scallop fishery, as discussed in Sections 8.8.3 and 8.8.4.

Information Acquired Through Outreach

As with other gear types, a major concern from fishermen is continued access to fishing grounds. Although many scallop fishermen stated that most effort occurs east of the Project Area, or at least east of the 20 fathom (36.6 m) line, the technical issues focus on maneuverability and space required for safe and effective fishing. Additionally, as with other types of fishing, it is understood that weather, visibility, currents, congestion, seabed obstacles and other factors may influence a captain's decision of whether to fish in an offshore wind area.

Hydraulic Clam Dredging

Methodology

Hydraulic clam dredges harvest bivalve shellfish from the soft bottom sediments in which they are buried. This technique of harvesting surfclams and ocean quahogs is utilized in Mid-Atlantic waters where bottom conditions allow. The hydraulic dredges are dragged along the bottom by the fishing vessel as a large hydraulic pump on the vessel forces sea water through a hose to a manifold on the front of the dredge (**Figure 8.8-25**). The manifold jets the water into the sand, temporarily fluidizing the sand and allowing the dredge to penetrate the sediment to approximately 1 ft (0.3 m) in depth to capture bivalves and any bivalve-sized items (rocks, debris, fish) in the process. Average towing speed is between 3.2 and 3.6 knots (5.9 and 6.7 km/h), with some tows ranging in speed from 2.2 to 4.0 knots (4.1 to 7.4 km/h). Typical dredge width may be 20 ft (6 m), but newer, larger vessels can tow a larger dredge or two dredges whose total width exceeds that. A typical ratio for tow rope to water depth would be 2.5:1. In the Lease Area, the maximum water depth is approximately 130 ft (40 m), so towing wire would be on the order of 325 ft (99 m).

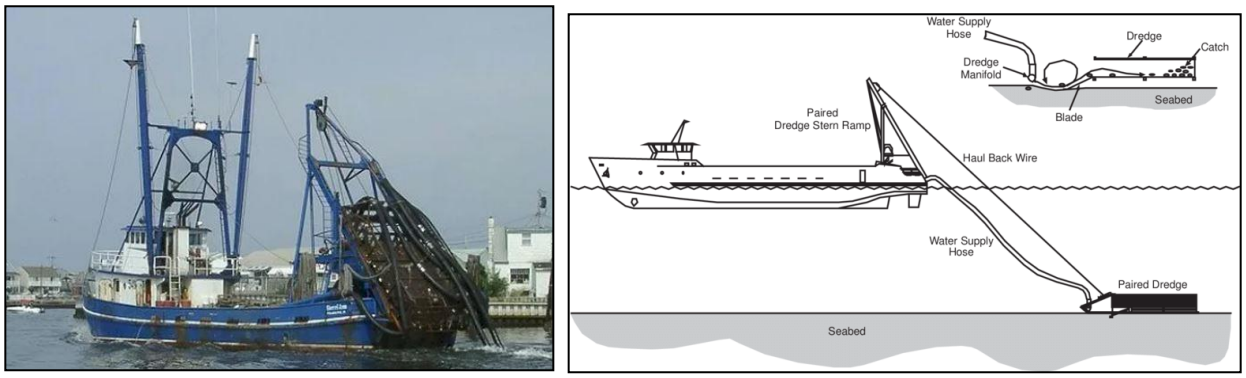


Figure 8.8-25 Hydraulic Clam Dredge Vessel (Marcus 2013) and Deployed Gear (Gilkinson et al. 2003)

Size and Configuration

The dimensions in **Table 8.8-9** were supported by several sources and draft review. As with other types of fishing, it is understood that weather, visibility, currents, congestion, seabed obstacles and other factors may

influence a captain's decision of whether to fish in an offshore wind area. Plan and section views of this working dredger with towing rope, hauling cable and pump hose is shown in **Figure 8.8-26**.

Table 8.8-9 Typical Hydraulic Clam Dredge Size and Configuration

Parameter	Value
Vessel length	120 ft (36.6 m)
Towing wire ratio	2.5:1
Typical wire out	57.5 fathoms (105.2 m)
Width of dredge	20 ft (6.1 m)
Length of dredge	45 ft (13.7 m)
Number of dredges	1
Total (bow to club stick)	480 ft (146.3 m)

Clam/Quahog Dredging Practice–Examples and Measurement of Tows with AIS

Figure 8.8-27 through **Figure 8.8-29** show tracks of typical clam dredgers from multiple tows made in the New York Bight during 2018-2019, with measurements of tow length and total swath width of multiple tows. No clam dredging was observed within the Lease Area in the AIS data for this period, although clam dredgers from Point Pleasant occasionally transited the Lease Area, and several dredged closer to western Long Island.

Occurrence in the Project Area

Historically, clam dredging has been conducted in a variety of locations throughout the region. Through outreach communication, most clam dredge fishermen consulted during Project outreach indicate that the Lease Area has not been productive in recent years, with low levels of fishing as shown in the most recent VMS data available (2015-2016; **Figure 8.8-30**). However, both surfclams and quahogs are among the top species by weight and revenue for New York and New Jersey ports (see **Table 8.8-3**). The Atlantic surfclam and ocean quahog environmental degradation closure area lies just to the west of the Lease Area and consists of a 182.7-square-nm (62,663.4-ha) area where no clam dredging may occur (see **Figure 8.8-1**). Clam dredging continues in areas north of the lease toward Long Island, and clam dredgers often transit the Lease Area on SW-NE headings between Point Pleasant and fishing grounds northeast of the Lease Area. Since the Lease Area does include water depths preferred for surfclam dredging, Empire is interested in preserving that harvest opportunity for potential future use and will continue to engage with fishermen on this topic.

Empire will avoid, minimize or mitigate construction, operations, and decommissioning impacts on the surfclam fishery, as discussed in Sections 8.8.3 and 8.8.4.

Hydraulic dredges penetrate the seabed more than other mobile gear types such as scallop dredges and otter trawls. Stevenson et al (2004) present summaries of numerous studies that have examined seabed penetration of these gear types. A key consideration is that a single pass by a hydraulic dredge penetrates more deeply than most commercial gear types, and it is common for a dredge or dredge fleet to continue fishing in discrete areas where a commercially viable number of clams is found. Therefore, some areas of seabed may experience impacts from repeated passes of a clam dredge, rather than a single dredge pass each time.

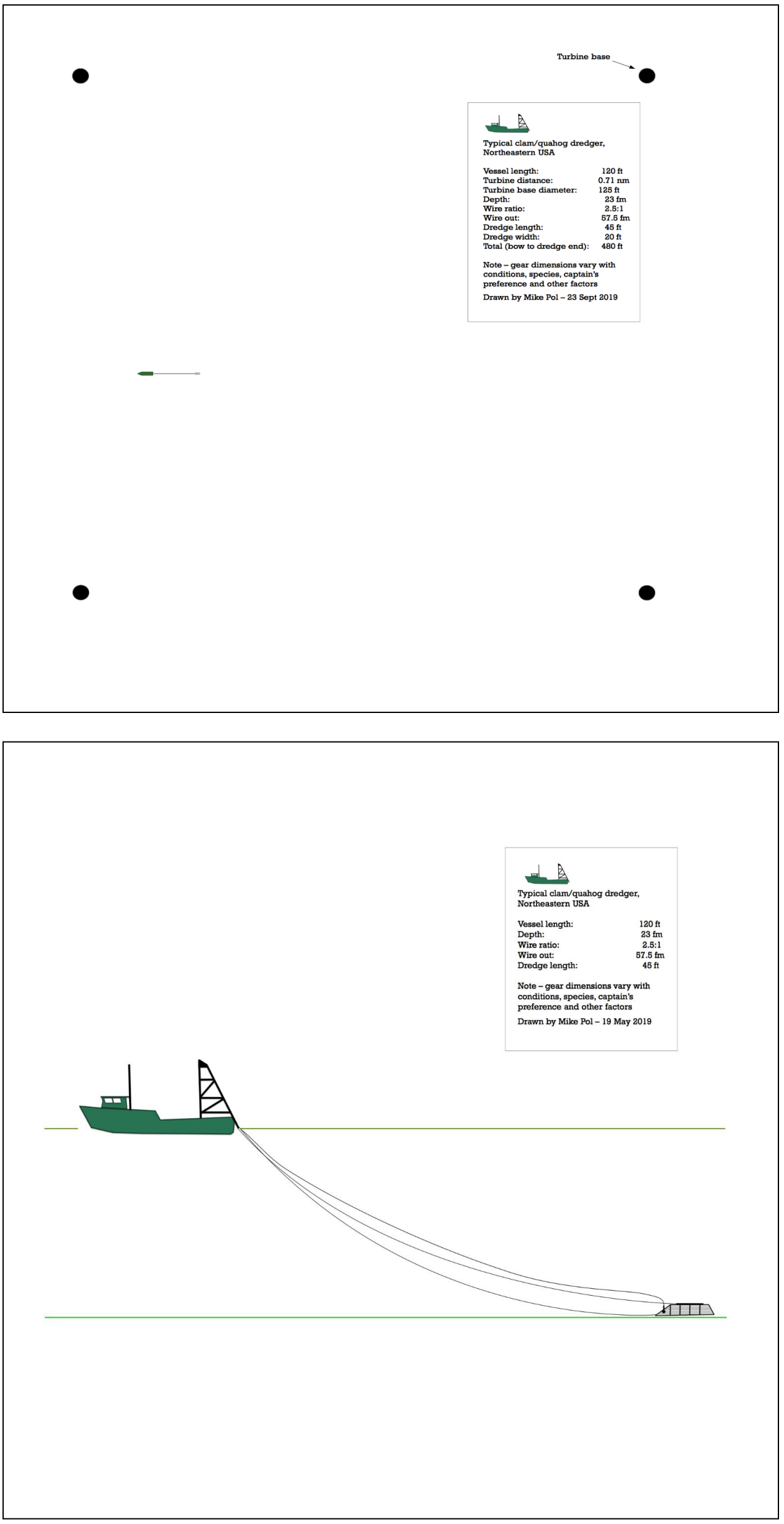


Figure 8.8-26 Scale drawing of typical regional clam dredger, showing the plan view (upper panel) and section view (lower panel) among wind turbines spaced at 0.71 nm (1.31 km)

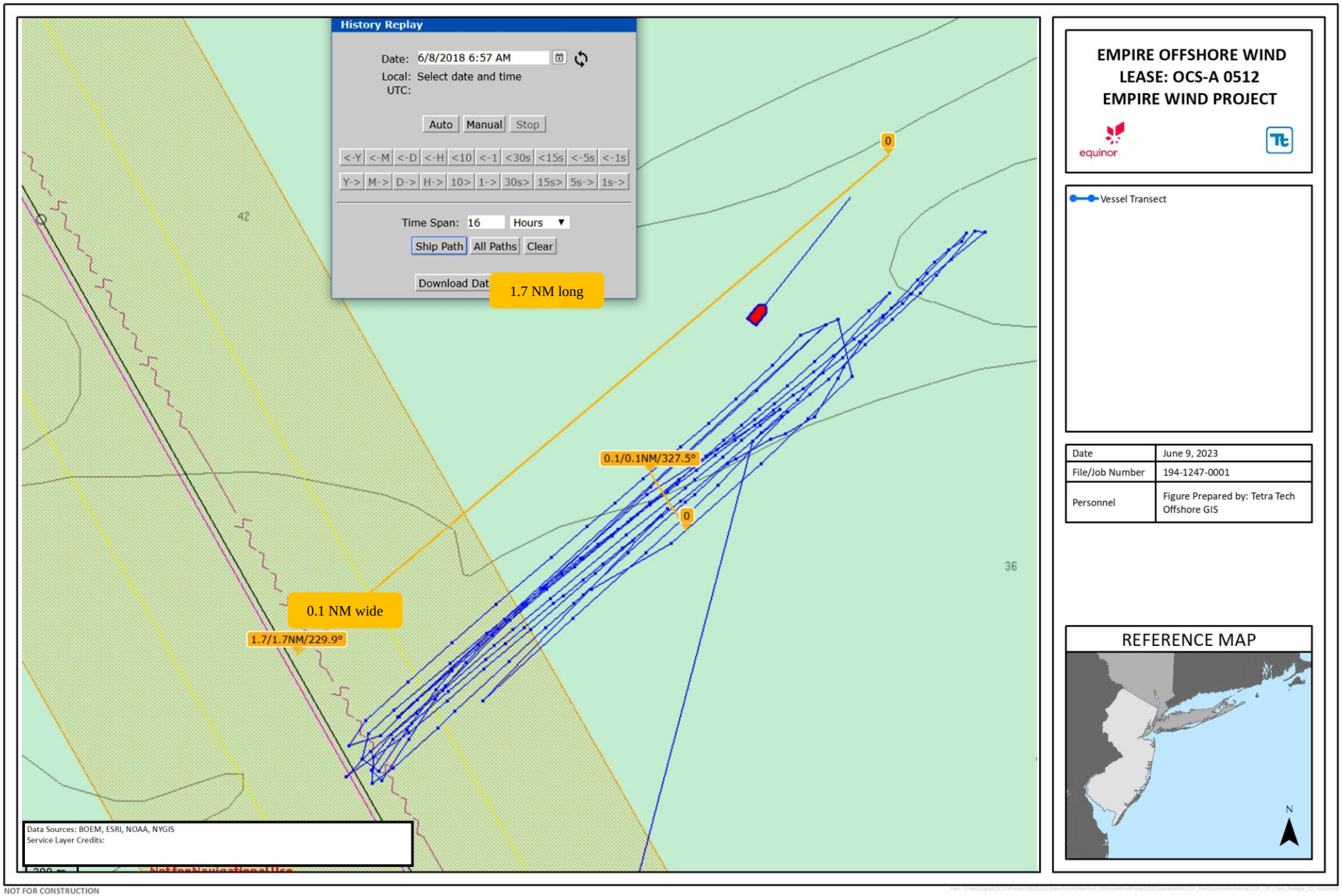


Figure 8.8-27 This clam dredger made approximately 12 tows in a swath 0.1 nm (0.2 km) wide by 1.7 nm (3.1 km) long. The purple line is an international telecommunications cable.

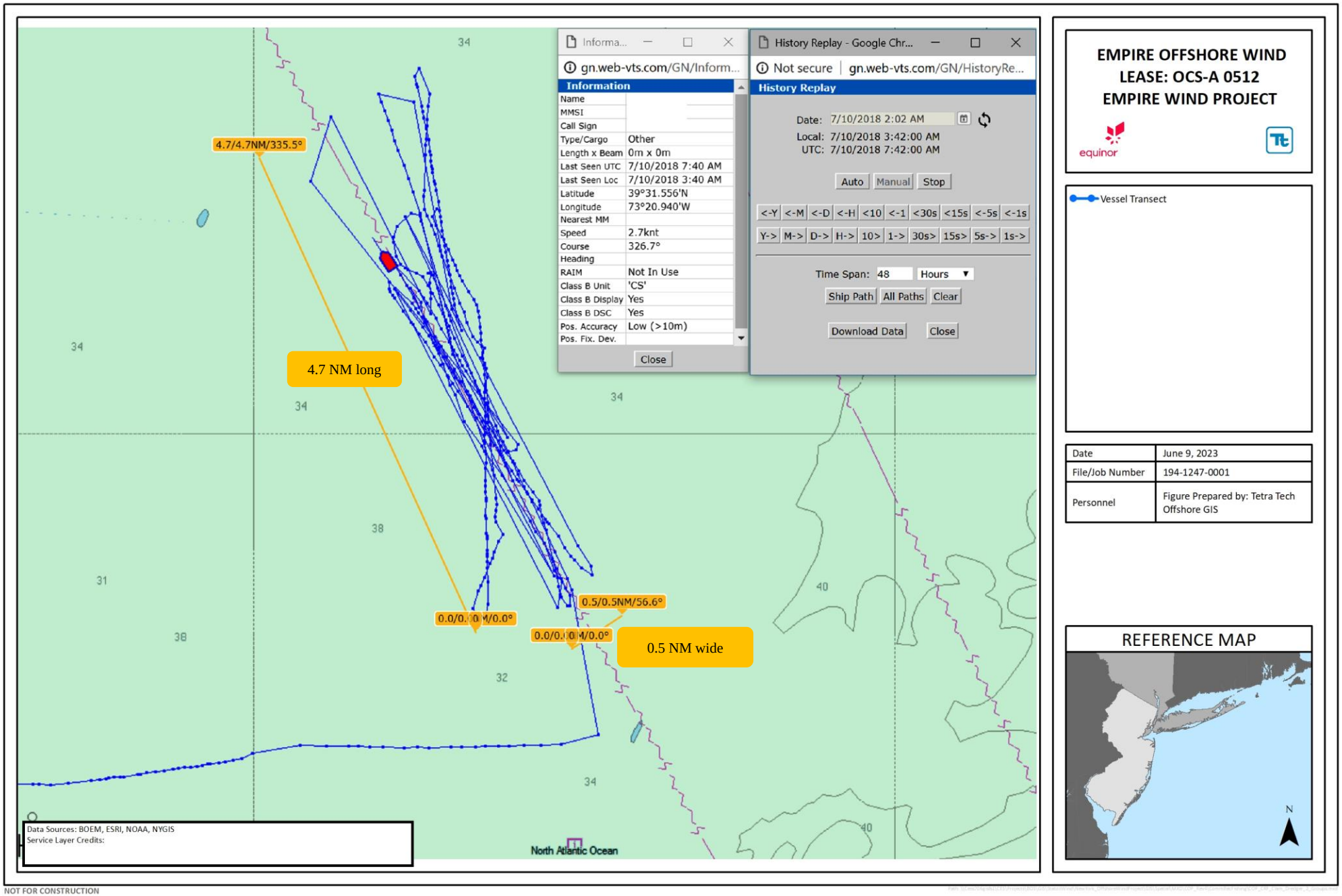


Figure 8.8-28 This clam dredger made approximately ten tows in a swath 0.5 nm (0.9 km) wide (and five tows outside that footprint). Total length was about 4.7 nm (8.7 km). Several of the tows were over and near a charted international telecommunications cable.

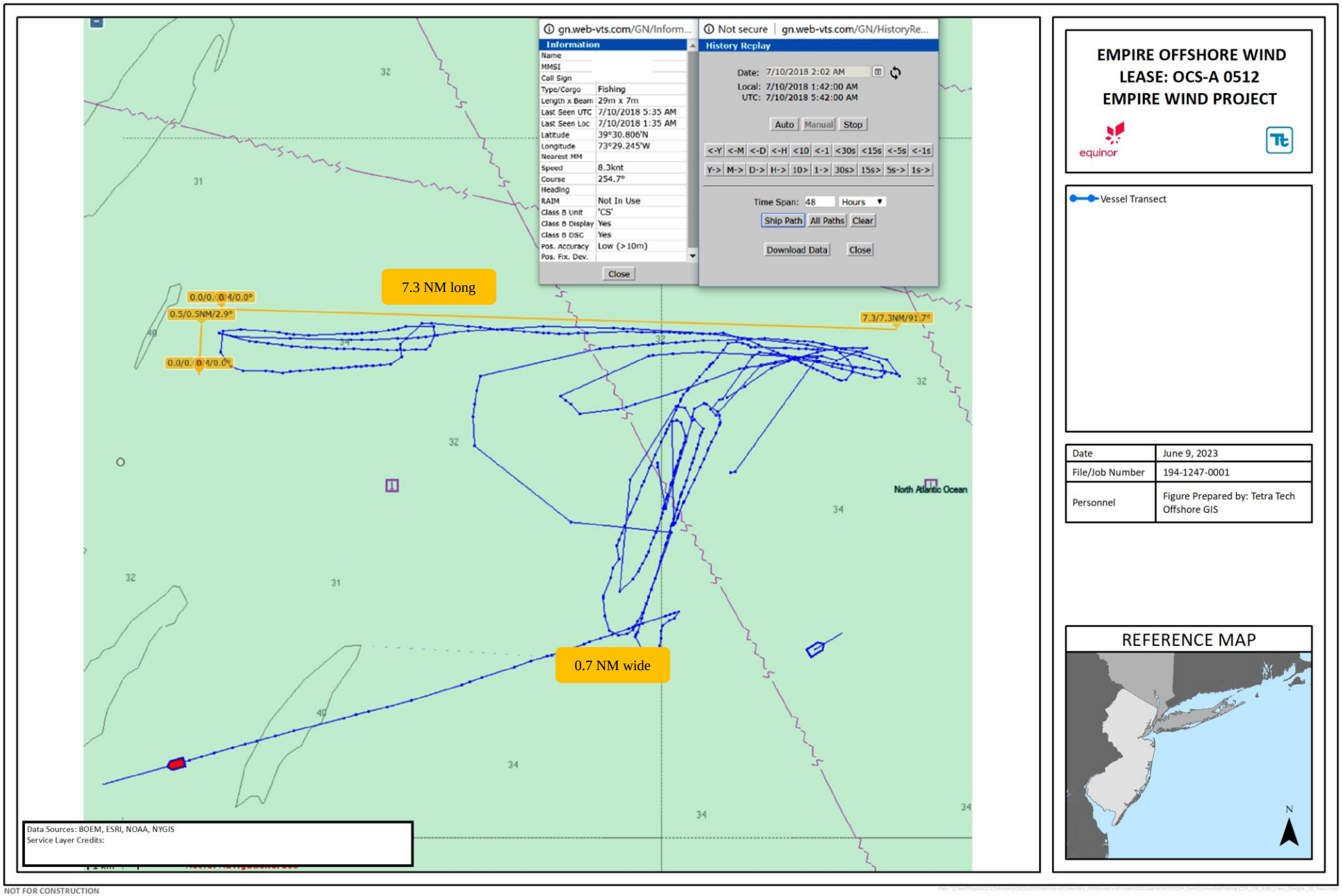


Figure 8.8-29 This 95-ft (29-m) clam dredger's trip was spread more broadly in two groups of tracks, in swaths of 0.5 to 0.7 nm (0.9 to 1.3 km) wide. At least five tows crossed an active telecom cable.

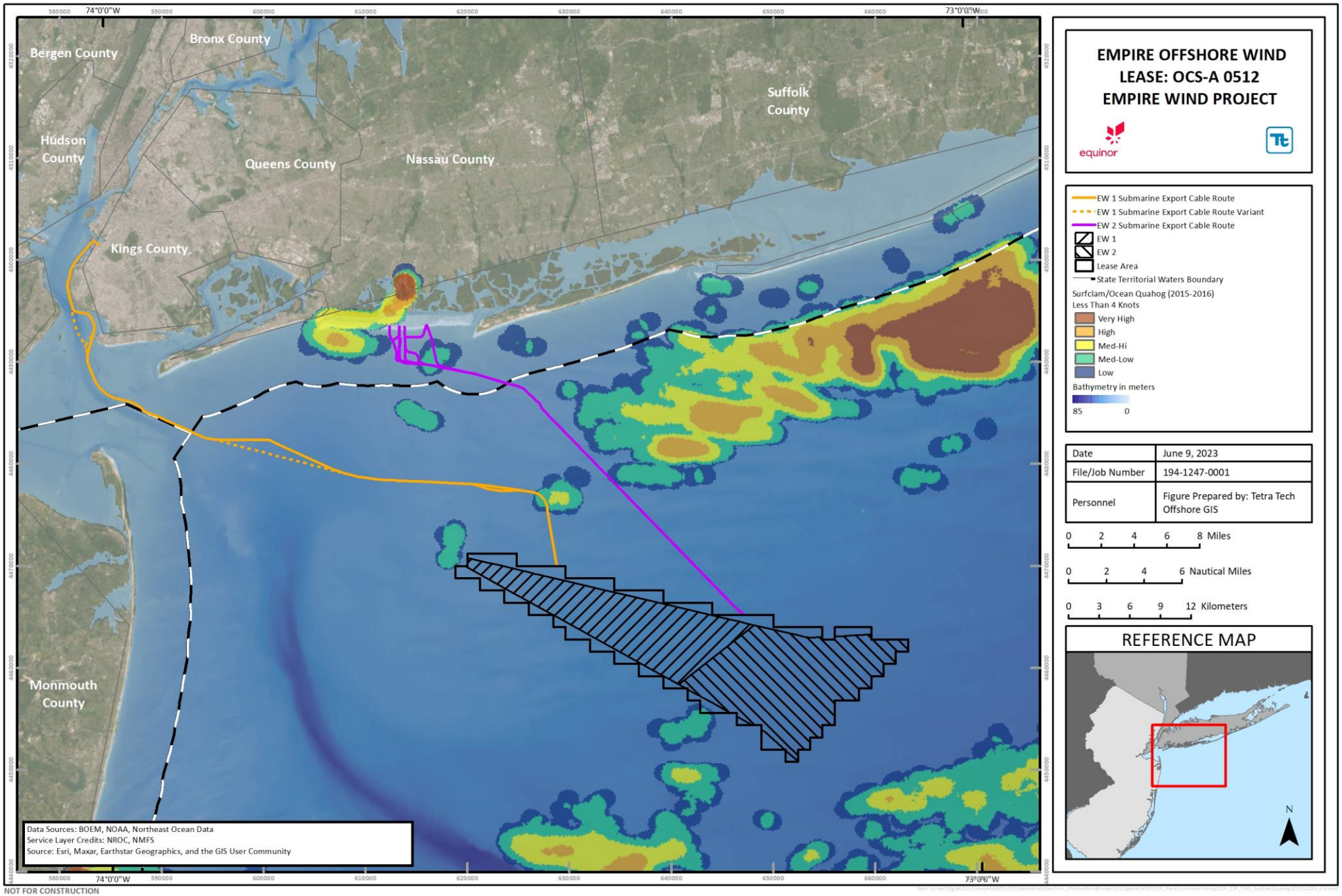


Figure 8.8-30 Surfclam/Quahog fishing activity at < 4 knots (7.4 km/h), 2015-2016 VMS Data (MARCO)

Captains, fleet managers and their representatives have shared their experiences and concerns about offshore wind including burial depth of offshore wind electrical cables due to snagging risk and/or liabilities. The industry and Empire have a shared goal of avoiding interactions between gear and all submarine infrastructure. A formal CBRA will consider risks of contact from fishing, ship anchors and other sources (discussed further in Section 8.8.3).

Information Acquired Through Outreach

As with other gear types, a major concern expressed by hydraulic clam dredge fishermen is continued access to fishing within the operational wind farms and over export cables. The technical issues include seabed penetration, maneuverability and space required for safe and effective fishing. Clam dredgers have also raised concerns over future access to fishing grounds in operational wind farms, with wind turbine spacing being an issue. Some have requested a minimum 2-nm (3.7-km) spacing between turbines.

Gillnetting

Methodology

Gillnets are composed of a wall or panels of netting used to capture fish by either wedging or entangling. The netting is typically composed of high-strength monofilament or multi-filament line. Gillnets can be configured in a variety of ways, but typically consist of floats along the top of the net and weights or anchors (lead line) along the bottom to keep the panel aligned vertically in the water column (**Figure 8.8-31**). The height of the net is dictated by regulation and can vary by fishery. Careful selection of the timing and location of the net, the depth of the net wall, and the size of the net mesh, allows gillnetters to effectively target specific species and sizes.

Anchored gillnets set close to the seabed are known as "bottom gillnets," "demersal gillnets," or "sink gillnets," and represent the most common type of gillnetting in the northeastern commercial fishing industry (NOAA Fisheries 2019, Pol and Carr 2000). Bottom gillnets are typically tended on a daily to semi-weekly basis for groundfish. When the target species is monkfish, for example, the nets are usually tied down by connecting the float line and lead line with a line shorter than the overall height of the net. Thus, the netting, which would extend further upward if fully stretched, may form a looser bag shape more effective for catching fish that generally stay on or very near the seabed.

Occurrence in the Project Area

In the Lease Area, gillnet fishing activity is low as shown in **Figure 8.8-32**. If prices and conditions for monk fishing improve it is likely that fishermen will increase their activity in the Lease Area and/or along cable routes. Empire will avoid, minimize, or mitigate construction, operations, and decommissioning impacts on the fisheries that utilize gillnetting methods, as discussed in Sections 8.8.3 and 8.8.4.

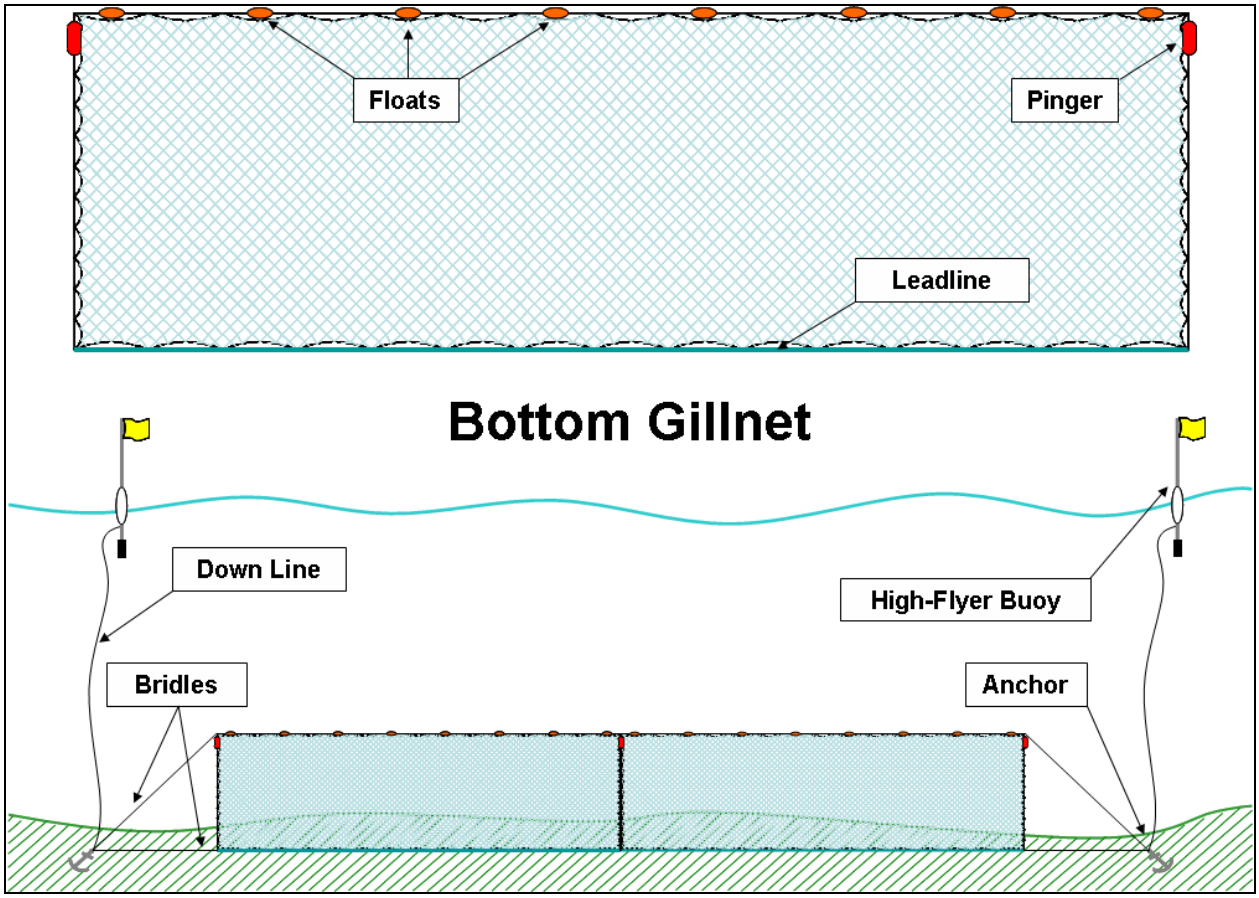


Figure 8.8-31 Gillnetting Illustration

Information Acquired Through Outreach

Several gillnetters based in Shinnecock, New York and Point Pleasant and Barnegat Light, New Jersey were consulted. Demersal gillnetting is conducted occasionally within the Lease Area, mainly toward the northeast end. Boats from both New Jersey and New York may gillnet here. Monkfish gillnetters from New England were known to fish here seasonally in past years but rarely do so now. Recent regulations, market conditions, and gear conflicts with mobile gear fishermen are among the factors limiting gillnet fishing in the Lease Area. New York and New Jersey also have several gillnetters that work on other species relatively close to shore, often hauling their nets at shorter intervals measured in hours. Considering the potential for contact with survey equipment and cable installation activities, communications with this fleet have been established and they are on mailing lists for Project updates, as part of the Fisheries Communication Plan for this Project.

Gillnet fishermen from the port of Shinnecock, New York reported very little fishing effort in the Lease Area during recent years, but noted they may be likely to return to the Lease Area if the fishing and conditions were favorable. These fishermen mainly target monkfish in depths as great as 200 feet (61 m), with nets up to 0.8 mile (1.2 km) long.

New Jersey gillnetters have reported strings up to 1 mi (1.6 km) long. They described no universal system for avoiding each other and mobile gear. Some gillnetters have expressed concern about tangling nets on turbine foundations. They are also concerned about increased spatial conflicts if mobile gear fishermen are displaced into grounds outside of wind farms, which could lead to increased competition and crowding.

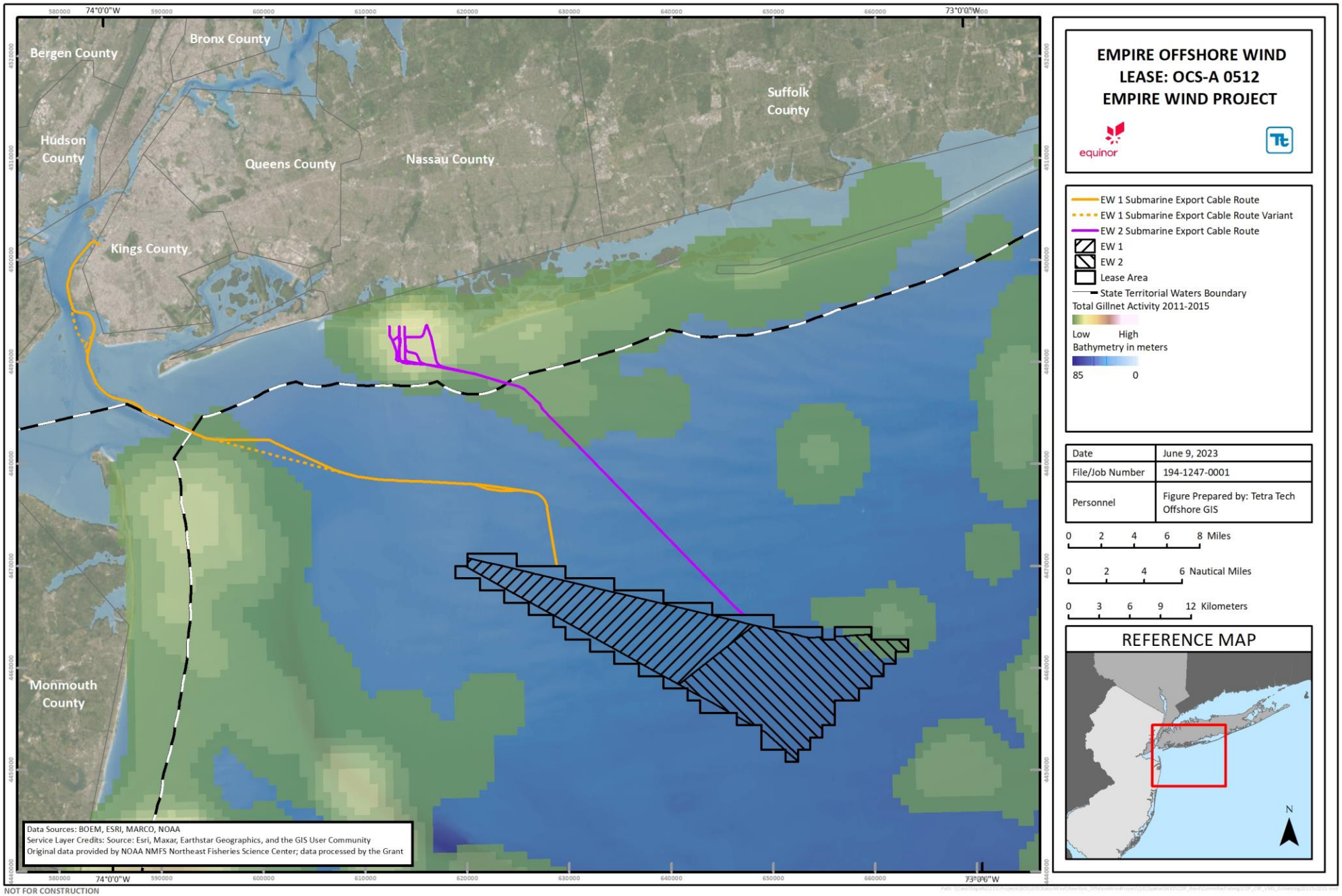


Figure 8.8-32 Gillnet activity at < 4 knots, 2011-2015 VTR Data (MARCO)

Lobstering

The Project Area lies within Lobster Management Area 4. Outreach to lobster fishermen has indicated that the Lease Area is not a productive area for lobstering, since much of it is relatively flat sand and gravel substrate, therefore very limited lobstering activity occurs within the Lease Area. Landings in New York and New Jersey have dramatically decreased from their peak in the 1980s and 1990s, most notably in New York. In 1996, New York lobster landings were 9.4 million pounds. However, New York and New Jersey lobster landings have been declining sharply in recent years (2010–2016) (ASMFC 2017). Some pot fishing is reportedly conducted for crabs and whelks in the Project Area, but the number of vessels involved appears low (aside from incidental catch with lobster pots). Extensive consultations and survey operations have yielded neither direct observations nor contacts, and specific areas have not been identified.

Methodology

Offshore lobster fishing is accomplished using "pot strings" (sometimes called trawls) (**Figure 8.8-33**) that are set both in a general north to south direction and east to west. Primary lobster fishing depths are 100-215 ft (30.5-65.5 m).

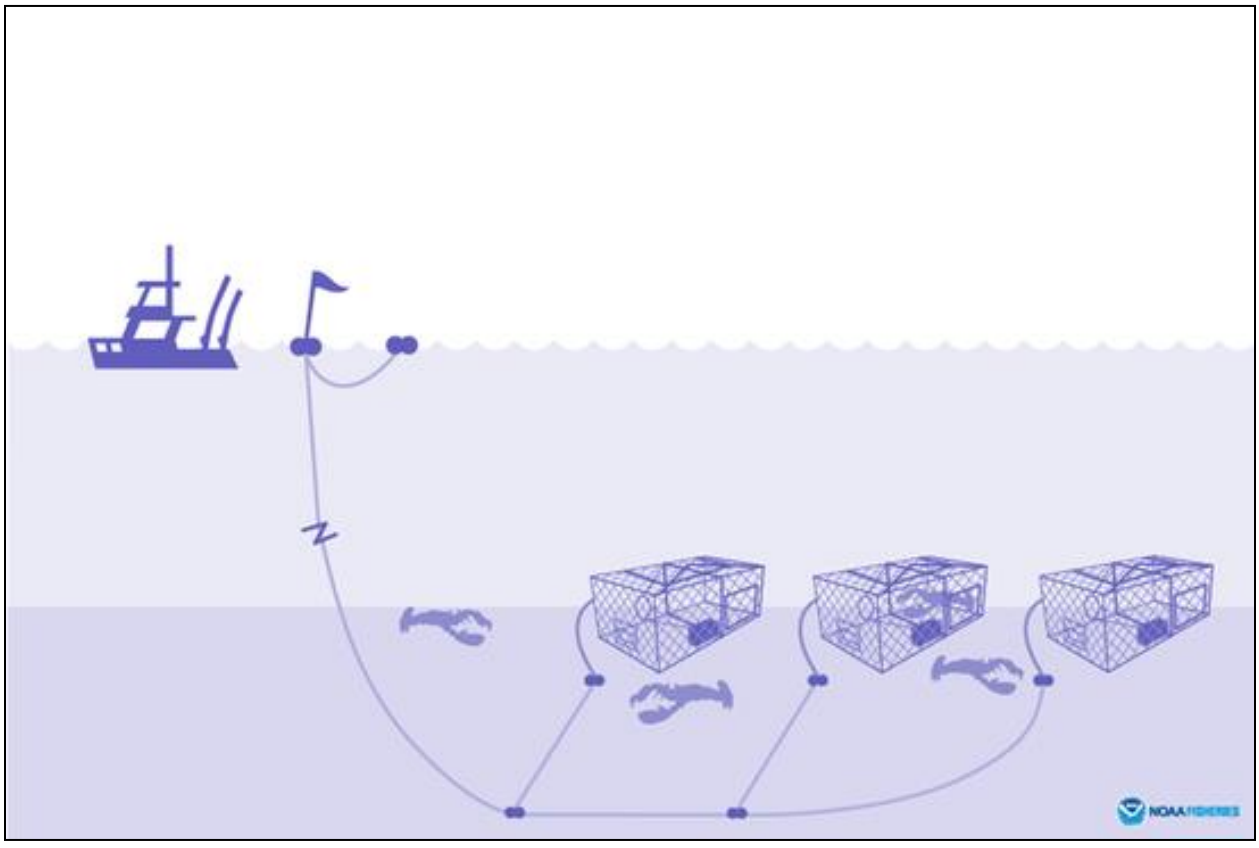


Figure 8.8-33 Offshore lobster fishing "Pot Strings"

Occurrence in the Project Area

Lobster fishing within the Lease Area is uncommon and lobstermen do not report the Lease Area as a productive area, since much of it is relatively flat sand and gravel substrate. There is also an intensive lobster fishery in the summer and early fall starting about 7 nm (13 km) west of the Lease Area around the subsea

extension of the Hudson River valley known as the "Mud Hole." This feature is also fished by gillnetters and otter trawlers. Fishermen who work the Mud Hole have been consulted in relation to offshore surveys and export cable routes. A very small number of New York lobstermen are known to work a few miles north of the Lease Area in the hard bottom general area of Cholera Bank. Extensive communications with them have facilitated cooperative relations resulting in no conflicts with surveys.

No VMS maps of lobster fishing activity are available because lobster vessels are not required to transmit VMS data as part of the lobster fishing regulations.

Empire will avoid, minimize or mitigate construction, operations, and decommissioning impacts on the lobster fishery, as discussed in Sections 8.8.3 and 8.8.4.

Information Acquired Through Outreach

Empire's outreach centered on ports with lobstermen active in the area including Freeport and Brooklyn, New York and Shark River and Point Pleasant, New Jersey. The team has encountered no lobstermen coming from more distant ports to fish in the Project Area. Since there is some potential for towed survey instruments to contact lobster pot buoy lines, this fishery has received considerable attention from Empire leading up to and during offshore survey activity (per the Fisheries Communication Plan). There were no negative interactions experienced in over 350 days of survey to date.

During 2018-2019, one New York lobsterman is known to be fishing outside the northwest boundary of the Lease Area in the areas where less homogenous seabed can be found. Sightings and his statements place his gear around Cholera Bank about 2 nm north of the Lease Area. However, lobstermen from both New York and New Jersey report that their habitual fishing methods include setting some of their pots in shipping lanes and in areas likely to be crossed by the Project's submarine export cables.

During a cable route survey in June 2018, frequent sightings of pot buoys in/around the "Mud Hole" led to suspension of the survey until the following year. Area 4 has an annual closure related to right whale migration during May, so towed survey activities were resumed at that time (with their own right whale impact mitigations in place). A scout boat assisted with location and identification of lobster gear in this area in 2019. Frequent communications with lobstermen, the scout boat, and the OFLRs on survey vessels enabled surveys to be conducted with no conflicts to date.

Mid-water Trawling

Methodology

According to GARFO sources, approximately four vessels were active in single-boat midwater trawling from 2012-2018 in the New York Bight (NOAA Statistical Area 612). They target pelagic species, mainly herring and mackerel, towing a large net through the water column with little or no seabed contact. Nets vary in length, mesh size, and material depending on size of the vessel and target species, with examples shown in **Figure 8.8-34** and **Figure 8.8-35**. The vessels and gear in this fishery are generally larger than those in bottom trawling. They typically tow at speeds of 3-4 knots (5.6-7.4 km/h).

Approximately 11 vessels were engaged in midwater pair trawling in New York Bight (Statistical Area 612) during 2012-2018. Three of these vessels were reported active in the Lease Area. With this system, two boats tow a single net through the water column. As one boat tows each side of the trawl, the net is held open by the vessels' distance apart. Trawl doors are not used, therefore reducing drag and increasing efficiency. Pair trawlers are usually large vessels for the high-volume fisheries and can be 200 ft (61 m) in length. Nets can vary in width

between 200-400 ft (61-121 m). Vessels generally fish in depths of 11-60 fathoms (20-110 m). These vessels usually tow at 3-4 knots (5.6-7.4 km/h). Scales drawings of mid-water/paired trawls were not developed, as this is not a commonly used method within the Project Area.

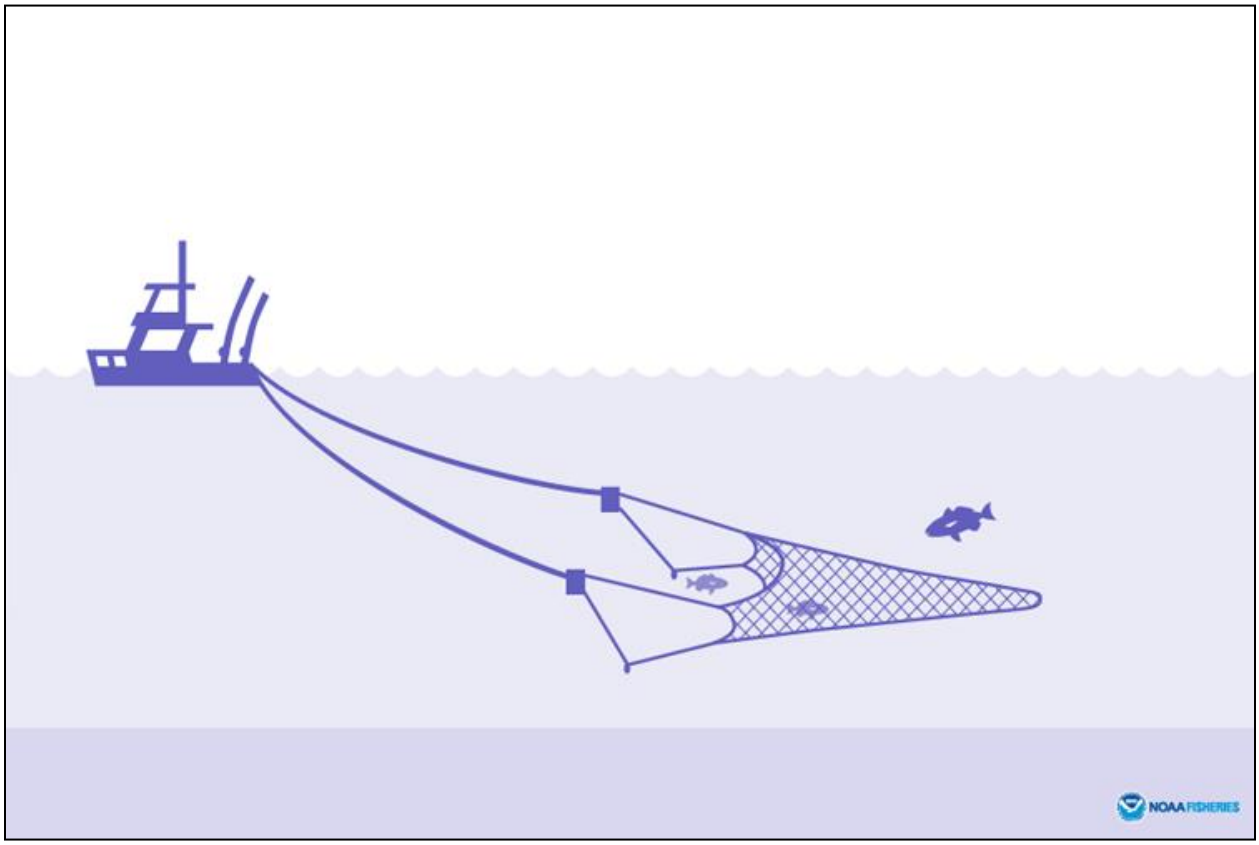


Figure 8.8-34 Midwater trawling (NOAA Fisheries 2018d)

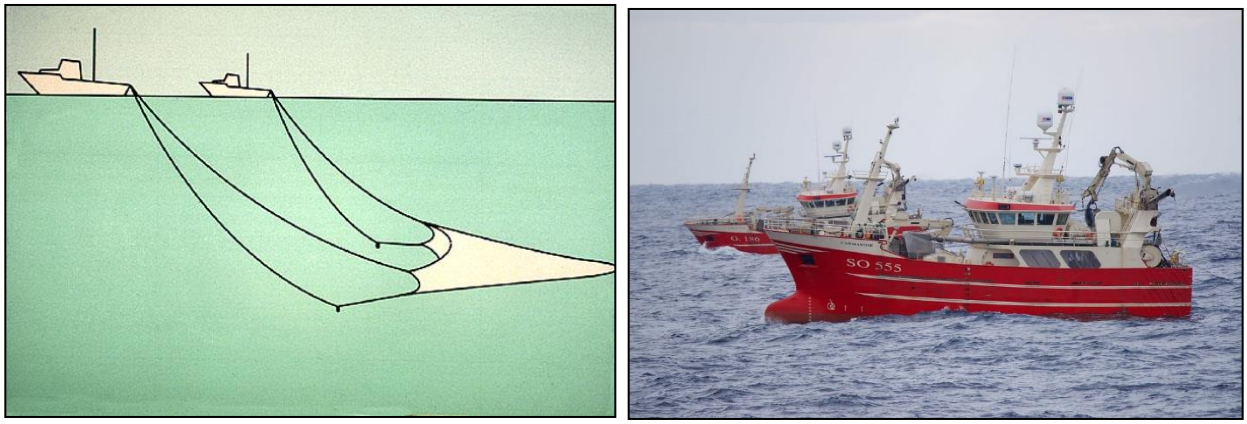


Figure 8.8-35 Midwater pair trawlers (FAO 2019; Irvine 2018)

Occurrence in the Project Area

In this region herring is one target of midwater trawlers. They populate the inshore and offshore waters from Maine to North Carolina and become increasingly scarce south of New Jersey. Mackerel populate the waters from Maine to North Carolina with concentrations of fish found on the continental shelf southeast of Long Island, New York and east of the Delmarva Peninsula (more than 100 nm [185 km] from the Project Area). Both pair and mid water trawlers from Maine to New Jersey may fish portions of the New York Bight when fish concentrations occur.

No VMS maps of mid-water trawling fishing activity are available because this method of fishing overlaps fish species targeted under several different fishery management plans and is not reported as "mid-water trawling" in the VMS data available on the MARCO database.

Other Commercial Fisheries – Rod and Reel

Rod and reel fishermen commercially harvest scup, black sea bass, tautog, summer flounder, blue fish, and striped bass, as well as shark, swordfish, and several tuna species south of Long Island. Rod and reel fishing occur year-round but increases in intensity from April through November. Rod and reel fishing occur throughout the Project Area depending on the location of target species but is less common within the Lease Area.

The inshore rod and reel fishery typically target bottom habitats that provide structure and ambush points for inshore fish to feed in. The offshore rod and reel fishery more often target areas of depth changes such as shoals, ridges, lumps, banks, shipwrecks, and reefs. These areas of seabed relief can create upwellings that, in turn, create rapid changes in temperature, which become aggregation points for prey species that attract migratory species targeted in the rod and reel fishery, such as tuna and shark. These areas of complex seabed are generally not conducive to wind turbine or submarine export and interarray cable installation and therefore there is generally a natural separation between offshore wind farms and these types of fishermen. Additionally, many recreational angling associations are embracing the concept of offshore wind development in that it will bring structure to new areas that have generally been fairly featureless and that turbine foundations and scour protection, like oil facilities in the Gulf of Mexico and artificial reefs, will likely increase species diversity and abundance within and surrounding these offshore facilities.

The commercial rod and reel fleet (including the less common "green-stick" method) in and around the Lease Area is a trolling or 'chunking' fishery, particularly in the Hudson Canyon located more than 40 nm (74 km) from the Project Area. Trolling is the act of towing artificial lures, often supplemented with baits such as ballyhoo, in a formation behind a vessel, using the wake and wash from the propellers to make these lures appear more natural. The trolling fishery in and around the Lease Area targets yellowfin and bigeye tuna, mahi-mahi, and, in recent years, even wahoo. Chunking is a term applied to fishermen that locate an area likely to attract tuna (such as a thermocline or subsea structure like an offshore canyon, such as the Hudson Canyon located south of the Lease Area) and methodically release chunks of cut bait into the water to attract fish. This fishery is commonly observed at night and generally targets the same species as the trolling fleet with the possible addition of swordfish (south and east of the Project Area and along the edge of the continental shelf). The chunking fleet is often comprised of the same vessels as the rod and reel fleet and can alternate between trolling and chunking on two to three-day trips.

8.8.2.3 Regional Effects of Climate Change on Distributions of Fisheries Resources

Fisheries distributions in the Project Area, and across all the Mid-Atlantic and New York Bight, are undergoing marked changes in response to ocean warming (Brander 2007; Hare et al. 2016) and decreases in the pH of

ocean water (acidification) (Saba et al. 2016). Regional effects of climate change on distributions of finfish and shellfish are discussed in **Section 5.5** and summarized below.

The acidification of ocean water is associated with impacts on survival and health of bivalves and shellfish, including scallop (Rheuban et al. 2018; Stevens and Gobler 2018; Cooley et al. 2015); declines in economic value of affected species are predicted (Rheuban et al. 2018). Less is known about direct effects of acidification on cartilaginous and bony fishes, but effects on fishes that rely on calcareous species could follow.

Water temperatures in the Project Area are reported to be increasing over time (Friedland and Hare 2007), which has resulted in geographic shifts of the spatial distribution of fish and shellfish species. Dozens of groundfish species and lobster in the continental shelf of Mid-Atlantic waters have shifted northward and offshore in response to warming water (Pinsky et al. 2013; Nye et al. 2009) and more species are predicted to follow (Selden et al. 2018; Kleisner et al. 2017). As bottom temperatures become too warm to support lobster larval development in the mid-Atlantic and shell disease increases, lobster landings are expected to continue to decline (Groner et al. 2018; Jaini et al. 2018; Rheuban et al. 2017; Collie and King 2016; Wahle et al. 2015). Egg-bearing female lobsters are expected to move farther offshore to spawn in cooler waters, which would disconnect the source of larval recruits from coastal habitats where they were once common (Carloni et al. 2018). Conversely, rising temperatures are making Mid-Atlantic water more suitable for some southern species, including bay anchovy and butterfish, while at the same time making this habitat less suitable for some northern species, including winter flounder and red hake (Oviatt 2004). Additionally, Atlantic surfclams are now found at deeper depths, with those in shallower depths exhibiting higher mortalities in recent years, possibly linked to increasing ocean temperatures (Weinberg 2005). Anadromous fish such as American shad, alewife, blueback herring, striped bass, endangered Atlantic sturgeon, and others are sensitive to adverse effects of climate change (Hare et al. 2016).

8.8.3 Impacts Analysis for Construction, Operations, and Decommissioning

The potential impacts on commercial and recreational fishing activity resulting from the construction, operations, and decommissioning of the Project are based on the maximum design scenario from the PDE (**Table 8.8-10**, see **Section 3 Project Description**). The Lease Area represents a small portion (124 sq mi [321 sq km] or 0.7 percent) of the 16,740 sq mi (43,355 sq km) that comprise the larger New York Planning Area within the New York Bight, from which the species targeted by commercial and recreational fisheries are harvested (see **Section 5.5** for a discussion of habitat and potential impacts for these species). For the purposes of this section, the maximum design scenario is based on the full build-out of the Lease Area of EW 1 and EW 2 and incorporates a total of up to 149 foundations at any of 176 locations within the Lease Area (made up of up to 147 wind turbines and 2 offshore substations) and includes two export cable routes to EW 1 and EW 2.

Table 8.8-10 Summary of Maximum Design Scenario Parameters for Commercial and Recreational Fishing

Parameter	Maximum Design Scenario	Rationale
Construction		
Offshore structures	Based on full build-out of EW 1 and EW 2 (147 wind turbines and 2 offshore substations). EW 1: 57 wind turbines and 1 offshore substation. EW 2: 90 wind turbines and 1 offshore substation.	Representative of the maximum number of structures for EW 1 and EW 2.
Wind turbine foundation	Monopile	Representative of the foundation option that has an installation method that would result in the maximum introduction of underwater noise.
Wind turbine foundation Installation method Underwater noise	Pile driving	Representative of the installation method that would result in the loudest underwater noise generated.
Submarine export cables	Based on full build-out of EW 1 and EW 2. EW 1: 40 nm (74 km). EW 2: 26 nm (48 nm).	Representative of the maximum length of new submarine export cables to be installed and the associated Project-related vessels.
Interarray cables	Based on full build-out of EW 1 and EW 2, with the maximum number of structures (147 wind turbines and 2 offshore substations) to connect. EW 1: 116 nm (214 km). EW 2: 144 nm (267 nm).	Representative of the maximum length of new interarray cables to be installed and the associated Project-related vessels.
Safety zones Project-related vessels and structures	Based on full build-out of EW 1 and EW 2, which corresponds to the maximum number of structures (147 wind turbines and 2 offshore substations), submarine and interarray cables, and maximum number of associated vessels and safety zones. 1,640 ft (500 m) around relevant structures, activities, and vessels.	Representative of the maximum cumulative area and duration in which marine users will be restricted from entering.
Duration Offshore construction	Based on full build-out of EW 1 and EW 2. EW 1: 57 wind turbines and 1 offshore substation. EW 2: 90 wind turbines and 1 offshore substation.	Representative of the maximum period required to install the offshore components, which has the potential to impact resources in, access to, or enjoyment of the Project Area.

Table 8.8-10 Summary of Maximum Design Scenario Parameters for Commercial and Recreational Fishing (continued)

Parameter	Maximum Design Scenario	Rationale
Operations		
Loss of habitat Foundation type	Based on the maximum overall footprint (147 x 39,902 ft^2 [3,707 m^2] for monopiles with scour protection, and 2 x 93,560 ft^2 [8,692 m^2] for piled jackets with scour protection). Total 6,052,714 ft^2 (562,315 m^2, 139 acres, 56.2 ha) including scour protection.	Representative of the maximum long-term loss of habitat and marine areas.
Offshore structures	Based on full build-out of EW 1 and EW 2 (147 wind turbines and 2 offshore substations). EW 1: 57 wind turbines and 1 offshore substation. EW 2: 90 wind turbines and 1 offshore substation.	Representative of the presence of new fixed structures in an area that previously had none.
Project-related vessels Collision risk	Based on full build-out of EW 1 and EW 2, which corresponds to the maximum number of structures (147 wind turbines and 2 offshore substations), submarine and interarray cables, and the maximum number of vessels and movements for servicing and inspections.	Representative of the maximum predicted Project-related vessels for collision risk.
Offshore O&M activities	Based on full build-out of EW 1 and EW 2, which corresponds to the maximum number of structures (147 wind turbines and 2 offshore substations), submarine and interarray cables, and the maximum amount of Project-related activities expected per year.	Representative of the maximum amount of activities, and associated vessels, from the Project during the O&M phase.
Interarray cables	Based on full build-out of EW 1 and EW 2, with the maximum number of structures (147 wind turbines and 2 offshore substations) to connect. EW 1: 116 nm (214 km). EW 2: 144 nm (267 km).	Representative of the maximum length of interarray cables and associated surface protection, which would result in the maximum risk of interactions with vessels anchors. Representative of the maximum extent of reduced draft and risk for interactions with vessel anchors.
Submarine export cables	Based on full build-out of EW 1 and EW 2. EW 1: 40 nm (74 km). EW 2: 26 nm (48 km).	Representative of the maximum number and length of submarine export cables and associated surface protection, which would result in the maximum risk of interactions with vessels anchors.

Table 8.8-10 Summary of Maximum Design Scenario Parameters for Commercial and Recreational Fishing (continued)

Parameter	Maximum Design Scenario	Rationale
		Representative of the maximum extent of reduced draft and risk for interactions with vessel anchors.

8.8.3.1 Construction

During construction, the potential impact-producing factors for commercial and recreational fishing may include:

- Increase in Project-related vessel traffic;
- Construction of the offshore components, including the foundations, submarine export cables, and interarray cables;
- Introduction of partially installed structures, including the foundations; and
- Presence of safety zones.

The following impacts may occur as a consequence of the factors identified above:

- Short-term implementation of safety zones around construction vessels, partially installed structures and installation activities creating temporary loss of, or access to, fishing grounds;
- Short-term localized impacts on commercial target species (**Section 5.5**);
- Short-term localized suspension of sediment to the water column (**Section 4.2**)
- Short-term presence of partially installed structures presenting allision and snagging risk; and
- Short-term increased Project-related vessel traffic resulting in increased collision risk (**Section 8.7**).

Short-term loss of, or access to, fishing grounds and presence of partially installed structures. Cable installation activities, for both submarine export cables and interarray cables, will overlap temporally and spatially with fishing activities. Pending expansion of USCG authorities, temporary safety zones during construction, or as required for maintenance, will be applied (as discussed in Section 8.8.4.2, Hazards to Navigation). Export cable installation activities will utilize a narrow "rolling" construction zone (approximately 1,640 ft [500 m] wide) along the submarine export cable route from landfall out to the Lease Area, while interarray cable installation activities will be limited to areas of construction zones. However, both submarine export cable and interarray cable installation impacts are anticipated to predominantly represent short-term impacts to fisheries where cable installation activities occur. Once cable installation is complete, marine activities, including commercial and recreational fishing, will continue; bound by existing navigational regulations.

As described in **Section 3** and **Section 8.12 Public Health and Safety**, to promote safety of the public, work crews, and equipment during construction, Empire proposes to utilize 1,640-ft (500-m) safety zones around relevant structures, activities, and vessels in a dynamic approach, as previously defined for the Block Island Wind Farm (81 FR 31862). Should USCG Safety Zone authorities not extend beyond 12 nm (22 km) at the time of construction, Empire will utilize a combination of safety vessels, LNMs, and COLREGS to promote both awareness of these activities and the safety of the construction equipment and personnel. Further safety zones may be defined as appropriate, in coordination with the USCG and based off of previous discussions with USCG (see **Appendix B**).

As demonstrated earlier in this section, much of the fishing effort (otter trawling, squid trawling, scallop dredging, hydraulic clam dredging, etc.) is concentrated outside of the Project Area, particularly in the most recent years for which data is available (see **Figure 8.8-10**, **Figure 8.8-24**, **Figure 8.8-30**, and **Figure 8.8-32**). In addition, the surveys of the Project Area conducted by Empire, which included opportunistic observations by OFLRs to characterize the fishing effort expended within the Lease Area, suggest that low levels of fishing activity currently exist within the Lease Area. After more than 350 days of observations during such surveys, commercial fishing was observed in the Lease Area on fewer than 15 of those days. Therefore, although some years have higher densities of fishing, in other years the likelihood of interaction between fishing and interarray cable installation is likely to be low. OFLRs observed higher concentrations of trawling and clam dredging vessels in areas 5-12 mi (8-19 km) north of the Lease Area. Near the Mud Hole (approximately 7 nm [13 km] west of the Lease Area), lobstering and trawling were observed. Five miles (8 km) south of the Lease Area, Empire observed scalloping. These observations are supported by reports from OFLRs and supplementary AIS records. With consideration to the direct observation data combined with AIS records and VMS data, the level of fishing activity within the Project Area is variable, but the most recent years indicate low levels of fishing activity; therefore, with rolling safety zones to minimize the effect of potential displacement from fishing areas, the potential for impacts due to loss of or access to grounds during construction is expected to be minimal.

Commercial and recreational fishermen seek assurance that they will have access to fish in, and transit through, the Project Area safely and effectively during construction. Empire and the federal and state agencies consulted throughout this process support this concept. It should be noted, however, that there may be temporary safety exclusion zones around turbines during construction and installation, and around cables if exposed on a temporary basis. The potential hazards to navigation associated with construction of the Project, including increased vessel traffic associated with the construction of offshore structures, are discussed in **Appendix DD Navigation Safety Risk Assessment**. To support safe navigation through and fishing within the Project Area during construction, and minimizing interactions with the commercial and recreational fishing industry, Empire has developed specific mitigation measures as part of a Fisheries Mitigation Plan (summarized in Section 8.8.4) to be implemented during construction of the Project (see **Appendix V**). This will be an expanded version of the current Fisheries Communication Plan that is currently implemented for the full Lease Area.

Short-term impacts on commercial target species. As described in **Section 5.5**, construction activities may result in localized, short-term impacts on fish and invertebrate resources, including: short-term physical disturbance of habitat, short-term exposure to underwater noise during construction activity, and short-term increase in turbidity and sediment deposition. The analysis of potential impacts in **Section 5.5** supports the overall determination that construction activities associated with the Project would be unlikely to result in significant adverse impacts on demersal or pelagic life stages of fish or invertebrates. Impacts on demersal and pelagic life stages of fish and invertebrates are likely to be short-term, localized and not affect managed fishery stocks or populations.

8.8.3.2 Operations and Maintenance

During operations and maintenance, the potential impact-producing factors for commercial and recreational fishing may include:

- The presence of new fixed structures (e.g., wind turbines and offshore substations);
- O&M vessel traffic;
- Presence of Project-related submarine export and interarray cables, and associated cable protection; and
- Installation of scour and cable protection.

The following impacts may occur as a consequence of the factors identified above:

- The long-term presence of new fixed structures may result in loss of access to traditional fishing grounds, modification of habitat and displacement of target commercial species, including potential long-term positive beneficial increases in species biodiversity and abundance during operations;
- Increased Project-related vessel traffic; and
- Long-term impacts to marine radar/navigation instruments due to the presence of wind turbines.

Loss of Access to Traditional Fishing Grounds. As demonstrated in Section 8.8.2 and each of the fishery-specific sections (Otter Trawling, Squid Trawling, Scallop Dredging, Hydraulic Clam Dredging, etc.), much of the fishing effort is concentrated outside of the Project Area, particularly in the most recent years for which data is available. In addition, observations during surveys conducted by Empire suggest that more recently there have been low levels of fishing activity within the Lease Area. After more than 200 days of observations during such surveys, commercial fishing was observed in the Lease Area on fewer than 15 of those days. In areas 5 to 12 mi (8 to 19 km) north of the Lease Area, Empire observed higher concentrations of trawling and clam dredging vessels. Near the Mud Hole (approximately 7 nm [13 km] west of the Lease Area), occasional lobstering and trawling were observed. Five miles (8 km) south of the Lease Area, Empire observed scalloping. Observations and reports from onboard OFLRs and AIS records support this. With consideration to the direct observation data combined with AIS records and VMS data, the level of fishing activity within the Project Area is variable, but the most recent years indicate low levels of activity in several fisheries, therefore, the potential for impacts due to loss of grounds is expected to be minimal. However, for certain mobile gear fisheries that have historically fished in the area (such as scallop and squid fisheries) there may be moderate impacts. Empire will mitigate to reduce impacts to loss of fishing grounds from the Project as described in **Appendix V**.

Once operational, commercial and recreational fishermen will continue to have the ability to transit safely and efficiently through the wind farm, as discussed in **Section 8.7** and **Appendix DD**, with the potential to seek alternate routes during bad weather. It should be noted that transit distances across the Lease Area are modest. In the NW corner, the crossing distance is approximately 2 nm (3.7 km). At the midpoint of the Lease Area the crossing distance is 4 nm (7.4 km), and in the wide southeast end 8 nm (14.8 km). Empire participated in a workshop on commercial fishing transits in New York Bight organized by NYSERDA, NYSDEC and RODA. One of the outcomes of that workshop is an understanding of the consideration of ACPARS transit lanes, east of the Lease Area. Empire has also recommended dominant row directions with orientations aligned with dominant trawl and transit directions to provide additional navigational flexibility during bad weather. In **Figure 8.8-36**, the widespread nature of transits by one Point Pleasant fishing vessel for 150 days in June-October 2018 appear generally consistent with the broader VMS transit data shown in **Figure 8.8-2**, indicating limited commercial fishing transits through, and use of, the Lease Area. Some recreational vessels from Long Island are likely to transit to fish in the Lease Area and in the canyons to the south. Per the Layout Rule, the turbine rows are aligned roughly north-south in an effort to provide such access.

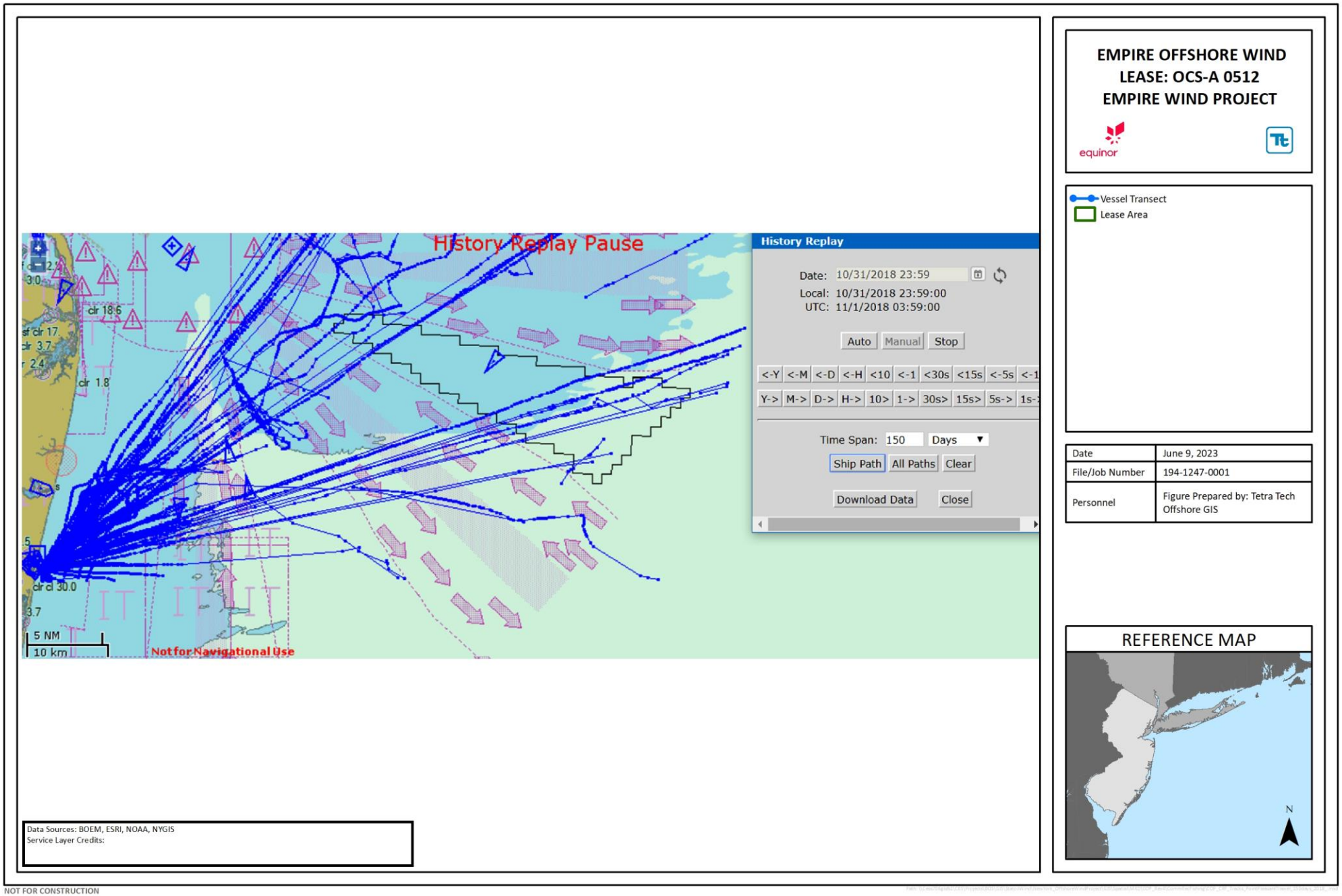


Figure 8.8-36 Tracks from a Point Pleasant trawler for 150 days in 2018.

Submarine Export Cables and Interarray Cables

The presence of Project-related submarine export and interarray cables in the operational wind farm is not expected to restrict access to traditional fishing grounds within the Lease Area or along the submarine export cable routes. As discussed in Section 3.3.2.2, Empire will determine through a CBRA the appropriate target burial depth for submarine export cables, informed by engagement with regulators and stakeholders (including commercial fisheries stakeholders), extensive experience with submarine assets, and based on an assessment of seabed conditions and activity (including fishing) in the area. The target burial depth accounts for seabed mobility and the risk of interaction with external hazards such as fishing gear and vessel anchors, while also considering other factors such as existing navigational routes.

The varying perception of fishing over subsea cables has been considered by the Project since it was initially raised. Some fishermen have indicated that they would be concerned about fishing over buried subsea cables, particularly through the Lease Area where there are higher densities of interarray cables, regardless of how deeply the cables were buried. Other captains stated that they would have no concerns towing between interarray cables or avoiding these areas in favor of others. Other fishermen have advised they would fish over sufficiently buried cables.

Information from the subsea telecommunications cable sector can provide insight to the discussion of offshore wind cable burial depth. Northern New Jersey and southern central Long Island have long been hubs where multiple existing international fiber optic subsea telecom cables land. There are currently approximately ten active international cables originating from northern and central New Jersey and an additional ten from Long Island. During the 1980s and 1990s, regional submarine telecom cables experienced several cases of damage from hydraulic clam dredges. During that period the typical target burial for such a cable was 2 to 3 ft (0.6 to 0.9 m) into the sediment. Since the year 2000, mainly for protection from such dredges, all new subsea telecom cables in this region have targeted burial of at least 5 to 6 ft (1.5 to 1.8 m) into the sediment. Subsea cable company sources report that regional damage rates at this target burial depth have been reduced to near zero (NASCA 2019).

To confirm that the Project cable installation has achieved the target burial depth, the submarine export and interarray cables will be inspected as part of a post-lay inspection regime designed to provide Empire with as-laid documentation and to confirm depths of burial. Additionally, the location of submarine export cables and associated cable protection will be provided to NOAA's Office of Coast Survey after installation is completed so that they may be marked on nautical charts. As discussed in Section 3.5.2, survey frequency thereafter will depend on the findings of the initial surveys (e.g., site seabed dynamics and sediment conditions). For example, a survey may be conducted after a major storm event (i.e., greater than 10-year event). Surveys of the cables will be most likely conducted in coordination with the scour surveys at the foundations.

The submarine export cable siting corridor is engineered to minimize areas where burial might be hindered by seabed conditions including hard grounds, variable glacial tills, areas of steep slopes, and shallow or surficial hardbottom or ledge (see **Section 4.1 Physical and Oceanographic Conditions**). However, in certain locations where target burial depth is not achieved, cable protection may be required, as discussed in Section 3.3.2.2. It is important to consider such instances on a case by case basis and consider the mobility of sediments in each area as well. For example, if target burial for a certain area were six feet, and firm seabed prevented achieving more than three feet, consideration might be given to avoiding extra measures that might cause snags (e.g., cable protection on the seafloor), depending on the seabed activities present (regulation permitting). The activities requiring deepest burial in the Project Area are ship anchoring and clam dredging. In areas where those are highly unlikely, three feet of cover may be appropriate protection, and this type of potential adjustment

of burial depth would be discussed with permitting agencies, as appropriate. Furthermore, in areas where firm seabed prevents deep burial by specialized cable tools, it is less likely that common fishing gear including trawls and dredges would penetrate such firm seabed.

It is anticipated that cable protection will have minimal impact to the existing fisheries regime, as areas where the seabed dictates cable protection are often found in proximity to other natural snags, and therefore are not likely trawled or dredged. Should an area of surficial hardbottom or a subsea asset crossing necessitate external protection of the cables (e.g., crushed rock), that area of bottom could become a snag to trawling or dredging (i.e., due to the potential for gear hangs). These areas may have already been known seabed obstructions (snags) prior to construction, as they often represent pre-existing surficial obstructions to burial that were unavoidable; however, some loss of grounds is likely to occur due to cable protection methods. For example, Empire has positively identified multiple planned, active, or out-of-service pipelines and cables that will be crossed by the submarine export cable routes (see **Section 8.10 Marine Energy and Infrastructure**). Short sections of out-of-service cables may be removed, to facilitate appropriate burial of new cables. Other structures such as pipelines may remain in place. When a new cable is laid over a pipeline, normal burial may not be possible, and that area may be considered ground lost to mobile gear. However, in this project area, the available information indicates few if any pipelines in trawling or dredging grounds where such crossings would be required. Cable burial remediation techniques, when applied, will be designed to minimize the potential for gear snags, as feasible. Empire has excluded concrete mattresses as a form of surface cable protection within the Lease Area in response to concerns raised from the fishing industry. In areas where concrete mattresses are essential, for example at crossings, they will be covered by another material (e.g., crushed rock). Fixed gear fishing around such deployments would continue as normal or with the potential benefit of additional seabed structure. Further, additional mitigation to avoid and reduce impacts (e.g., route planning, burial depth surveys, feedback based on fisheries input, etc.) will minimize the impacts of submarine export cables and interarray cables, as described in Section 8.8.4.

Additionally, it is possible that in the maximum design scenario of the full build-out of EW 1 and EW 2, the two offshore substations, which collect and export power from the interarray cables to the submarine export cables, may have more permanent safety and security exclusions during operation. However, the overall impact of these substations should also be small, as the Project has been designed to accommodate pre-existing activities and fishing patterns.

Fixed Structures

Once the Project foundations are installed, a discrete area of seabed will be rendered inaccessible due to the physical presence of the foundation and the seabed scour protection surrounding it, if required. The habitat conversion, however, is proportionally smaller by orders of magnitude in comparison to the overall region, where there is similar seabed habitat throughout the surrounding New York Bight (see **Section 5.5**). Fixed gear fishermen such as the gillnet fleet will likely be asked to keep surface marker buoys at least 165 ft (50 m) away from the foundations within up to two service vessel approach corridors to allow for safe approach by service vessels, but nets on the seabed set in close proximity to the foundations should not limit access (as long as the vessel follows all applicable USCG regulations). Traps and nets set in this manner have been productive in the British lobster fishery as the increased seabed structure can provide improved habitat for structure-oriented fish and invertebrate species, where such structure is otherwise limited.

Vessel access concerns during operations are different for recreational and commercial fishermen; as larger vessels and gear are typically associated with commercial fishing, and smaller vessels and gear are typically associated with recreational fishing. However, Empire, and it is understood the USCG, have no intention of

prohibiting fishing activities within a wind farm. Fixed gear, such as demersal gillnets (anchored on the seabed), lobster/crab pots, and bottom longlines should find relatively few challenges fishing within the Lease Area, but the coexistence of mobile and fixed gear must also be considered. Fishermen consulted during outreach have not reported any significant levels of lobster fishing in the Lease Area, nor have observations from OFLRs aboard survey vessels. There has been monkfish gillnetting in the area. Although reported to be at lower levels in recent years, it is anticipated that it will continue. The greatest concerns have been voiced by mobile gear commercial fishermen using otter trawls, scallop dredges, and hydraulic clam dredges; as such, those gear types are focused on in this document.

There should be few, if any, barriers for recreational fishermen wanting to fish in the wind farm during operations. Mariners will be discouraged from physically contacting the foundations, for example to tie up to them. Otherwise, full access within the operational wind farm arrays should present few restrictions or barriers. Many recreational fishermen believe that the additional structure provided by the wind turbine foundations will provide an aggregating device to attract fish, known as the "reef effect", which could increase sport fishing into the area and provide a beneficial consequence. Charter and recreational fishermen report positive fishing trips to the Block Island Wind Farm (Providence Journal 2019). However, it is possible that in the full build-out of EW 1 and EW 2, the two offshore substations may have long-term safety and security exclusions during operations due to the nature of the substation infrastructure. This safety/security zone would represent a smaller space than previously described temporary safety zones, encompassing only the immediate surrounding area. Overall impact should also be minimized as the Project has been designed to accommodate pre-existing activities and fishing patterns.

Spatial Planning

Empire is developing an appropriate layout of up to 149 foundations at any of 176 locations as reflected in the PDE (see **Section 3**). The final number of wind turbines installed will depend of a variety of factors, including final design selections, physical conditions within the Lease Area, feedback from stakeholders, and approval from BOEM. However, Empire's approach to the development of a layout reflects consultations and feedback with fishermen from Massachusetts to New Jersey. Their inputs differ but generally indicate, but are not limited to:

- Fishermen want assured access to offshore wind areas with turbine layouts and cable installation that support safe, effective fishing and transit;
- Fishermen using trawls and dredges prefer straight rows of turbines for towing access;
- Typical tows may be made in any direction depending on catch, depth, seabed, wind and tide, but in many cases, fishermen prefer to tow along consistent depth contours;
- Align turbine rows for compatibility with traditional practices that facilitate coexistence;
- Bury electrical cables deeper than gear penetration and avoid the use of concrete mattresses;
- Space wind turbines as far apart as possible. Requests have ranged from >1 nm to 4 nm (1.9 to 7.4 km);
- Include transit corridor(s) up to 4 nm (7.4 km) wide;
- Align turbines in a manner that reduces impacts on vessel navigation and navigation equipment (e.g., radars);
- Avoid building on Cholera Bank; and
- Maintain SAR capabilities.

Every available source of information informed draft layout planning. To facilitate a Project design promoting coexistence, the "Layout Rules" presented below were developed and will be followed by the Project. Feedback

from both the fishing and maritime communities, which related to clarity on layouts where design envelopes and timing of projects leave uncertainty, resulted in Empire establishing Layout Rules from which to apply to the first phase of designing wind farm layouts. The Layout Rules established for the initial phase of planning and feedback are included in the text below. Empire is committed to the principles of the Layout Rules as part of the COP, with the intention of providing clarity to the fishing and maritime communities as to what layouts could be selected from the design envelope at the final stage of Project development. While the implementation of some of these rules have compromised the overall optimal energy output, the Project believes that these rules are a necessary means to design a space that supports multiple uses of the defined waterways. The following text provides an overview of the Layout Rules and their related benefit to fisheries:

1. **Layout Pattern and Regularity**: The position of all wind turbines and substation platforms (except those covered by Rule 2) shall, so far as is practicable, be arranged in straight and easily understandable patterns within individual wind farm site layouts, avoiding structures which break this pattern and without any dangerously projecting peripheral structures.

   Reason: To facilitate safe navigation, aid location of casualties or incidents during emergency response, and to avoid creating an isolated hazard in or around the wind farm, while allowing the flexibility to optimize wind turbine arrays with consideration for issues such as local geology, seabed obstacles, and energy capture.

   Value to fisheries: This supports existing fishing practices where tows are predominantly in straight lines. The regularity of layouts reduces an otherwise introduced pressure on the fisher to set different courses while trawling in the operational wind farm. In addition, some fishing vessels transit through the Lease Area. It is considered that this approach will reduce the risk and burden to set different courses on transiting fishing vessels, reducing allision risk.

2. **Perimeter-Type Layouts:** The position of all wind turbines and substation platforms forming a line of perimeter structures around a Lease Area shall, so far as is practicable, be arranged in straight or curved lines in an understandable pattern, avoiding structures which break this pattern and without any dangerously projecting or peripheral structures.

   Reason: To facilitate safe navigation, aid location of casualties or incidents during emergency response, and to avoid creating an isolated hazard in or around the wind farm, while allowing the flexibility to optimize wind turbine arrays with consideration for issues such as local geology, seabed obstacles, and energy capture.

   Value to fisheries: Consistent, easily recognizable perimeters to the wind farms are of benefit to the wider maritime community that use the adjacent waters and in particular the TSSs into and out of the ports of New York and New Jersey, with this measure reducing the risk of allisions with the perimeter wind turbines in comparison to no set perimeter rule. By also reducing the risk of disorientation of larger commercial vessels at sea, this may indirectly reduce the risk of interactions, for example collisions, with fishing vessels. Moreover, the clearly distinguishable perimeter of the wind farms reduces the risk of disorientation to fishing vessels, which Empire has been advised may start trawl tows outside the wind farm and finish inside; start outside, tow through, and finish outside the other end; or start inside and finish outside.

3. **Layout Clarity**: Any changes in wind turbine size and separation distance within the Lease Area will be introduced so as to minimize potential visual confusion for any vessel navigating through the wind farm. For example, should the Lease Area be built out as individual wind farms, a future wind farm with larger wind turbines should be designed to be distinguishable from, but not significantly different in orientations as compared to earlier wind farms within the Lease Area with smaller turbines.

Reason: To facilitate safe navigation for vessels which are working within the Empire Lease Area, (noting an assumption of no significant levels of passing traffic within the zone other than fishing, small commercial, tugs and barges, and recreational craft).

Benefit to fisheries: This supports consistency and minimizes potential disorientation to fishers in later wind farms. For example, if a fisher gets accustomed to towing in a set heading in the first wind farm, the same tow heading will apply for the subsequent wind farms. Likewise, the same principal applies for transiting fishing vessels. It should be noted that although orientations will be consistent, spacing between wind turbines may differ in later wind farms, for example increasing as larger wind turbines become commercially available. The "distinguishable" marking or lighting will facilitate identification of the specific wind farm and associated spacing.

4. **Boundary Clarity:** Opposing wind farm site boundaries within the Lease Area, which approach closer than 2 nm (3.7 km) to each other (for example Project 1 and Project 2) shall be aligned broadly parallel with one another and marked to distinguish between separate wind farms, for example an early wind farm followed by a later wind farm.

   Reason: To facilitate safe navigation for vessels which are working within the Wind Farm (noting an assumption of no significant levels of passing traffic within the zone other than fishing, small commercial, tugs and barges and recreational craft).

   Benefit to fisheries: This supports safer navigation of fishing vessels within the Lease Area, with an increased understanding of which charted wind farm they are in, and the associated spacing considerations of that wind farm, in what could otherwise be potentially disorientating.

5. **Proximity to Project Boundaries**: All wind farm surface and sub-surface structures, including rotor swept areas, will be located wholly within the relevant wind farm or cable corridor lease area boundaries. No permanent above seabed infrastructure will be located in the export cable corridors, save for cable protection where appropriate.

   Reason: To ensure all aspects of the development are within the assessed and permitted areas.

   Benefit to fisheries: This provides fishers with the assurance that there will be no uncharted or unassessed hazards related to the wind farm development outside of the prescribed Project limits.

6. **Turbine Spacing**: Where feasible, wind turbine spacing should be consistent and as far apart as possible, with maximum spacing in the dominant trawl tow direction, where feasible with minimum spacing no less than 0.65 nm (1.2 km).

   Reason: To ensure adequate space in rows for SAR activity and to facilitate continued fishing opportunities within the operational Projects.

   Benefit to fisheries: As above, the principal reason is to ensure the space between wind turbine rows facilitates continued fishing opportunities within the offshore wind energy development where increased spacing reduces restricted access.

7. **Rows:** There should be at least one line of orientation of rows of turbines with a clear line of sight and heading from one entrance at the perimeter to an exit at the opposite perimeter. Where there is a dense perimeter, but fewer turbines in the wind farm, there should be an ability to conduct SAR flights and trawl tows entering and exiting at the perimeters and maintaining a fixed heading.

Reason: To allow for safe navigation of fishing vessels or small craft within the offshore wind energy development area and to ensure potential requirements for SAR activities are met (for example, the search patterns of SAR helicopters).

Benefit to fisheries: This facilitates existing mobile fishing practices with the ability to maintain a fixed heading from start to finish of trawl tows, including from starting or ending tows outside of the offshore wind energy developments.

8. **Orientation of Rows**: Where feasible, align turbines with rows that are sympathetic to the dominant trawl directions of most active and potentially impacted fisheries. For example, for the Lease Area, a southwest to northeast orientation in line with bathymetry.

   Reason: To facilitate continued opportunities for fishing vessels to tow trawls within operational Projects, minimizing modifications to existing practices (for the Lease Area, this is a southwest to northeast orientation in line with bathymetry).

   Benefit to fisheries: This avoids the need for mobile fishers to modify existing practices and reduces the negative impact that may occur as a result from loss of efficient practices.

9. **Burial of Cables**: Interarray and export cables to be buried to a target burial depth of at least 6 ft (1.8 m) where feasible. Deeper burial depths to be targeted as appropriate to CBRAs and regulatory requirements (for example in federally managed channels, anchorage areas and areas fished by bottom impacting gear).

   Reason: To minimize the risk of mariners interacting with offshore wind energy development cables.

   Benefit to fisheries: As above, this minimizes the potential risk of snagging mobile trawl gears on submarine cables.

10. **Lower Tip Heights**: Blade lower tip heights should equal or exceed 85 ft (26 m) above HAT.

    Reason: To ensure safe clearance of recreational and small commercial vessels.

    Benefit to fisheries: As above, this ensures safe clearance of recreational and small commercial vessels.

Application of the available data and Layout Rules resulted in the production of several draft layouts that are under discussion with selected fishing representatives and agencies, through seeking feedback from the issuance of a "Layouts Brochure" and through public Fisheries Open Houses.

On behalf of the Project, Equinor Wind US LLC has engaged in a series of discussions and exchanges with RODA as well as fisheries groups and other maritime stakeholders that are not represented by RODA to look at possible means of addressing identified concerns. Layout conversations with RODA representatives began in the fall of 2018. Following extensive discussions, a major step forward was made when Equinor Wind US LLC and RODA met in January 2020 in a "Layouts Workshop" to discuss potential layouts for EW 1 that could reduce use constraints between the Project and the regional fishing industry. In addition, Equinor Wind US LLC held multiple "Fisheries Open Houses" to consider views from fishermen not represented by RODA. Over the course of eight months, these discussions resulted in several proposed mitigation approaches. Specifically, Equinor Wind US LLC proposed a layout that established a portion of EW 1 with an internal "open area" surrounded by perimeter turbines locations (referred as the "Empire Wind Open Area Layout"). This approach worked within the already established Layout Rules, which have been established with multiple user groups (operating both within and adjacent to the Lease Area) in mind (see Section 3.3.1.3 for details). Equinor Wind US LLC aims to allow for flexibility in its approach in order to manage some of the uncertainties

in wind farm layout design, while contemplating foregoing the use of certain locations within the COP PDE to avoid/reduce impacts. Equinor Wind US LLC considered a request from RODA to avoid installing wind turbines at three to five locations at the western tip of the Lease Area and instead create new locations toward the center of the array (see **Figure 8.8-37**). Equinor Wind US LLC also considered a "Phase Separation Zone" of 1 nm (1.8 km) between EW 1 and EW 2 that would result in the removal of seven locations within the boundaries of EW 2 in the optimized layout. Removal of these positions was subsequently determined not to leave sufficient remaining locations to meet the EW 1 and EW 2 offtake agreements because geotechnical conditions (presence of glauconite) present concerns for the successful installation of foundations at several other locations. As Equinor Wind US LLC determines which locations to utilize for installation of wind turbines, the locations adjacent to the open area will be prioritized for avoidance in the event that not all locations are required.

To further mature the discussion for the Lease Area, Equinor Wind US LLC also committed to installing a maximum of 90 wind turbines for EW 2, among the 103 locations analyzed within the layout proposed in Section 3. This represents approximately 13 fewer wind turbines than the number analyzed in this COP as part of the PDE. The final number of installed wind turbines may vary from this intention depending on the wind turbine model selected during the procurement process, site specific ground conditions within the Lease Area, further stakeholder feedback, and BOEM approval.

Empire acknowledges the request for further consideration around transit capability. Noting that the Layout Rules (specifically Layout Rule #7) identifies establishing a layout, as practicable, with consistent lines of orientation, vessel AIS data collected by Empire and transit data made available to Empire demonstrate a southwest to northeast fishing vessel transit trend for fishing vessels transiting between New Jersey, New England, and eastern Long Island ports to fishing grounds. Under the Empire Wind Open Area Layout, Empire establishes a line of orientation between the turbine rows in the southeast to northwest orientation, with the minimum separation of 0.65 nm (1.2 km) between turbines (Layout Rule #6), except in one instance where the distance between two positions is 0.57 nm, approximately 150 meters less than the 0.65-nm spacing. Additionally, Empire proposed a southwest to northeast transit corridor of 1 nm (1.9 km) between the EW 1 and EW 2 as part of the layout workshop with RODA. This transit corridor could be established by avoiding turbine installation at the western-most row of EW 2 locations. Removal of these positions was subsequently determined not to leave sufficient remaining locations to meet the EW 1 and EW 2 power purchase agreements because geotechnical conditions (presence of glauconite) present concerns for the successful installation of foundations at several other locations. It is also noted that the USCG NNYBPARS Final Report released in December 2021 (USCG 2021) proposes a Barnegat to Narragansett Fairway east of the Lease Area, which may offer alternative transit options.

While EW 2 layouts are still under discussion with RODA and other maritime stakeholders, through this consultation and compromise proposal Empire is offering to forgo turbine placement in an area of the Lease in the interest of demonstrating a commitment to coexistence with the commercial fishing industry, while also considering other maritime stakeholders. It is important to note that these commitments are only achievable if other interests (e.g., shipping industry, USCG) find that these layouts, designed within the broader Layout Rules, address their specific concerns, if BOEM determines that any remaining impacts are acceptable, and if geotechnical conditions allow. Empire will continue to engage with maritime stakeholders to receive and, where appropriate, incorporate their feedback (see Section 8.8.1.3 and **Appendix B**).

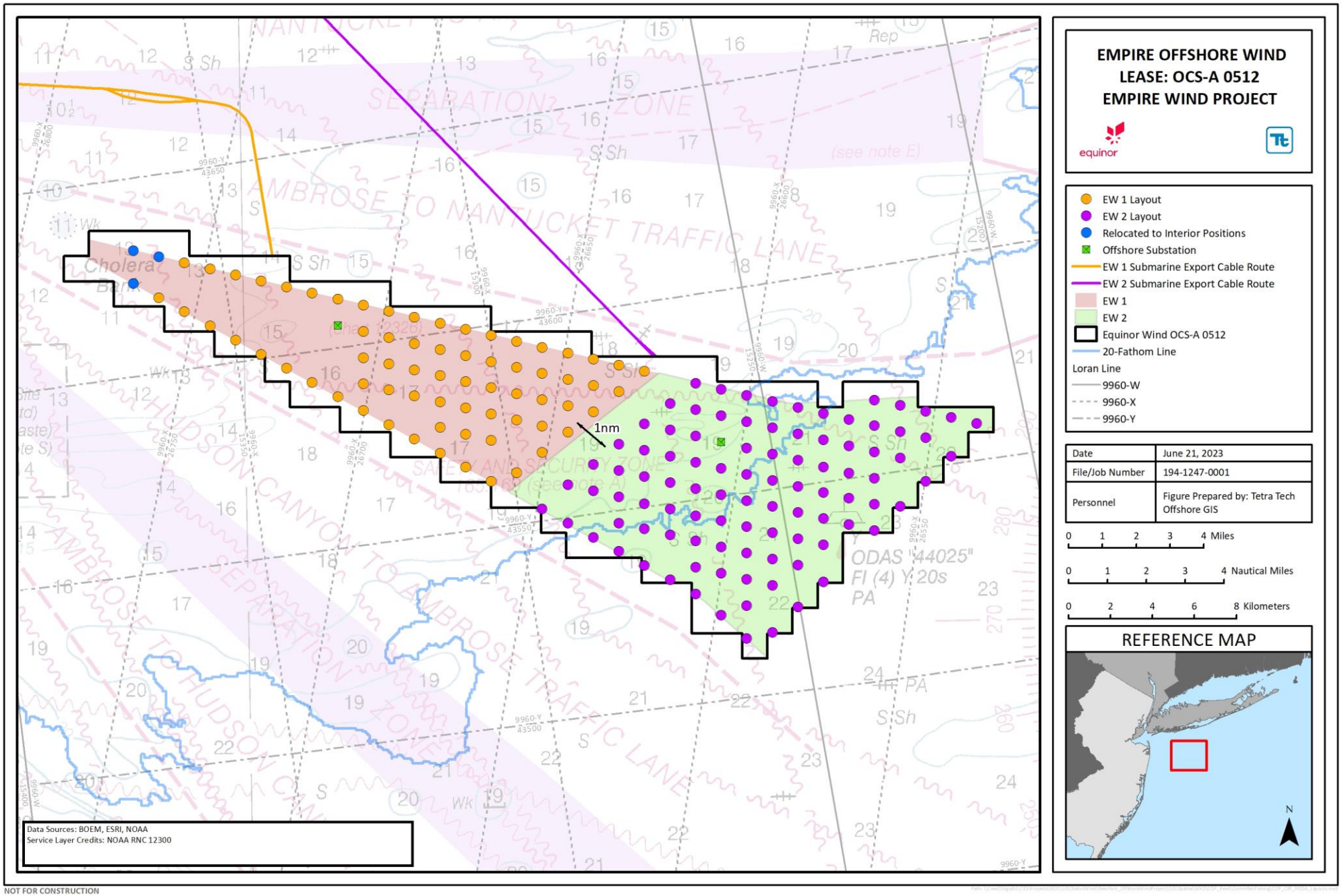


Figure 8.8-37 Empire Wind Open Area Layout

As described in **Section 3**, the final Project layouts will be established at a later time to provide flexibility for Empire to select the appropriate available technology at the time, while also providing flexibility to adapt layouts during the regulatory process. However, the Layout Rules provide future clarity of the conditions in which layouts can be designed within and for impact assessments to be judged against. Fisheries data and consultation feedback from the fishing industry and maritime community has resulted in the Empire Wind Project establishing Layout Rules that aim to minimize impacts on existing fishing practices and facilitate ongoing access to traditional fishing grounds. The Layout Rules also take into account existing and future maritime navigation trends and SAR capabilities. As the Project continues to develop, feedback from the Layout Rules consultations will be considered for modifying the Project's Layout Rules and potential layouts.

Wind Turbine Spacing

The minimum turbine spacing in any one direction for the Project is 0.65 nm (1.2 km), except in one instance in which two turbines near the southeastern boundary of EW 1 will be spaced 0.57 nm (1.05 km) apart. However, spacing may exceed this based on stakeholder feedback, the regulatory process and wind turbine dimensions. Based on available data, Empire believes that when combined with the embedded mitigation from the Layout Rules, a spacing of at least 0.71 nm (1.31 km) in the dominant trawl directions in this area will support safe, effective fishing and transit by the majority of fishing vessels and gear in the area, appreciating there are different fishing practices in different parts of the Lease Area. With such spacing the Lease Area has the potential to support more than two gigawatts of capacity. Increased spacing can potentially displace wind turbines to elsewhere in the region, which may include more productive grounds for fisheries, such as the deeper waters that may be targeted by scallopers. Empire believes the current plans achieve an optimal balance in consideration of all area stakeholders and activities.

Transits by Fishing Vessels

VMS data, AIS data, and information from fishermen indicate that the majority of transits through the Project Area are trawlers and clam dredgers originating in Point Pleasant, New Jersey, steaming to and from fishing grounds off Long Island and southern New England. The width of the Lease Area ranges from approximately 2 nm (3.7 km) in the northwest to 8 nm (14.8 km) in the southeast. The areas where they cross the Lease Area are distributed broadly and tracks appear fan-shaped, as in **Figure 8.8-36**. The headings also vary, but range around the southwest-northeast direction. Recreational fishermen from western Long Island ports including Freeport may also transit the Lease Area on route to the canyons and other offshore grounds. Within the NSRA (**Appendix DD**), Empire found that when commercial fishing vessels were assessed for transiting through the Project, all impact areas were rated "Broadly Acceptable". This risk level accounts for the Project's built-in mitigations and assesses deviations, adverse weather deviations, collision risk, powered allision risk, and drifting allision risk. The surrounding existing fairways and proposed ACPARS fairways are also built-in factors considered in the assessment of transit in and around the area. Some of the mitigations adopted to assist in the transiting of vessels through the Project include the Layout Rules (**Section 8.7**) and the lighting and marking scheme. It should also be noted that the NSRA assess transits within the maximum design scenario of 176 structure locations (full build-out of EW 1 and EW 2, consisting of 176 locations, with two offshore substations in determined locations and up to 147 wind turbines in any of the remaining locations).[16] Additionally, NYSERDA, NYSDEC, and RODA have been seeking feedback related to fishing vessel transit in the New York Bight, including surveys to fishermen and a workshop held in March 2019 (F-TWG 2019). Their goal is to refine commercial fishing transit to influence BOEM's future wind energy lease areas in the New York Bight.

[16] The NSRA modeled up to 176 wind turbines and 2 offshore substations, given that the proposed 147 wind turbines is fewer than assumed in the modeling, the current enveloped is considered as being within the worst case parameters assessed.

Following the workshop, NYSERDA, NYSDEC, and RODA solicited further feedback from fishermen on potential transit corridor options and accepted comments through late December 2019. Empire participated in the March 2019 workshop and continues to monitor the post workshop activities.

Hazards to Navigation. Empire has completed a NSRA. The NSRA, consistent with BOEM requirements and regulatory guidance (USCG Navigation and Inspection Circular [NVIC] 02-07[17] and Commandant Instruction [COMDTINST 16003.2A][18]), contains an assessment of the impact of navigational transit hazards associated with the operation of the Project. Potential hazards relating to fishing vessels transiting within the Lease Area are qualified in **Appendix DD**. The review of existing developments assists in qualifying activity of vessels engaged in fishing within wind farm arrays and allows for further review of incidents and accidents of fishing allision. This risk assessment within the Lease Area is in line with the assessment methodology used for other shipping and navigation impacts, including the recommendation of any additional mitigations to support navigational safety.

Regarding the act of safe fishing within offshore wind farm areas, NYSERDA produced several drawings for its Offshore Wind Master Plan (2017), to provide stakeholders with a better understanding of the area between wind turbines relative to typical vessel and gear spreads and how vessels may fish and maneuver within offshore wind farms areas. These figures have been recreated and customized for the Project (shown earlier in this section, as **Figure 8.8-19** and **Figure 8.8-26**) and depict an 87-ft (27-m)-long otter trawler (squid trawler), a typical scallop dredger, and a 120-ft (37-m)-long clam dredge vessel with wind turbines spaced 0.71 nm (1.31 km) apart. NYSERDA indicated that the extended spacing is expected to increase opportunities for fishing within arrays, depending on gear types and other factors, when compared to European offshore wind farms that typically have closer spacing between wind turbines. The scaled drawings (shown in **Figure 8.8-12** and **Figure 8.8-19**) reinforce the concept that there should be ample room for safe fishing operation (including vessel turns) within the Lease Area, based on those included in the NYSERDA Fish and Fisheries Study (NYSERDA 2017).

Additionally, in accordance with NVIC 02-07, the USCG will consider the areas of navigational safety, the traditional uses of the waterways, and impacts of USCG missions when evaluating the potential impacts of an offshore renewable energy installation (USCG 2007). The USCG will help develop appropriate terms and conditions that provide for navigational safety and minimize potential impacts on other Coast Guard missions.

With respect to financial impacts associated with increased overhead expenses, there are no documented cases of an insurance company or underwriter raising rates on vessels or fleets that work within offshore windfarms in Europe or at the Block Island Wind Farm.

A CBRA will be conducted, identifying areas where specific burial depths are recommended for both interarray cables and submarine export cables. For areas that may be subject to fishing, including the Lease Area and much of the submarine export cable length, there is a general recommendation of 6-ft (1.8-m) target burial. This is based on extensive studies of seabed penetration of fishing gear (Stevenson et al. 2004 and others) and experience with subsea telecom cables in the New York Bight. During the nineteen eighties and nineties, submarine cables landing in New Jersey suffered a number of cases of damage related to ship anchors and hydraulic clam dredges. Since 2000, new subsea cables in the New York, New Jersey, and Rhode Island have

[17] NVIC 01-19 was released in August 2019; however, given the stage of progression with this NSRA and in consultation with the USCG, updates have only been provided where appropriate noting the differences were minimal.

[18] An updated COMDINST 16003.2B (USCG 2019) was published on June 28, 2019, describing how various studies, such as port access route studies and NSRAs, are used by the USCG for decision making about Marine Transportation System issues.

adopted a practice of burial to depths of 4.9 to 6.6 ft (1.5 to 2 m) into the sediment. During this period, rates of cable damage in the New York Bight have been very low even with AIS records clearly showing clam dredges and other gear types working over and near subsea cables (NASCA 2019), as shown in **Figure 8.8-27** through **Figure 8.8-29**.

Further, clam dredgers have expressed concern that during haul back they lose directional control of the vessel. Since this could increase the risk of allision with a turbine it warrants further consideration. Local clam dredge captains have indicated that the process of hauling and setting the dredge typically takes less than five minutes. Minimum turbine spacing for this Project is proposed at 0.65 nm (1.2 km), except in one instance in which two turbines near the southeastern boundary of EW 1 would be 0.57 nm (1.05 km) apart, with spacing likely to be more than this in areas as appropriate to fishing type and feedback. A vessel drifting at 2 knots (3.7 km/h) for 5 minutes will travel 1,000 ft (309 m). Moreover, with the Lease Area varying in width from about 2 nm (3.7 km) in the northwest corner to 8 nm (14.8 km) in the southeast, and a towing speed of 3.5 knots (6.5 km/h), it should be possible to plan for ending a tow such that haul back to be outside the Lease Area.

Although efforts have been made to find areas suitable for cable burial during the spatial planning phase, in areas where target burial cannot be achieved due to firm sediment, shallower burial may be required, which may require surface protection. Fishermen using mobile gear that penetrate the sediment (e.g., clam and scallop fisheries) in this area often avoid hard sediments. Their gear does not penetrate deeply in such areas, and it is likely to achieve less seabed penetration than a specialized cable installation tool designed for seabed penetration used to bury cables. Additionally, to decrease the risk of gear snagging where target burial depth cannot be achieved and there is evidence of these fishing practices, Empire has committed to limit the use of concrete mattresses. The Lease Area and submarine export cable routes are not generally subject to very strong currents that can cause mobile seabed, sand waves, and potential exposure of buried cables. In areas where there are significant risks from ship anchors, burial requirements will be substantially deeper.

Change in Target Species Availability. Installation of the wind turbine and offshore substation foundations will convert affected isolated areas of benthic habitat within the Lease Area to hard substrate through the foundation itself at the seabed, as well as through the use of scour protection materials on the seabed. After installation, operation of the Project will result in long-term modification of the habitat composition in the immediate area of the foundations through the addition of hard settlement areas and vertical habitat structures.

Empire will introduce structures into an area of relatively uniform substrate, especially in the Lease Area. As described in **Section 5.5** the foundations will quickly become colonized by algae and invertebrates, creating an artificial reef effect. Mobile fish and macroinvertebrates that prefer structure will likely increase near the foundations, which may enhance the quality of fishing for various industry sectors such as sport and recreational fishing, as has been well-documented in the Gulf of Mexico near oil and gas foundations and associated in-water structures (BSEE 2018). On the Atlantic Coast, the Chesapeake Light Tower in federal waters east of Virginia Beach is built on an oil rig foundation repurposed as a Fish Aggregating Device (Ball 2013). Other artificial reef materials have been deployed near the Chesapeake light tower (e.g., barges, rail cars, tires, tug boats and tangled steel) to create a locus of structured habitat for prime recreational species such as black sea bass, summer flounder, tautog, triggerfish, king mackerel, striped bass, spadefish, Spanish mackerel, and cobia. The artificial reef extends throughout the water column (as will the wind turbines) and supports different species from the seabed to the water surface (Ball 2013).

The lack of naturally occurring structured habitats in the Lease Area may limit the current distribution and abundance of benthic species that use hardbottom and structure, such as tautog and black sea bass (Guida et al. 2017). These and other species associated with structure and hardbottom may move into the Lease Area in response to the installation of foundations and scour. Lobster may also seek shelter in the crevices created by

various protection methods offshore. Other species may not be attracted to the structures. For example, the distribution, abundance, and condition of seven flatfish species were found not to change following the construction of the Block Island Wind Farm; likewise, multispecies bottom trawl and lobster surveys showed no changes from pre-construction conditions (Carey 2017). Although local distributions of squid and finfish may respond to the presence of foundations, no population-level effects are expected. Benthic species that prefer open sandy bottoms, such as some flatfish, would not be affected by the introduction of structure because sandy bottom is ubiquitous in the Lease Area and surrounding areas of the seafloor. Specific predator/prey interactions are factored into these, thus far, short term studies and will continue to be monitored in the future.

The foundations are expected to attract mobile pelagic species such as tuna (Itano and Holland 2000) and schooling forage fish (Brown et al. 2010), as well as sea turtles (Blasi et al. 2016) and marine mammals (Rein et al. 2013). Highly migratory pelagic predators move throughout the oceans and some will likely encounter the wind turbine foundations. Tuna (e.g., yellowfin, bigeye, albacore) and sharks (e.g., dusky, whitetip, shortfin mako, common thresher) may be attracted by the abundant prey that congregate on the vertical structures for shelter, foraging, or other reasons. Most highly migratory species respond to offshore structures as well as to temperature and currents (NOAA Fisheries 2017a). Some highly migratory fish may visit offshore structures because the fish are using them as navigational landmarks (Taormina et al. 2018). The role of offshore structures in fish community ecology has not been extensively studied, as the structures are generally considered to enhance recreational fishing. Schooling forage species such as halfbeaks, butterfish, and mackerel are expected to attract valuable species that follow the Gulf Stream through New York Bight, such as yellowfin, bluefin, and bigeye tuna; mahi; and wahoo. Recreational anglers in private vessels or charter boats currently venture as far as Hudson Canyon in late summer to target the highly migratory gamefish. Effects of the introduction of structure in the Lease Area may be adverse, beneficial, or mixed, depending on the species and location (van der Stap et al. 2016). Overall, adverse impacts on commercially and recreationally valuable species are expected to be negligible within the context of the New York Bight (NOAA Fisheries 2015; RICRMC 2010).

The powerful Gulf Stream current brings warm water, ichthyoplankton, and pelagic fish from Florida, through the New York Bight and into the south coast of Long Island. Although the Gulf Stream remains farther offshore than the Lease Area and is not expected to influence water movements at the wind turbines, eddies are common, which influence species assemblages within the New York Bight, especially in summer/fall. Described as a river in the sea, the Gulf Stream carries nearly four billion cubic feet of water per second into the south coast of Long Island, where it travels at about 1 mph (1.6 km/h) (NOAA 2018). The Gulf Stream sometimes carries floating Sargassum to the New York Bight (DOE 2012); the mats of brown algae support a thriving ecosystem including more than 100 species of invertebrates, and eggs, larvae, juveniles, and adult life stages of pelagic fish such as tuna and billfish (NOAA Fisheries 2017a). The exact location of the Gulf Stream off the south coast of Long Island and New England varies on an approximately nine-year cycle. Changes in the position of the north wall of the current are known to affect the spatial distribution of the fish biomass in the south coast of Long Island, largely through effects on bottom temperature (Davis et al. [2017] and references within). The influence of the position of the Gulf Stream on fish species in the area is recognized in predicting the stocks of some managed species, including silver hake and yellowtail flounder. Additional information on oceanographic conditions is provided in **Section 4.1**.

It is likely that offshore structures will enhance, rather than diminish, recreational fishing opportunities in the Project Area. This is especially likely for highly migratory fish such as tuna, billfish, sharks, mahi and wahoo, and increased structure may also enhance the availability of other species in the Project Area (black sea bass, summer flounder, hake, tautog, etc.). The foundations and scour protection will become artificial reefs when sessile benthic organisms and algae settle upon the surfaces. This happens rapidly as the materials used in these

structures are completely benign. As offshore petroleum facilities have in the Gulf of Mexico, these structures will attract marine life, enhancing fisheries and contributing to recreational fishing and some commercial fishing economic activities. Recreational, and especially those commercial fishermen with enhanced fisheries, will adapt to harvest a richer diversity of marine life now assembled in a smaller area. These structures will provide habitat, shelter, food, and other necessary elements for biodiversity.

8.8.3.3 Decommissioning

Impacts during decommissioning are expected to be similar or less than those experienced during construction. 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 all potential impacts will be re-evaluated at that time. For additional information on the decommissioning activities that Empire anticipates for the Project, please see **Section 3**.

8.8.4 Summary of Avoidance, Minimization, and Mitigation Measures

Empire is committed to coexistence with commercial and recreational fishing in the planning, installation, operation and maintenance of its offshore wind energy facilities. This section presents a summary of actions taken, in progress, and planned to support this commitment. Since the early planning stages of this effort, in January 2018, Empire has conducted outreach and research to support this coexistence with other maritime stakeholders, including and especially offshore fishing. Empire has documented over 1,000 contacts with fishermen and fishery agencies from within the Mid-Atlantic and southern New England region, with a focus on those who travel or fish in or near the Lease Area and submarine export cable routes. These include individual and group meetings as well as telephone conversations, emails, and text messages. In addition to outreach and communications, Empire believes that technical approaches to the challenge of coexistence are essential. Empire conducts continuous inquiry into the fishing gears and methods used in each wind area where Empire operates.

In public and private meetings, ranging from individuals to large groups with presentations and questions, fishermen and stakeholders have voiced concerns covering the following topics:

- Loss of access to fishing grounds;
- Safety concerns of fishing within wind farms;
- Safety concerns of transit through wind farms;
- Impacts of turbines making radar less reliable and increasing navigational risks;
- Increased crowding of fishing vessels during periods of high catch, in concentrated areas;
- Avoidance of grounds in wind farms pushing fishing more into shipping lanes;
- Effects of noise during installation and operation;
- Potential snags on equipment lost during installation;
- Potential snags on scour protection;
- Potential snags on cables or mattressing to protect cables;
- Effects on marine mammals;
- Effects on birds;
- Effects of EMF on organisms;
- Effects of increased turbidity on organisms; and
- Effects of turbidity and altered currents on the Cold Pool threatening the survival/viability of scallops, clams, and others.

Empire believes that it is also important to supplement fishermen's reports with additional sources of independent, objective data. Empire seeks all available sources of data to achieve the most detailed, accurate, and comprehensive understanding of current practice.

To further the goal of coexistence, Empire developed a Fisheries Mitigation Plan (**Appendix V**) that fully describes Empire's approach to coexistence and communication with the commercial and recreational fishing communities throughout all stages of the Project. Naturally, the Fisheries Mitigation Plan will continue to evolve through discussions with the New York State Fisheries Technical Working Group and the fishing industry as the Project develops through the continued use of adaptive management.

Empire believes that mitigation measures to reduce impacts on fisheries should be identified and developed in close engagement with relevant fisheries stakeholders early in the Project development process. This should be through an iterative process of Project design, including site selection, cable routing, timing of works, and consideration of construction and operations methods. Empire endeavors to minimize disruption to fisheries at all stages of Project development, including during survey activity, construction, operations, maintenance, and decommissioning. These consultations have already yielded valuable insights that have been incorporated in Empire's survey and planning processes, which avoid or reduce potential impacts through, for example, a modified layout of wind turbine positions for a reduced number of installed wind turbines (see Section 8.8.3.2 Spatial Planning).

As demonstrated by the engagement with RODA, technical solutions such as appropriate wind turbine layouts, turbine spacing, cable routing, and burial depth targets, tailored to the characteristics of local fishing and the Project Area, can be essential factors in supporting coexistence and reducing impacts.

8.8.4.1 Construction

The mitigation plan will include use of FLO(s) who will support and coordinate interaction with the fishing community and promote information-sharing and communication, as well as USCG LNMs, and social media outreach. Additionally, Empire will provide advance notice to help commercial and recreational fishermen avoid targeted areas during specific construction activities. Empire has effectively utilized these measures to minimize conflicts with commercial and recreational fishing activities during Project surveys. Empire may also request that commercial fishermen not deploy gear near the active construction areas for certain periods of time to help further avoid conflicts and minimize the chances of interactions. This communication and outreach strategy will help to minimize disruption to regular fishing activities in the Project Area, including potential concerns regarding fishing gear loss. During construction, Empire will commit to the following avoidance, minimization, and mitigation measures to mitigate the impacts described in Section 8.8.3.1:

- Continued implementation of a Fisheries Mitigation Plan throughout the construction process to alert local fishing industries to relevant construction activities through the use of in-person communications, social media, website communications, and LNMs;
- Cable route planning to avoid areas of hard or steep seabed where burial is difficult, if those areas coincide with high fishing activity;
- Utilization of rolling construction zones to minimize areas closed off to fishing;
- Where feasible, planning the location and timing of construction activities that minimize overlap with areas or times of high activity;
- Continued active engagement with the fishing industry on the timing and location of construction so that they can, where possible, elect to fish in other areas and plan accordingly;
- Continued use of offshore OFLRs to facilitate communications with the fishing community;

- Continued communications between FLO and fisheries on the areas of temporary construction closures, when they are re-opened, updates on schedules through email serves, flyers, websites;
- A CBRA to determine sufficient burial depth along the submarine export cable route and, where target burial depth cannot be reached, secondary protection shall be considered;
- Continued work with the fishing industry and fisheries agencies to identify sensitive spawning and fishing periods to actively avoid or reduce interaction with receptors during construction, where feasible;
- Marking and lighting all wind turbines and offshore substations in accordance with USCG, BOEM, and IALA O-139 guidance;
- Utilization of a safety vessel to alert mariners to safety zones and/or active construction areas where appropriate;
- Implementation of 1,640-ft (500-m) safety zones around relevant structures, activities, and vessels in a dynamic approach, as previously defined for the Block Island Wind Farm (81 FR 31862). Should USCG Safety Zone authorities not extend beyond 12 nm (22 km) at the time of construction, Empire will utilize a combination of safety vessels, LNMs, and COLREGS to promote both awareness of these activities and the safety of the construction equipment and personnel;
- Installation of operational AIS on all vessels associated with the construction and operation of the Project; and
- Project construction vessels will utilize, to the extent practicable, the surrounding TSSs while transiting to and from the Lease Area.

In addition, during construction, Empire will consider the following avoidance, minimization, and mitigation measures to mitigate the impacts described in Section 8.8.3.1:

- Temporary lighting and marking may be used during the construction phase to alert mariners to areas under construction.

8.8.4.2 Operations and Maintenance

During operations, Empire will commit to the following avoidance, minimization, and mitigation measures to mitigate the impacts described in Section 8.8.3.2:

- In the event of maintenance within the offshore environment, the Project will alert the fishing industry to the occurrence of these activities. Communication methods will include the use of FLOs, social media, website communications, and LNM;
- The Project will utilize the Layout Rules (as described in **Section 3**), as practicable, to achieve wind farm layouts, wind turbine spacing and lines of orientation within the array that facilitate continued access to traditional fishing grounds;
- All wind turbines and offshore substations will be marked and lit in accordance with USCG, BOEM, and IALA O-139 guidance;
- Submarine export and interarray cables will be buried to a target burial depth of 6 ft (1.8 m);
- Following installation of the submarine export and interarray cables, the Project will conduct cable burial surveys at appropriate intervals to assess if target burial depth is being maintained;
- Micro-siting of the submarine export cable route to further reduce potential impacts on sensitive habitats and minimize areas where burial is more challenging;
- Regular updates to the local marine community through Project websites, social media, the USCG LNM and active engagement with other stakeholders;

- To minimize risk of anchors and fishing gear snagging the submarine export cable, the submarine export cable route has been routed to target areas where chances of burial are improved;
- Additionally, the use of concrete mattresses as surface cable protection will be limited;
- All submarine export cable, interarray cable, wind turbine, and offshore substation locations will be provided to NOAA and updated on nautical charts appropriately;
- To the extent practicable and in consultation with the fishing industry, turbine locations and cable routes will be marked on the most common types of software used by fishermen for navigation and fishing; and
- Installation of AIS signals on turbines, as appropriate, to facilitate safe navigation.

8.8.4.3 Decommissioning

The avoidance, minimization, and mitigation measures proposed to be implemented during decommissioning are expected to be similar to those implemented during construction and operations, as described in Section 8.8.4.1 and Section 8.8.4.2. A full decommissioning plan will be approved by BOEM prior to any decommissioning activities, and all best management practices and mitigation for decommissioning activities will be proposed at that time.

8.8.5 References

Table 8.8-11 Summary of Data Sources

Source	Includes	Available at	Metadata Link
BOEM	Lease Area	https://www.boem.gov/BOEM-Renewable-Energy-Geodatabase.zip	N/A
BOEM	State Territorial Waters Boundary	https://www.boem.gov/Oil-and-Gas-Energy-Program/Mapping-and-Data/ATL_SLA(3).aspx	http://metadata.boem.gov/geospatial/OCS_SubmergedLandsActBoundary_Atlantic_NAD83.xml
MARCO	Total Gillnet Activity	https://oceandata.rad.rutgers.edu/arcgis/rest/services/	N/A
NJDEP	NJ Sportfishing Area	https://opendata.arcgis.com/datasets/df7de8c132a749d680ae415b30322fc8_0.zip?outSR=%7B%22latestWkid%22%3A3857%2C%22wkid%22%3A102100%7D	https://www.arcgis.com/sharing/rest/content/items/df7de8c132a749d680ae415b30322fc8/info/metadata/metadata.xml?format=default&output=html
NOAA, NYDEC	Artificial Reef	ftp://ftp.coast.noaa.gov/pub/MSP/ArtificialReefs.zip	https://inport.nmfs.noaa.gov/inport/item/54191
NOAA	Lobster Restricted Gear Area	https://www.greateratlantic.fisheries.noaa.gov/educational_resources/gis/data/shapefiles/Lobster_Restricted_Gear_Areas/Lobster_Restricted_Gear_Areas_20140915.zip	https://www.greateratlantic.fisheries.noaa.gov/educational_resources/gis/data/shapefiles/Lobster_Restricted_Gear_Areas/Lobster_Restricted_Gear_Areas_METADATA.pdf

Table 8.8-11 Summary of Data Sources (continued)

Source	Includes	Available at	Metadata Link
NOAA	Mudhole North Management Area	http://www.greateratlantic.fisheries.noaa.gov/educational_resources/gis/data/shapefiles/Mudhole_North_Management_Area/Mudhole_North_Management_Area_20140915.zip	http://www.greateratlantic.fisheries.noaa.gov/educational_resources/gis/data/shapefiles/Mudhole_North_Management_Area/Mudhole_North_Management_Area_METADATA.pdf
NOAA	Sea Scallop Accountability Measure Area	http://www.greateratlantic.fisheries.noaa.gov/educational_resources/gis/data/shapefiles/Sea_Scallop_Accountability_Measure_Areas/Sea_Scallop_Accountability_Measure_Areas_20180419.zip	http://www.greateratlantic.fisheries.noaa.gov/educational_resources/gis/data/shapefiles/Sea_Scallop_Accountability_Measure_Areas/Sea_Scallop_Accountability_Measure_Areas_METADATA.pdf
NOAA	Surfclam/ Quahog Closed Area	https://www.greateratlantic.fisheries.noaa.gov/educational_resources/gis/data/shapefiles/Environmental_Degradation_Closures/Environmental_Degradation_Closures_20140501.zip	https://www.greateratlantic.fisheries.noaa.gov/educational_resources/gis/data/shapefiles/Environmental_Degradation_Closures/Environmental_Degradation_Closures_METADATA.pdf
NOAA	Southern New England Scallop Dredge Exemption Area	http://www.greateratlantic.fisheries.noaa.gov/educational_resources/gis/data/shapefiles/SNE_Scallop_Dredge_Exemption_Area/SNE_Scallop_Dredge_Exemption_Area_20150315.zip	http://www.greateratlantic.fisheries.noaa.gov/educational_resources/gis/data/shapefiles/SNE_Scallop_Dredge_Exemption_Area/SNE_Scallop_Dredge_Exemption_Area_METADATA.pdf
NOAA	Sector Small-Mesh Exemption Area	http://www.greateratlantic.fisheries.noaa.gov/educational_resources/gis/data/shapefiles/Sector_Small-Mesh_Exemption_Area/Sector_Small-Mesh_Exemption_Area_20190215.zip	http://www.greateratlantic.fisheries.noaa.gov/educational_resources/gis/data/shapefiles/Sector_Small-Mesh_Exemption_Area/Sector_Small-Mesh_Exemption_Area_METADATA.pdf
NOAA	Southern New England Exemption Area	http://www.greateratlantic.fisheries.noaa.gov/educational_resources/gis/data/shapefiles/SNE_Exemption_Area/SNE_Exemption_Area_20150315.zip	http://www.greateratlantic.fisheries.noaa.gov/educational_resources/gis/data/shapefiles/SNE_Exemption_Area/SNE_Exemption_Area_METADATA.pdf

Table 8.8-11 Summary of Data Sources (continued)

Source	Includes	Available at	Metadata Link
NOAA	Sea Scallop Rotational Area	http://www.greateratlantic.fisheries.noaa.gov/educational_resources/gis/data/shapefiles/Sea_Scallop_Rotational_Areas/Sea_Scallop_Rotational_Areas_20180419.zip	http://www.greateratlantic.fisheries.noaa.gov/educational_resources/gis/data/shapefiles/Sea_Scallop_Rotational_Areas/Sea_Scallop_Rotational_Areas_METADATA.pdf
NOAA	Mudhole South Management Area	http://www.greateratlantic.fisheries.noaa.gov/educational_resources/gis/data/shapefiles/Mudhole_South_Management_Area/Mudhole_South_Management_Area_20140915.zip	http://www.greateratlantic.fisheries.noaa.gov/educational_resources/gis/data/shapefiles/Mudhole_South_Management_Area/Mudhole_South_Management_Area_METADATA.pdf
NOAA NCEI	Bathymetry	https://www.ngdc.noaa.gov/mgg/coastal/crm.html	N/A
Northeast Ocean Data	VMS Fishery Specific	https://devservices.northeastoceandata.org/neoddev/rest/services/	N/A
NROC	VMS Fishing Transits/ Activity	https://portal.midatlanticocean.org/data-catalog/fishing/	https://www.northeastoceandata.org/files/metadata/Themes/CommercialFishing/VMSCommercialFishingDensity.pdf
NYSDEC	Proposed Artificial Reef	https://www.nyserda.ny.gov/-/media/Files/Publications/Research/Biomass-Solar-Wind/Master-Plan/17-25g-Consideration-of-Potential-Cumulative-Effects.pdf	https://www.dec.ny.gov/docs/fish_marine_pdf/dmrreefguide.pdf.
NYSDOS	Recreational Fishing	https://opdgig.dos.ny.gov/#/search/browse	http://opdgig.dos.ny.gov/geoportal/catalog/search/resource/detailsnoheader.page?uuid={3B5083DA-2060-4F5D-8416-201A0A2B962B}
NY OPDGIG	Recreational Diving Wreck	https://opdgig.dos.ny.gov/#/search/browse	http://opdgig.dos.ny.gov/geoportal/catalog/search/resource/detailsnoheader.page?uuid={4990846B-A419-486B-AA9F-A7D770382832}

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8.9 Department of Defense and OCS National Security Maritime Uses

This section describes national security maritime uses that occur within and around the Project Area. Potential impacts to/conflicts with military activities resulting from construction, operations, and decommissioning of the Project are discussed. Proposed Project-specific measures adopted by Empire as a result of outreach and engagement are also described, which are intended to avoid, minimize, and/or mitigate potential impacts to national security maritime uses.

Other resources and assessments detailed within this COP that are related to national security maritime uses include:

- Aviation (Section 8.6);
- Marine Transportation and Navigation (Section 8.7);
- Aircraft Detection Lighting System (ADLS) Analysis (Appendix BB);
- Obstruction Evaluation and Airspace Analysis (Appendix CC); and
- Navigation Safety Risk Assessment (Appendix DD).

Data Relied Upon and Studies Completed

For the purposes of this section, the Study Area includes the offshore waters and coastlines within and in the vicinity of the Lease Area and the EW 1 and EW 2 submarine export cable routes (see **Figure 8.9-1**).

This section relies upon navigation charts and maps, as well as information gathered during outreach and engagement activities. Empire understands that certain national security activities are covert and not visible to the public. Therefore, Empire has been working with key stakeholders within the Department of Defense (DoD) and Homeland Security to maintain an open communication during the development of this COP. This includes coordination with the U.S. Navy Fleet Forces Command, initiated in December 2019 to review the Project, design approach and applicable assessments. On July 29, 2020, Empire received a request from the DoD Clearinghouse to enter into a partnership to initiate mitigation discussion for potential impacts resulting from the construction and installation of the Project. Empire intends to enter into this partnership, responding with a confirmation letter on August 19, 2020. Empire remains committed to continuing with open lines of communication, and more detail on engagement efforts with key national security stakeholders is further described in Section 8.9.1.

8.9.1 Affected Environment

The affected environment is defined as areas where national security maritime activities are known to occur and have the potential to be directly or indirectly affected by the construction, operations, and decommissioning of the Project. This includes the Lease Area and submarine export cable routes. Permits necessary for the improvement of port and construction/staging facilities will be the responsibility of the owners of these facilities. Empire expects such improvements will broadly support the offshore wind industry and will be governed by applicable environmental standards, which Empire will comply with in using the facilities. Known areas of national security maritime operation are illustrated in **Figure 8.9-2**.

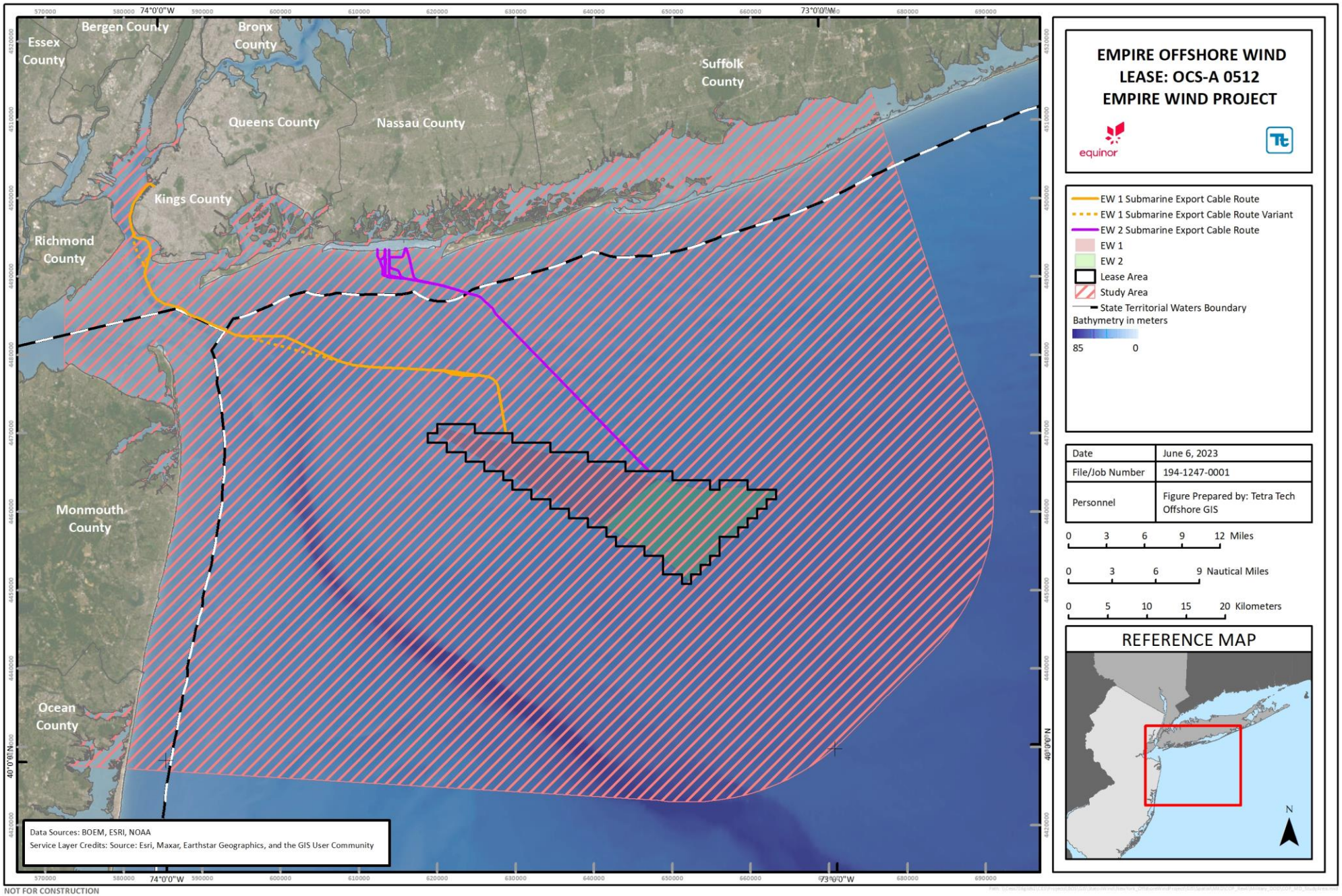

Figure 8.9-1 National Security Maritime Uses Study Area

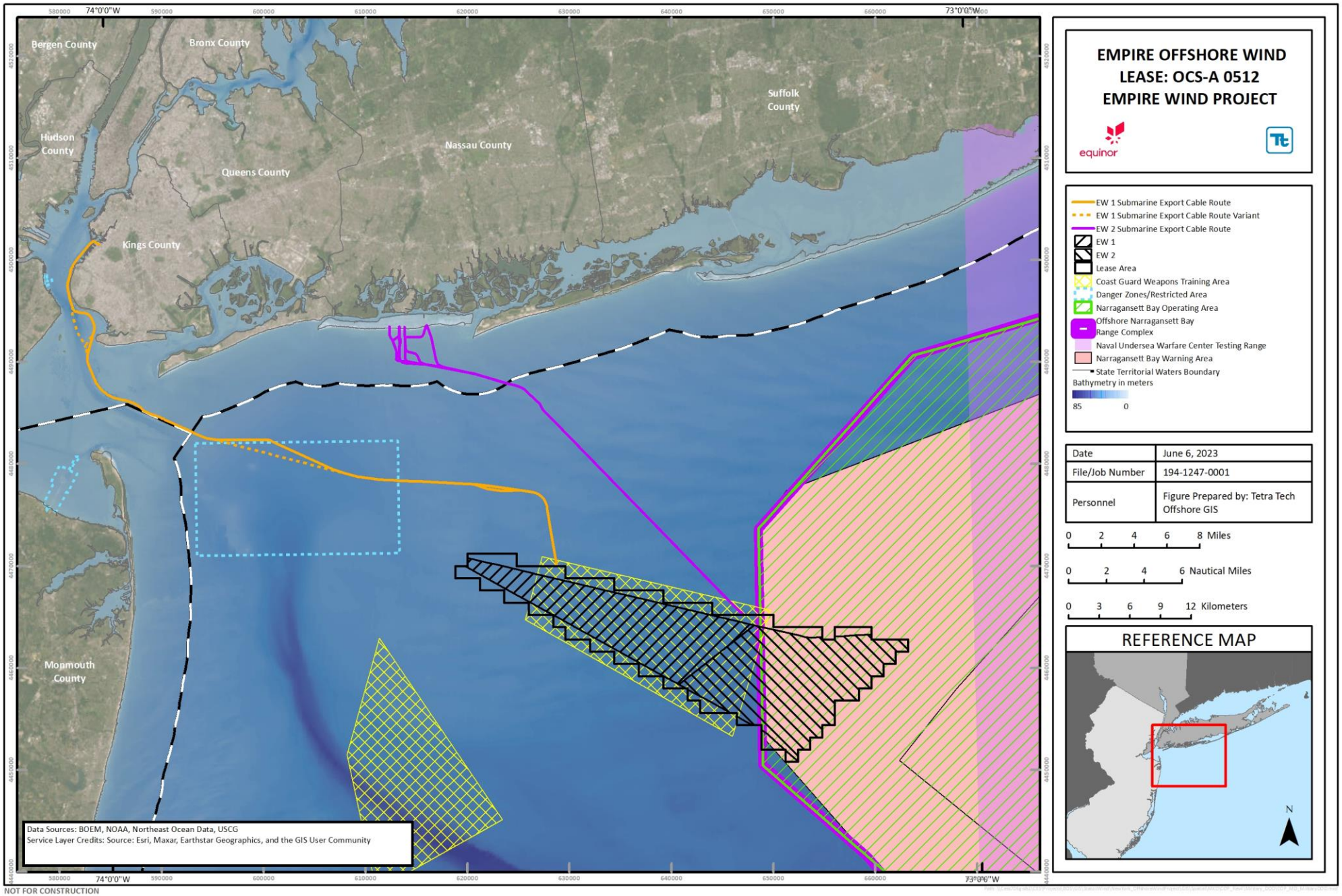

Figure 8.9-2 Military Use in the Study Area

8.9.1.1 Military Range Complex

The Offshore Narragansett Bay Range Complex primarily consists of surface sea spaces and subsurface space located off the coasts of Massachusetts, Rhode Island, and New York. It is controlled by the Fleet Area Control and Surveillance Facility, Virginia Capes Naval Air Station Oceana. Primary Navy installations operating in this complex are located in New London, Connecticut, and Newport, Rhode Island. As part of the range complex, the Narragansett Bay Operating Area (OPAREA) extends from the shoreline seaward to approximately 180 nm (333 km) from land at its farthest point. The eastern portion of the Lease Area overlaps with the OPAREA; however, this overlap accounts for less than 1 percent of the total OPAREA. Based on feedback from the Naval Seafloor Cable Protection Office, there are no areas of identified overlap along the submarine export cable siting corridors. An informal assessment was also submitted to the DoD Clearinghouse in December 2019 for spatial review of the Project Area. In a response letter dated July 29, 2020, the DoD Clearinghouse did not refer to the potential for impacts to the Narragansett Bay OPAREA resulting from the Project.

8.9.1.2 Warning Areas

The Narragansett Bay Warning Area is actively used for U.S. Navy subsurface and surface training and testing activities and to prepare submarines and their crews for formal voyages. Specifically, these Warning Areas are used to support special-use airspace, flight testing, surface-to-air gunnery exercises using conventional ordnance, Antisubmarine Warfare exercises, and air-intercept training (Globalsecurity.org 2018). Special use airspace is an area designated for operations where limitations may be imposed on aircraft not participating in operations. (Impacts to aviation are discussed further in **Section 8.6 Aviation**.) The eastern portion of the Lease Area is located within a Narragansett Bay Warning Area (see **Figure 8.9-2**). An informal assessment was also submitted to the DoD Clearinghouse in December 2019 for spatial review of the Project Area. In a response letter dated July 29, 2020, the DoD Clearinghouse did not refer to the potential for impacts to the Narragansett Bay Warning Area resulting from the Project.

8.9.1.3 Danger Zones and Restricted Areas

Danger zones are defined by 33 CFR § 334.2 as "a defined water area (or areas) used for target practice, bombing, rocket firing or other especially hazardous operations, normally for the armed forces." Restricted Areas are those defined areas where public access is prohibited or limited due to general use by the U.S. government. There are three Danger Zones/Restricted Area (DZ/RA) within the vicinity of the Study Area (see **Figure 8.9-2**).

A large DZ/RA is located at the mouth of New York Harbor and described on NOAA Chart 12326 (2016) as the following:

> *"Area is open to unrestricted surface navigation but all vessels are cautioned neither to anchor, dredge, trawl, lay cables, bottom, nor conduct any other similar type of operation because of residual danger from mines on the bottom."*

The presence of mines on the seabed in this area presents a risk to cable installation activities, as the EW 1 submarine export cable route passes through its boundaries (see **Section 2 Project Design Development** for additional information on the EW 1 submarine export cable route routing). Empire has committed to carrying out an UXO study and will avoid, minimize, or mitigate the risk, as appropriate.

A second DZ/RA, the Naval Weapons Station Earle, is located in Sandy Hook Bay and is the only base on the East Coast with the ability to load and unload ammunition from warships at a safe distance from heavily

populated areas, due to a 2.9-mi (4.7-km) pier (U.S. Navy, n.d.). Given the high security of this facility, a DZ/RA is established around the pier.

A third DZ/RA is established around the Navy Homeport Pier on Staten Island, formerly part of the Stapleton Naval Station in New York Harbor. The pier is owned by the New York City Economic Development Corporation (NYCEDC) and is currently the home of a New York Fire Department posting at the section of the pier closest to the shore. The pier otherwise is unused except for the annual July 4th fireworks presentation. Future plans include upgrades as part of the NYCEDC New Stapleton Waterfront Revitalization Plan. The pier is also under consideration as a support facility for the offshore wind industry (NYCEDC, n.d.).

8.9.1.4 Weapons Training Areas

The USCG operates two Weapons Training Areas (WTAs) offshore New York and New Jersey (See **Figure 8.9-2**). These areas are utilized by the USCG for proficiency training in law enforcement operations (BOEM 2016). These WTAs have been established by practice, not by regulation, and are used for small caliber weapons training, generally from small vessels that must transit during the day to the WTA. One of these WTAs is located within the Lease Area. The USCG is aware of the proposed facility and is currently evaluating whether an alternate training area may be required or if training activities could occur within an active wind farm. Empire will work with the USCG to facilitate potential training activities within the operational wind farm.

8.9.2 Impacts Analysis for Construction, Operations, and Decommissioning

The potential impacts resulting from the construction, operations, and decommissioning of the Project are based on the maximum design scenario from the PDE (for a complete description of the construction, operations, and decommissioning activities that Empire anticipates for the Project, see **Section 3**). For national security maritime uses, the maximum design scenario/greatest potential to conflict with military activities is the maximum number of wind turbines, offshore substations, submarine export cables, and interarray cables, resulting in the maximum number of fixed structures in the water (see **Table 8.9-1**). The parameters provided in **Table 8.9-1** represent the maximum potential impact from full build-out of the Lease Area of EW 1 and EW 2 and incorporates a total of up to 149 foundations at any of 176 locations within the Lease Area (made up of up to 147 wind turbines and 2 offshore substations) with two submarine export cable routes to EW 1 and EW 2.

Table 8.9-1 Summary of Maximum Design Scenario Parameters for National Security Maritime Uses

Parameter	Maximum Design Scenario	Rationale
Construction		
Offshore structures	Based on full build-out of EW 1 and EW 2 (147 wind turbines and 2 offshore substations). EW 1: 57 wind turbines and 1 offshore substation. EW 2: 90 wind turbines and 1 offshore substation.	Representative of the maximum number of structures for EW 1 and EW 2.
Wind turbine foundation	Monopile	Representative of the foundation option that has an installation method that would result in the maximum introduction of underwater noise.

Table 8.9-1 Summary of Maximum Design Scenario Parameters for National Security Maritime Uses (continued)

Parameter	Maximum Design Scenario	Rationale
Wind turbine foundation Installation method Underwater noise	Pile driving	Representative of the installation method that would result in the loudest underwater and in-air noise generated.
Submarine export cables	Based on full build-out of EW 1 and EW 2. EW 1: 40 nm (74 km). EW 2: 26 nm (48 km).	Representative of the maximum length of new submarine export cables to be installed.
Interarray cables	Based on full build-out of EW 1 and EW 2, with the maximum number of structures (147 wind turbines and 2 offshore substations) to connect. EW 1: 116 nm (214 km). EW 2: 144 nm (267 km).	Representative of the maximum length of interarray cables to be installed.
Safety zones Project-related vessels and structures	Based on full build-out of EW 1 and EW 2, with the maximum number of structures (147 wind turbines and 2 offshore substations) and maximum number of associated vessels and safety zones. 1,640 ft (500 m) around relevant structures, activities, and vessels.	Representative of the maximum cumulative area and duration, which national security maritime users would experience the presence of these zones.
Duration Offshore construction	Based on full build-out of EW 1 and EW 2, with the maximum number of structures (147 wind turbines and 2 offshore substations) and the maximum period of cumulative duration for installation.	Representative of the maximum period required to install the offshore components, which has the potential to impact resources in, access to, or enjoyment of the Project Area.
Operations		
Offshore structures	Based on full build-out of EW 1 and EW 2 (147 wind turbines and 2 offshore substations). EW 1: 57 wind turbines and one offshore substation. EW 2: 90 wind turbines and one offshore substation.	Representative of the presence of new fixed structures in an area that previously had none.
Project-related vessels Collision risk	Based on full build-out of EW 1 and EW 2, with the maximum number of structures (147 wind turbines and 2 offshore substations) and submarine export and interarray cable. Based on maximum number of vessels and movements for servicing and inspections.	Representative of the maximum predicted Project-related vessels for collision risk.

8.9.2.1 Construction

During construction, the potential impact-producing factors to national security maritime uses may include:

- Construction of the offshore components, including the wind turbines, offshore substations, foundations, submarine export cables, and interarray cables;
- Staging activities and assembly of Project components at applicable facilities or areas; and
- The export cable landfall, including open cut trenching, HDD, or Direct Pipe installation.

The following impacts may occur as a consequence of the factors identified above:

- Short-term increase in Project-related vessel traffic during construction; and
- Short-term displacement of national security maritime training uses due to the presence of Project-related vessels and implementation of safety zones.

Increase in Project-related construction vessel traffic. An increase in Project-related construction and support vessel traffic transiting to, from, and within the Lease Area and the submarine export cable routes is anticipated during construction due to the presence of Project-related construction vessels. This increase has the potential to impact the frequency of vessel collisions as a result of the temporary increased congestion of the waterway. Project-related vessels are expected to travel in the existing traffic patterns and within the TSS lanes as much as possible to minimize impacts to the other marine users and to be consistent with other waterway usage. Vessel traffic related to the Project is expected to be minimal in relation to the existing vessel traffic. In addition, no Project activities so far, such as the geophysical and geotechnical survey activities, have resulted in interactions with national security operations in the Lease Area, nor have any national security maritime vessels been sited within the Study Area during the site assessment period. Furthermore, based on the maritime data assessed in the Navigation Safety Risk Assessment, military vessel activity in the Study Area is considered low; therefore, the likelihood of Project construction vessel activity interfering with military activities is anticipated to be low. See **Section 8.7 Marine Transportation and Navigation** and **Appendix DD Navigation Safety Risk Assessment** for a further discussion of the potential impact to national security maritime vessel traffic. Empire proposes to implement the following measures to avoid, minimize, and mitigate impacts:

- Project vessels will utilize transit lanes, fairways, and predetermined passage plans consistent with existing waterway uses, to the extent practicable; and
- Regular communications and updates with key national security maritime stakeholders on Project-related construction vessel activities.

Displacement/disturbance of national security maritime training uses due to the presence of Project-related construction vessels and implementation of temporary safety zones. During construction, Empire proposes to utilize up to 1,640-ft (500-m) safety zones around relevant structures, activities, and vessels in a dynamic approach, as previously defined for the Block Island Wind Farm (81 FR 31862). Should USCG safety zone authorities not extend beyond 12 nm (22 km) at the time of construction, Empire will utilize a combination of safety vessels, LNMs, and COLREGS to promote both awareness of these activities and the safety of the construction equipment and personnel. Empire understands that while these activities may impact training schedules, construction and safety zones will cease should national security users need to access the area due to an emergency. All areas will be marked and lit in accordance with USCG/BOEM (2021) requirements and monitored by a Project support vessel where appropriate. The location and timing of the safety zones will be posted in the LNM system, as well as on the Project website. Empire will continue to

maintain contact with military users throughout the offshore construction period to minimize potential conflicts. Empire proposes to implement the following measures to avoid, minimize, and mitigate impacts:

- Active engagement with key national security stakeholders, including U.S. Fleet Forces, the USCG, and U.S. Navy Office of Cable Protection. This engagement will be conducted through DoD Clearinghouse, with an increase in frequency expected as Empire moves closer to commencement of construction activities. On July 29, 2020, Empire received a request from the DoD Clearinghouse to enter into a partnership to initiate mitigation discussion for potential impacts resulting from the construction and installation of the Project. Empire intends to enter into this partnership, responding with a confirmation letter on August 19, 2020;
- Dynamic construction and safety zones where feasible, focusing on sites being actively worked on, to minimize the extent of the affected area; and
- Partially constructed structures and safety zones will be properly marked and lit in accordance with the IALA O-139, USCG requirements, and the 2021 BOEM Lighting/Marking Guidance (see **Section 3** for additional details on the proposed marking and lighting measures).

8.9.2.2 Operations and Maintenance

During operations, the potential impact-producing factors to national security maritime uses may include:

- The presence of fixed structures (e.g., wind turbines, offshore substations, submarine export cables, and interarray cables).

The following impacts may occur as a consequence of the factors identified above:

- Long-term modification of existing waterway use; and
- Long-term presence of new fixed structures (e.g., wind turbines, offshore substations, submarine export cables, and interarray cables) in the Lease Area.

Modified existing waterway use. The operation of the wind farm will create a new permanent navigational pattern within the Lease Area (see **Section 8.7** and **Appendix DD** for a discussion of navigation safety). National security maritime users will be free to transit throughout the wind farm, however, and no changes to existing uses are expected along the submarine export cable routes. Temporary, up to 1,640-ft (500-m) safety zones may also be implemented during operations and maintenance activities (e.g., foundation locations and/or cable installation vessels); however, the likelihood of a temporary safety zone occurring in the operations phase in a location and time coinciding with national security marine uses is low. Empire proposes to implement the following measure to avoid, minimize, and mitigate impacts:

- Regular communications and updates will occur with key national security stakeholders, including the DoD Clearinghouse on the timing and location of maintenance activities.

Presence of new fixed structures. The presence of new fixed structures within the Lease Area has the potential to disrupt military activities. The wind turbines and offshore substations may create obstructions to national security–related training, such as the USCG weapons training activities. An informal assessment was also submitted to the DoD Clearinghouse in December 2019 for spatial review of the Project Area. On July 29, 2020, Empire received a request from the DoD Clearinghouse to enter into a partnership to initiate mitigation discussion for potential impacts resulting from the construction and installation of the Project. Empire intends to enter into this partnership, responding with a confirmation letter on August 19, 2020. Empire proposes to implement the following measures to avoid, minimize, and mitigate impacts:

- Properly mark and light wind turbines and offshore substations in accordance with IALA O-139, USCG requirements, and the 2021 BOEM Lighting/Marking Guidance, unless a variance is approved by the applicable agency prior to construction (see **Section 3** for additional details on the proposed marking and lighting measures);
- Provide as-built information to NOAA Fisheries to support necessary updates to navigation charts in coordination with NOAA Fisheries and other stakeholders as needed;
- Partner with the USCG to facilitate training exercises within the operational wind farm, as requested; and
- Regular communication and updates will occur with key national security stakeholders, including the DoD Clearinghouse on Project-related activities that may affect national security operations.

8.9.2.3 Decommissioning

Impacts during decommissioning are expected to be similar or less than those experienced during construction, as described in Section 8.9.2.1. 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 additional information on the decommissioning activities that Empire anticipates for the Project, please see **Section 3**.

8.9.3 Summary of Avoidance, Minimization, and Mitigation Measures

In order to mitigate the potential impact-producing factors described in Section 8.9.2, Empire is proposing to implement the following best management practices and mitigation measures.

8.9.3.1 Construction

During construction, Empire will commit to the following avoidance, minimization, and mitigation measures to mitigate the impacts described in Section 8.9.2.1:

- Project vessels will utilize transit lanes, fairways, and predetermined passage plans consistent with existing waterway uses, to the extent practicable;
- Regular communications and updates will occur with key national security maritime stakeholders on Project-related construction vessel activities;
- Active engagement with key national security stakeholders including U.S. Fleet Forces, the USCG, and U.S. Navy Office of Cable Protection will take place. This engagement will be conducted through the DoD Clearinghouse, with an increase in frequency expected as Empire moves closer to commencement of construction activities. On July 29, 2020, Empire received a request from the DoD Clearinghouse to enter into a partnership to initiate mitigation discussion for potential impacts resulting from the construction and installation of the Project. Empire intends to enter into this partnership, responding with a confirmation letter on August 19, 2020. Empire met with the DoD in November 2021 and discussions are ongoing to finalize the mitigation agreement;
- Dynamic construction and safety zones will be implemented where feasible, focusing on sites being actively worked on, to minimize the extent of the affected area; and
- Partially constructed structures and safety zones will be properly marked and lit in accordance with IALA O-139, USCG requirements, and the 2021 BOEM Lighting/Marking Guidance (see **Section 3** for additional details on the proposed marking and lighting measures).

8.9.3.2 Operations and Maintenance

During operations, Empire will commit to the following avoidance, minimization, and mitigation measures to mitigate the impacts described in Section 8.9.2.2:

- Wind turbines and offshore substations will be properly marked and lit in accordance with IALA O-139, USCG requirements, and the 2021 BOEM Lighting/Marking Guidance, unless a variance is approved by the applicable agency prior to construction (see **Section 3** for additional details on the proposed marking and lighting measures);
- As-built information will be provided to NOAA Fisheries to support necessary updates to navigation charts in coordination with NOAA Fisheries and other stakeholders as needed;
- Empire will work with the USCG to facilitate training exercises within the operational wind farm, as requested; and
- Regular communication and updates will occur with key national security stakeholders, including the DoD Clearinghouse on the timing and location of maintenance activities and Project-related activities that may affect national security operations.

8.9.3.3 Decommissioning

Avoidance, minimization, and mitigation measures proposed to be implemented during decommissioning are expected to be similar to those implemented during construction and operations, as described in Section 8.9.3.1 and Section 8.9.3.2. A full decommissioning plan will be approved by BOEM prior to any decommissioning activities, and avoidance, minimization, and mitigation measures for decommissioning activities will be proposed at that time.

8.9.4 References

Table 8.9-2 Data Sources

Source	Includes	Available at	Metadata Link
BOEM	Lease Area	https://www.boem.gov/BOEM-Renewable-Energy-Geodatabase.zip	N/A
BOEM	State Territorial Waters Boundary	https://www.boem.gov/Oil-and-Gas-Energy-Program/Mapping-and-Data/ATL_SLA(3).aspx	http://metadata.boem.gov/geospatial/OCS_SubmergedLandsActBoundary_Atlantic_NAD83.xml
NOAA	Danger Zone/Restricted Area	ftp://ftp.coast.noaa.gov/pub/MSP/DangerZonesAndRestrictedAreas.zip	https://inport.nmfs.noaa.gov/inport/item/48876
NOAA NCEI	Bathymetry	https://www.ngdc.noaa.gov/mgg/coastal/crm.html	N/A
Northeast Ocean Data	Narragansett Bay Operating Area	http://www.northeastoceandata.org/files/metadata/Themes/NationalSecurity.zip	http://northeastoceandata.org/files/metadata/Themes/Security/NEOPAREABoundary.pdf
Northeast Ocean Data	Offshore Narragansett Bay Range Complex	http://www.northeastoceandata.org/files/metadata/Themes/NationalSecurity.zip	http://northeastoceandata.org/files/metadata/Themes/Security/NEMilitaryRangeComplex.pdf

Table 8.9-2 Data Sources (continued)

Source	Includes	Available at	Metadata Link
Northeast Ocean Data	Naval Undersea Warfare Center Testing Range	http://www.northeastoceandata.org/files/metadata/Themes/NationalSecurity.zip	http://northeastoceandata.org/files/metadata/Themes/Security/NENUWCDIVNPTTestingRangeBoundary.pdf
Northeast Ocean Data	Narragansett Bay Warning Area	http://www.northeastoceandata.org/files/metadata/Themes/NationalSecurity.zip	http://northeastoceandata.org/files/metadata/Themes/Security/NEWarningAreas.pdf

BOEM (Bureau of Ocean Energy Management). 2016. "Commercial Wind Lease Issuance and Site Assessment Activities on the Atlantic Outer Continental Shelf Offshore New York." BOEM. October 21. Available online at: https://www.boem.gov/NY-EA-FONSI-2016/. Accessed February 14, 2018.

BOEM. 2021. *Guidelines for Lighting and Marking of Structures Supporting Renewable Energy Development.* Available online at: https://www.boem.gov/sites/default/files/documents/renewable-energy/2021-Lighting-and-Marking-Guidelines.pdf.

GlobalSecurity.org. 2018. "Narragansett Bay Complex." Available online at: https://www.globalsecurity.org/military/facility/moa-narra.htm. Accessed March 2021.

NOAA (National Oceanic and Atmospheric Administration). 2016. "Chart 12326." Office of Coast Survey. Available online at: https://charts.noaa.gov/PDFs/12326.pdf. Accessed December 19, 2019.

NYCEDC (New York City Economic Development Corporation). n.d. "New Stapleton Waterfront." Available online at: https://edc.nyc/project/new-stapleton-waterfront. Accessed July 7, 2020.

U.S. Navy. n.d. "CNIC, Naval Weapons Station Earle: Getting Here." Available online at: https://www.cnic.navy.mil/regions/cnrma/installations/nws_earle/about/installation_guide/getting_here.html. Accessed March 27, 2019.

8.10 Marine Energy and Infrastructure

This section discusses the additional marine uses within and surrounding the Project Area, not otherwise addressed in the COP. Potential impacts to these resources or potentially conflicting uses, resulting from construction, operations, and decommissioning of the Project are discussed. Proposed Project-specific measures adopted by Empire as a result of outreach and engagement are also described, which are intended to avoid, minimize, and/or mitigate potential impacts to these resources, which include:

- Offshore energy (renewables and fossil fuels);
- Sand borrow areas and dredge disposal sites;
- Cables and pipelines; and
- Scientific research and surveys.

Other resources and assessments detailed within this COP that are related to these additional marine uses and resources include:

- Commercial and Recreational Fishing (Section 8.8);
- Department of Defense and OCS National Security Maritime Uses (Section 8.9);
- Other Marine Uses (Section 8.11); and
- Navigation Safety Risk Assessment (Appendix DD).

Data Relied Upon and Studies Completed

For the purposes of this section, the Study Area includes the offshore waters and coastlines within and in the vicinity of the Lease Area and the submarine export cable routes (see **Figure 8.10-1**).

These sections relied upon the publicly available information provided by BOEM, the USACE, and NOAA, as well as geophysical data collected by Empire.

8.10.1 Offshore Energy

8.10.1.1 Affected Environment

Offshore Wind

Currently, there is one other offshore wind lease area (OCS-A 0544) within the Study Area, located adjacent to the eastern end of the Lease Area. Lease Area OCS-A 0544 and five other lease areas in the New York Bight were auctioned on February 23 to 25, 2022 (see **Figure 8.10-2**). As these Lease Areas may or may not be built-out, they will not be considered further in this assessment.

BOEM has leased two other areas off the coast of New Jersey. Lease Area OCS-A 0499 is approximately 50 mi (80.5 km) to the southwest of the Empire Lease and is leased to EDF Renewables Development, Inc. as the Atlantic Shores Project (under Atlantic Shores Wind, LLC, a joint venture between EDF Renewables and Shell). Lease OCS-A 0489 is being developed by Ocean Wind, LLC (Ørsted) as the Ocean Wind Project. Furthermore, the closest Lease Area in the Massachusetts WEA is Lease Area OCS-A 0487, which is located more than 100 mi (161 km) to the northeast. These leases are outside of the Study Area and will therefore not be considered further.

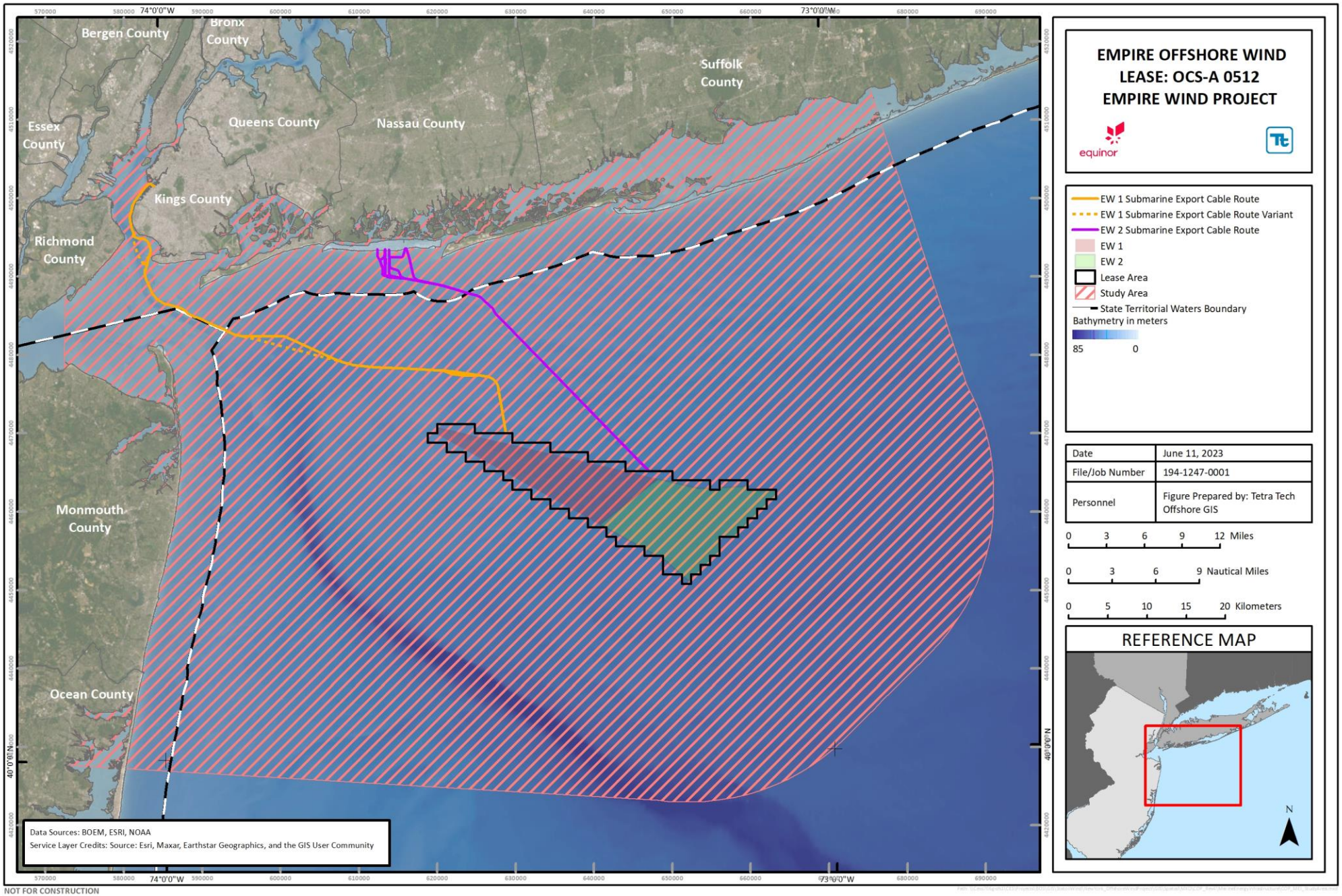

Figure 8.10-1 Marine Energy and Infrastructure Study Area

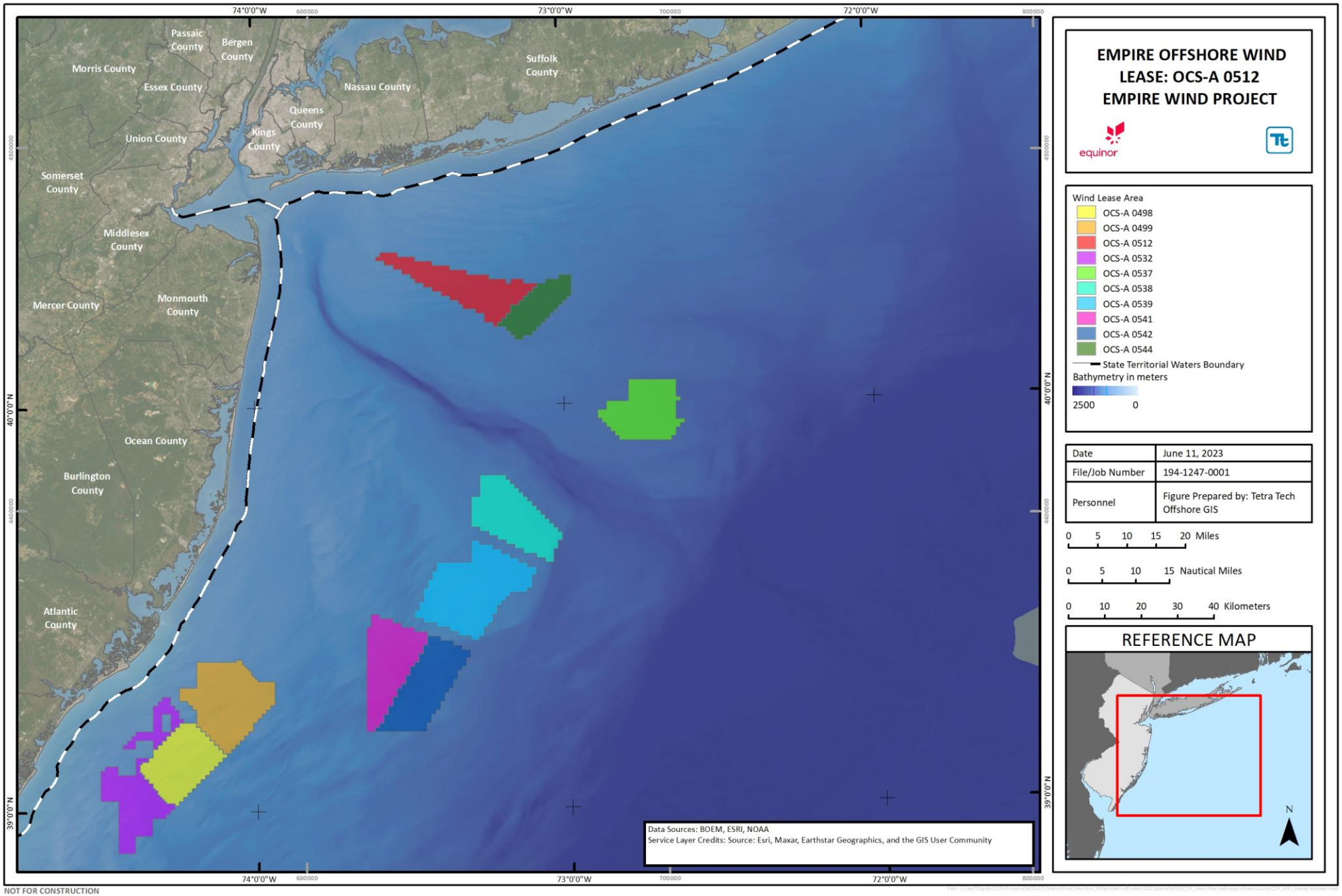

Figure 8.10-2 Offshore Wind Areas in the New York Bight and New Jersey Lease Areas

Oil and Gas Operations

There are currently no active oil and gas lease areas located in the North Atlantic region under the current Outer Continental Shelf Oil and Gas Leasing 5-year program (2017-2022). Under Executive Order 13795 and Secretary's Order 3350, however, BOEM initiated the development process of a new 5-year program (2019-2024). The first of three drafts, released on January 4, 2018, includes a proposed program area in the North Atlantic region (northern Delaware to Maine, see **Figure 8.10-3**) (BOEM 2018a).

In response to the new program, New York State signed legislation A.2572/S.2316, banning offshore drilling in state waters (New York State 2019). Similarly, the state of New Jersey state legislature signed Assembly Bill 839, known as the Shore Tourism and Ocean Protection from Offshore Oil and Gas Act, to prevent drilling in state waters (State of New Jersey 2018). Therefore, oil and gas operations are not anticipated to be proposed within the Study Area and will not be considered further at this time.

8.10.1.2 Impacts Analysis for Construction, Operations, and Decommissioning

Given the preliminary stages of other offshore energy assets in the vicinity of the Study Area at this time, no presence of oil and gas operations, and a low likelihood of future oil and gas exploration in the vicinity of the Study Area, there are no anticipated impacts associated with construction, operations, and decommissioning of the Project. Empire expects BOEM to consider cumulative impacts associated with new leasing of offshore wind areas within the New York Bight as part of the ongoing leasing activity.

8.10.1.3 Summary of Avoidance, Minimization, and Mitigation Measures

As described in Section 8.10.1.2, as no impacts are anticipated to other offshore energy assets and oil and gas operations in the vicinity of the Study Area, avoidance, minimization, and mitigation measures are not proposed.

8.10.2 Sand Borrow Areas and Dredge Disposal Sites

8.10.2.1 Affected Environment

Sand Borrow Areas

BOEM's Marine Minerals Program works to mitigate and replenish erosion along coastlines and related terrain. There are 12 requested and active OCS lease areas for marine minerals, the closest of which is off the coast of Virginia; none are located in the Study Area (BOEM 2018b). The states of New York and New Jersey have also designated additional sand resource areas to help restore coastal erosion and damage that resulted from Superstorm Sandy (BOEM 2014; NJGWS 2019). Sand resource areas represent delineations of areas in the OCS where there is some likelihood that a usable sand resource exists, as identified by survey or some level of study. However, it does not indicate that there are any direct plans to utilize these resources at the present time. None of the identified sand resource areas are located in the Lease Area; however, the two submarine export cable routes will cross, or run adjacent to, portions of sand resource areas (**Figure 8.10-4**).

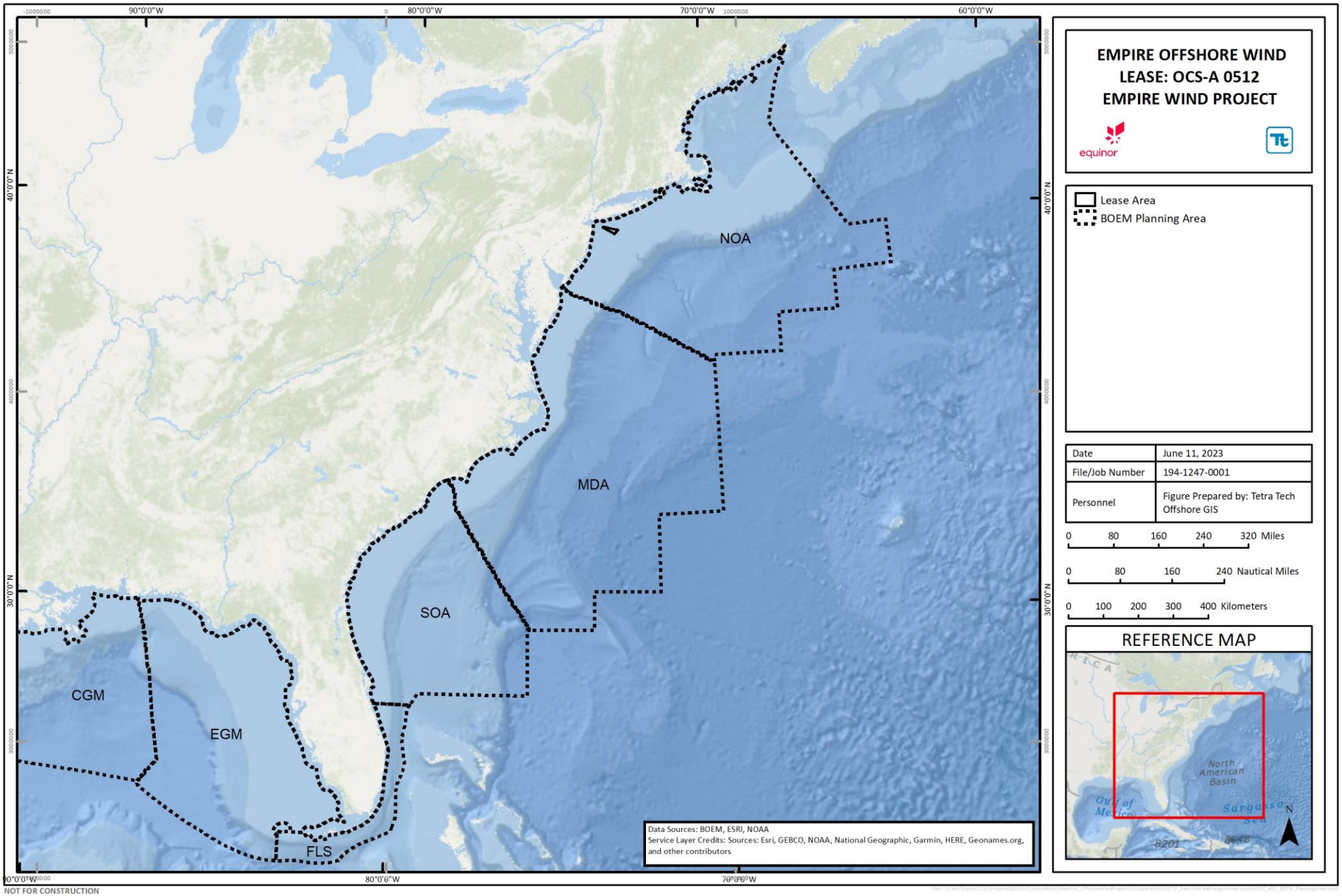

Figure 8.10-3 Five-Year Outer Continental Shelf Oil and Gas Leasing Program Regions (2019-2024)

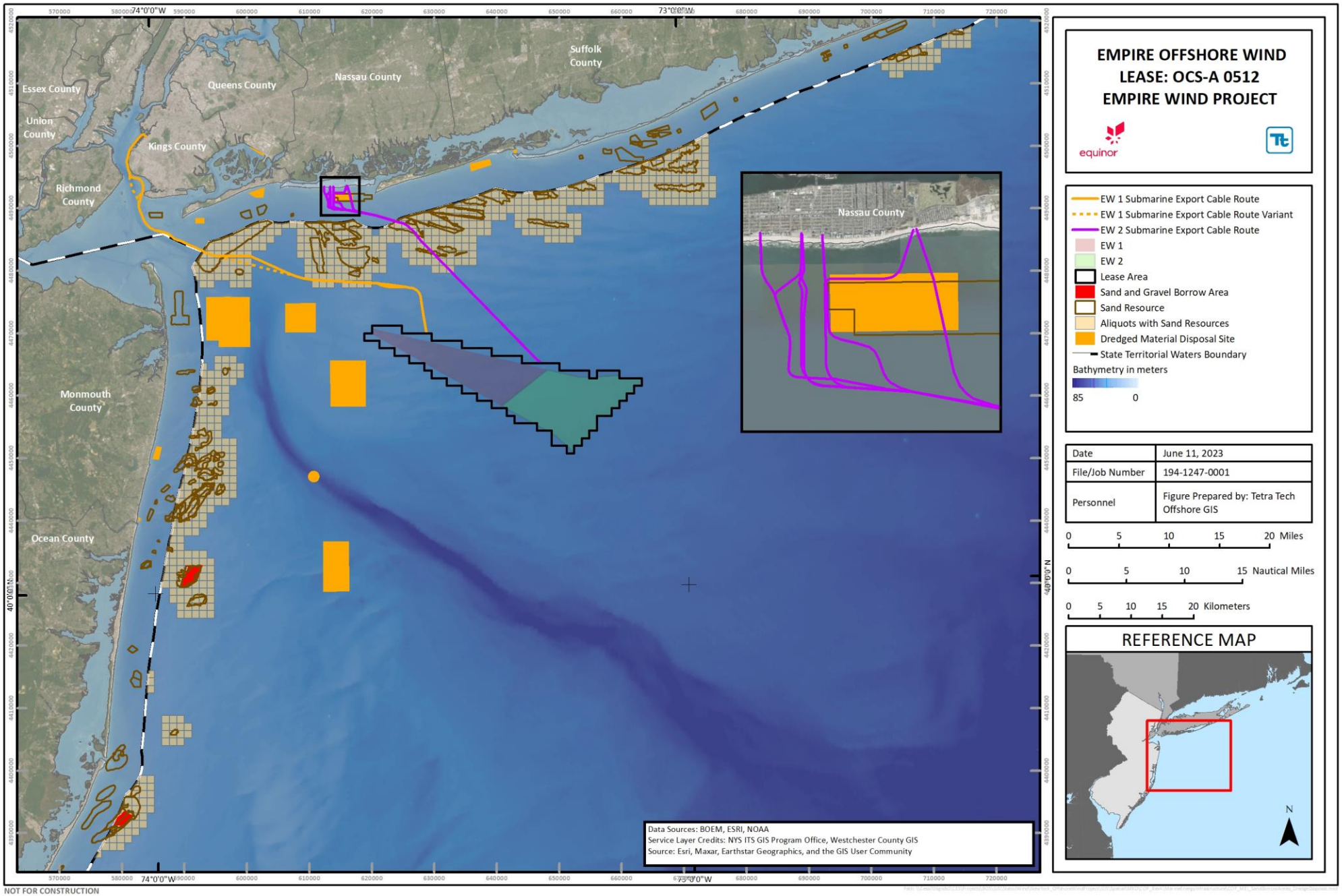

Figure 8.10-4 New York and New Jersey Sand Resource Areas and Ocean Disposal Sites

Discussions with BOEM's Marine Minerals Program indicate that the polygon areas currently identified as sand resources encompass all of the potential areas that could be resources on the OCS, but that all of them will likely not be needed. Additionally, most of the areas identified likely will not be needed as sand resources for many years, as additional work on resource evaluation and delineation is needed. While avoidance of all areas identified as having a potential sand resource along the submarine export cable route is not entirely possible, Empire's cable routing methods include avoiding areas of high sand mobility, further discussed in **Section 4.1 Physical and Oceanographic Conditions**. Therefore, many areas of sand ridges that are considered ideal potential sand resources have been avoided by the Project design. Within the state waters of New York, the EW 1 submarine export cable route avoids a BOEM Marine Minerals Program sand resource area approximately 1.1 nm (2 km) south of Coney Island. Portions of some of the EW 2 submarine export cable routes may traverse a BOEM Marine Minerals Program sand resource area and USACE sand borrow area located approximately 0.5 nm (1 km) south of Long Beach, New York that is collocated with a dredged material disposal site, as discussed in Dredge Disposal Sites.

Dredge Disposal Sites

The use of Ocean Disposal Sites for the dumping of uncontaminated dredged material is authorized through a permit issued by the USACE. The USACE relies on the EPA's ocean dumping criteria when evaluating permit requests for, and implementing federal projects involving, the transportation of dredged material for the purpose of dumping it into ocean waters. There are multiple dredge material disposal sites considered "available" within New York Bight. Several additional sites are categorized as "discontinued" or "unknown"; none are located in the Lease Area (see **Figure 8.10-4**).

The EW 2 submarine export cable route passes through a dredge disposal site off of Long Beach, New York, known as the Jones Inlet Dredged Material Disposal Site, with a status of "available" (Marine Cadastre 2019). Discussions with the USACE indicate that this site is no longer in use. This area is approximately collocated with an area identified by BOEM's Marine Minerals Program as a sand resource. It is understood that material may be placed in this area after it is dredged from Jones Inlet to maintain the channel depth and may later be used for beach replenishment.

8.10.2.2 Impacts Analysis for Construction, Operations, and Decommissioning

The potential impacts resulting from the construction, operations, and decommissioning of the Project are based on the maximum design scenario from the PDE (for a complete description of the construction, operations, and decommissioning activities that Empire anticipates for the Project, see **Section 3**). For sand resource areas and ocean disposal sites, the maximum design scenario is the maximum number of submarine export cables, as described in **Table 8.10-1**. The parameters provided in **Table 8.10-1** represent the maximum potential impact from full Lease Area build-out of EW 1 and EW 2 and incorporates the submarine export cable routes to EW 1 and EW 2.

Table 8.10-1 Summary of Maximum Design Scenario Parameters for Sand Resource Areas and Ocean Disposal Sites

Parameter	Maximum Design Scenario	Rationale
Construction		
Submarine export cables	Based on full build-out of EW 1 and EW 2. EW 1: 40 nm (74 km). EW 2: 26 nm (48 km).	Representative of the maximum length of new submarine export cables to be installed.

Table 8.10-1 Summary of Maximum Design Scenario Parameters for Sand Resource Areas and Ocean Disposal Sites (continued)

Parameter	Maximum Design Scenario	Rationale
Operations		
Submarine export cables	Based on full build-out of EW 1 and EW 2. EW 1: 40 nm (74 km). EW 2: 26 nm (48 km).	Representative of the maximum number and length of submarine export cables to be installed.
Coverage of submarine export cables	Based on 10% of submarine export cables requiring remedial surface protection (other 90% achieving suitable target burial depth).	Representative of the maximum portion of the submarine export cables that would require remedial surface cable protection.

8.10.2.2.1 Construction

During construction, the potential impact-producing factors to sand borrow areas and dredge disposal sites may include:

- Installation of the submarine export cables within these areas (or future areas).

The following impacts may occur as a consequence of the factors identified above:

- Short-term restricted access to sand resources and dredge disposal material.

Restricted access to sand resources and dredge disposal material. Installation of the submarine export cables may result in installation vessels being present within the affected sand resource and dredge disposal sites for a period of time as cables are installed, with temporary restricted access to those areas as vessel safety zones are applied to ensure maritime safety. During this time, extraction of sand resources or dumping will be temporarily restricted. Empire has proactively sited the submarine export cables to avoid active sand borrow and disposal sites to the extent practicable in an effort to avoid impacts. As can be seen in **Figure 8.10-4**, it is not possible to entirely avoid aliquots with sand resources; however, in the event that existing sand resource areas become designated sand borrow sites, Empire will work with the appropriate federal and state agencies to identify opportunities for mitigation.

It is expected, however, that as the submarine export cables only cover less than one percent of the existing sand resource areas off the New York coastline, the likelihood of those areas being designated as sand borrow sites over the export cable routes is low.

8.10.2.2.2 Operations and Maintenance

During operations, the potential impact-producing factors to sand resource areas and dredge disposal sites may include:

- Long-term presence of submarine export cables and associated remedial surface cable protection.

The following impacts may occur as a consequence of the factors identified above:

- Long-term restricted use of these areas due to the presence of submarine export cables and associated remedial surface cable protection.

Restricted use of these areas. During operations, users will be restricted from collecting sand resources from sand borrow areas within the vicinity of the submarine export cables, to avoid uncovering the buried cable or due to the presence of remedial surface cable protection. Furthermore, sampling required by the EPA within the dredge disposal sites will be restricted from occurring within the vicinity of the submarine export cables and/or remedial surface cable protection to avoid making contact with the cable and/or protection. Empire has proactively sited the submarine export cables to avoid active sand borrow sites and disposal sites to the extent practicable in an effort to avoid impacts. As can be seen in **Figure 8.10-4**, it is not possible to entirely avoid sand resource areas; however, in the event that existing sand resource areas are considered for designation as sand borrow areas, Empire will work with the appropriate federal and state agencies to safeguard the export cable assets.

It is expected, however, that as the export cables only cover less than one percent of the existing sand resource areas off the New York coastline, the likelihood of those areas being designated as sand borrow sites over the export cable routes is low. In addition, the very nature of potential sand borrow sites lends itself to a higher likelihood of sufficient cable burial, minimizing the likelihood of remedial surface cable protection.

To avoid unintentional designation of sand borrow sites or dredging of resources over installed submarine export cables, Empire will engage with NOAA to ensure that nautical charts can be updated with the as-laid positions of Project-related cables.

8.10.2.2.3 Decommissioning

Impacts during decommissioning are expected to be similar or less than those experienced during construction, as described in Section 8.10.2.2.1. 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 additional information on the decommissioning activities that Empire anticipates for the Project, please see **Section 3**.

8.10.2.3 Summary of Avoidance, Minimization, and Mitigation Measures

In order to mitigate the potential impact-producing factors described in Section 8.10.2.2, Empire is proposing to implement the following avoidance, minimization, and mitigation measures:

8.10.2.3.1 Construction

During construction, Empire will commit to the following avoidance, minimization, and mitigation measures to mitigate the impacts described in Section 8.10.2.2.1:

- Siting of submarine export cables to avoid sand resource and dredge disposal areas to the extent practicable; and
- Regular installation schedule and location updates in relation to sand resource and dredge disposal areas with the appropriate federal and state agencies and dredge/disposal stakeholders.

8.10.2.3.2 Operations and Maintenance

During operations, Empire will commit to the following avoidance, minimization, and mitigation measures to mitigate the impacts described in Section 8.10.2.2.2:

- Siting of submarine export cables to avoid sand resource and dredge disposal areas to the extent practicable;
- Siting of submarine export cables to maximize the likelihood of sufficient cable burial;
- Provision of as-laid cable positions to NOAA for inclusion in nautical charts; and

- Active engagement with the appropriate federal and state agencies in relation to designation of future sand borrow and disposal sites.

8.10.2.3.3 Decommissioning

Avoidance, minimization, and mitigation measures proposed to be implemented during decommissioning are expected to be similar to those implemented during construction, as described in Section 8.10.2.3.1 and Section 8.10.2.3.2. A full decommissioning plan will be approved by BOEM prior to any decommissioning activities, and avoidance, minimization, and mitigation, measures for decommissioning activities will be proposed at that time.

8.10.3 Cables and Pipelines

8.10.3.1 Affected Environment

Cables

Given the long history of New York Bight as a hub of trans-Atlantic and regional telecommunications activity, there are numerous charted cables within the Lease Area and along the submarine export cable routes. The current status of many of these charted cables is poorly documented in the public domain, including the NOAA charts, with many of the charted cables dating back to telegraph systems installed up to 135 years ago.

There are currently six NOAA-charted submarine cables that cross through the Lease Area, with an additional three uncharted cables identified within the Lease Area during geophysical survey activities. Through the plotting of known active cables and ongoing contact with cable owners, maintenance organizations, and regulators, it is understood that none of the charted cables within the Lease Area are currently in-service. Additionally, the Project has engaged the U.S. Navy Office of Seafloor Cable Protection to ensure that no U.S. DoD cables are located within the Lease Area.

It is anticipated that there will be seven crossings of active or planned cables along the EW 1 submarine export cable route:

- One bundle of two 345 kV HVAC transmission lines buried in the New York Harbor southern utility corridor (treated as one crossing): active;
- Two 138-kV HVAC transmission cable bundles buried in the New York Harbor northern utility corridor (treated as two crossings): active;
- The Neptune Regional Transmission System (Neptune HVDC to Long Beach, New York): active;
- The Poseidon Transmission Cable: planned;
- The Wall, New Jersey to Long Island (Wall-LI) fiber optic telecommunications cable: planned; and
- A possible New York Telephone Cable between Fort Hamilton and Fort Wadsworth was identified during a USACE Freedom of Information Act request, but not found during the HRG survey campaigns: status unconfirmed.

It is also anticipated that the EW 1 submarine export cable route may cross approximately six out-of-service cables, which would not require the specialized crossing techniques planned for crossing pipelines or active cables.

It is anticipated that there will be four crossed active or planned cables along the EW 2 submarine export cable route:

- The FLAG Atlantic South telecommunications cable: active;
- The Poseidon Transmission Cable: planned;
- The Wall-LI telecommunications cable: planned; and
- The Neptune HVDC to Long Beach, New York: planned.

If the EW 2 submarine export cable route comes ashore at the westernmost locations, at the EW 2 Landfall A and/or EW 2 Landfall E sites, there will be a second crossing of the FLAG Atlantic South telecommunications cable. In addition to those cables identified, the submarine export cable routes also cross several charted out-of-service cables and cable areas identified on the NOAA charts. Recent geophysical survey activities have not positively identified cables within the cable areas; however, it is anticipated that that cable crossings may be required in some locations.

Where cable crossings along the submarine export cable routes are identified as necessary, specific crossing methodology will be developed and engineered as the submarine export cable routes become finalized. Cable crossings will require a physical separation, such as a concrete mattress or an exterior protection product installed on the cable. Cable crossing negotiations between the asset owners and Empire are underway and will determine the agreed crossing method (see **Section 3** for additional information on standard cable crossing methodologies).

Pipelines

There are no charted pipelines in the Lease Area, nor were any identified during geophysical survey activities. Given the locations of regional facilities and lack of offshore oil and gas infrastructure in the area, no pipelines are anticipated to occur within the Lease Area.

It is anticipated that there will be nine crossings of active, planned, or out-of-service pipelines along the EW 1 submarine export cable route:

- The Transco Lower New York Bay Lateral gas pipeline: active;
- The Transco Raritan Bay Loop gas pipeline: planned;
- One gas pipeline buried in northern New York Harbor utility corridor: active;
- Two gas pipelines buried in southern New York Harbor utility corridor: active;
- One petroleum product pipeline buried in southern New York Harbor utility corridor: active;
- The deeply tunneled replacement Brooklyn-Staten Island water siphon: active; and
- Two retired and partially dismantled Brooklyn-Staten Island water siphons: out-of-service.

The EW 2 submarine export cable route may cross the active Transco Lower New York Bay Lateral gas pipeline, should the EW 2 submarine export cable route come ashore at the westernmost landfalls, the EW 2 Landfall A and/or EW 2 Landfall E sites. However, the EW 2 submarine export cable route will not cross any pipelines when making landfall at the EW 2 Landfall B or EW 2 Landfall C sites.

Where pipeline crossings are required, specific crossing methodology will be developed and engineered as the submarine export cable routes become finalized. In service pipeline crossings will require a physical separation, such as a concrete mattress or an exterior protection product installed on the cable. Physical separation distance will be negotiated between Empire and the asset owner; discussions are currently underway (see **Section 3** for additional information on standard cable crossing methodologies).

8.10.3.2 Impacts Analysis for Construction, Operations, and Decommissioning

The potential impacts resulting from the construction, operations, and decommissioning of the Project are based on the maximum design scenario from the PDE (for a complete description of the construction, operations, and decommissioning activities that Empire anticipates for the Project, see **Section 3**). For cables and pipelines, the maximum design scenario is the maximum number of submarine export cables and interarray cables, and therefore fixed and buried structures, in the water. The parameters provided in **Table 8.10-2** represent the maximum potential impact from full build-out of the Lease Area of EW 1 and EW 2 and incorporates a total of up to 149 foundations at any of 176 locations within the Lease Area (made up of up to 147 wind turbines and 2 offshore substations); 2 submarine export cable routes to EW 1 and EW 2; and the maximum length of interarray cabling.

Table 8.10-2 Summary of Maximum Design Scenario Parameters for Cables and Pipelines

Parameter	Maximum Design Scenario	Rationale
Construction		
Submarine export cables	Based on full build-out of EW 1 and EW 2. EW 1: 40 nm (74 km). EW 2: 26 nm (48 km).	Representative of the maximum length of new submarine export cables to be installed and the maximum number of cable and pipeline crossings.
Offshore structures	Based on full build-out of EW 1 and EW 2 (147 wind turbines and 2 offshore substations). EW 1: 57 wind turbines and 1 offshore substation. EW 2: 90 wind turbines and 1 offshore substation.	Representative of the maximum number of structures for EW 1 and EW 2.
Interarray cables	Based on full build-out of EW 1 and EW 2, with the maximum number of structures (147 wind turbines and two offshore substations) to connect. EW 1: 116 nm (214 km). EW 2: 144 nm (267 km).	Representative of the maximum length of interarray cables to be installed and maximum number of cable and pipeline crossings.
Anchor Snags Project-related vessels	Based on full build-out of EW 1 and EW 2, which corresponds to the maximum number of structures (147 wind turbines and 2 offshore substations), submarine export and interarray cables, and maximum associated vessels.	Representative of the greatest risk of anchor snags on cables and pipelines from Project-related vessels.
Operations		
Submarine export cables	Based on full build-out of EW 1 and EW 2. EW 1: 40 nm (74 km). EW 2: 26 nm (48 km).	Representative of the maximum number and length of submarine export cables to be installed, maximum number of cable and pipeline crossings, and potential for future crossings over these assets.
Interarray cables	Based on full build-out of EW 1 and EW 2, with the maximum number of structures (147 wind turbines and 2 offshore substations) to connect. EW 1: 116 nm (214 km).	Representative of the maximum length of interarray cables to be installed and likelihood of cable and pipeline crossings.

Parameter	Maximum Design Scenario	Rationale
	EW 2: 144 nm (267 km).	
Project-related vessels Anchor snags	Based on full build-out of EW 1 and EW 2, which corresponds to the maximum number of structures (147 wind turbines and 2 offshore substations), submarine export and interarray cables, and maximum number of vessels and movements for servicing and inspections.	Representative of the maximum predicted Project-related vessels and associated risk of anchor snags on cables and pipelines.

8.10.3.2.1 Construction

During construction, the potential impact-producing factors to cables and pipelines may include:

- Pre-clearance and installation of the submarine export cables and interarray cables.

The following impacts may occur as a consequence of the factors identified above:

- Damage to existing cables and pipelines during pre-clearance, crossings, and/or from Project-related vessels (e.g., anchor snags, jack-up footings).

Disturbance to existing cables and pipelines. During construction and installation, activities including pre-lay grapnel clearance, pre-sweeping and pre-trenching, the lay and burial of submarine export and interarray cables, and foundation installation activities are proposed to occur within the Lease Area and submarine export cable siting corridors. These seabed-disturbing activities have the potential to inadvertently impact existing, unidentified cables and pipelines, though this is unlikely due to the extensive survey reconnaissance performed by Empire.

Empire has planned the routing of the submarine export cable routes to minimize and avoid cable and pipeline crossings to the greatest extent practicable. In addition, where avoidance is not possible, Empire has planned submarine export cable routes to cross existing cables and pipelines at as close to right angles as possible to ensure industry best practice crossings.

All known cables and pipelines potentially impacted by the Project will have engineered crossing methodologies established and documented through crossing agreements prior to construction. Therefore, impacts to existing assets are not anticipated. As described in **Appendix H Marine Site Investigation Report,** Empire has conducted extensive high-resolution geophysical survey, including seabed side-scan sonar imagery, marine magnetic mapping, and sub-bottom profiling throughout the Lease Area and along the submarine export cable routes to confirm the location of known assets and identify any unknown or mis-charted cables or pipelines. Furthermore, pre-installation surveys are proposed to occur along the submarine export cable routes. Additionally, Empire will require briefings be held on Project-related installation vessels with supporting charts and/or geospatial data of the location of existing cables and pipelines to be avoided during anchoring and jack-up operations. Therefore, Empire does not anticipate inadvertent impacts to unknown seabed assets, considering the work conducted to date as well as additional planned work to identify existing assets in the Project Area.

Empire is seeking and will implement negotiated crossing agreements with the asset owner of any cable and pipeline to be crossed, which will use industry-standard techniques to protect both the existing cable or pipeline and Empire's submarine export cables. Empire is also seeking to minimize shoaling of the water depth, and thereby minimizing risk or restriction for mariners in these areas, through the proposed design of these crossing

agreements. Empire has approached all known asset owners to establish crossing principles and agreements and to seek further information on as-laid positions, depths, and additional engineering data. All crossing agreements will be microsited and engineered to avoid or minimize to the extent practicable the potential impacts to any critical features of the crossed asset of concern to the asset owner, such as anodes on a pipeline, or repeaters or other optical bodies in telecommunications cables. Additionally, Empire will provide adequate notice to the asset owner and allow for representation during installation operations at a crossed cable or pipeline.

Empire has also reached out to subsea cable industry owners' organizations, such as the International Cable Protection Committee (ICPC) and the North American Submarine Cable Association (NASCA) to provide the organization's members with the Lease Area and submarine export cable routes for consideration and comments in regards to active or planned subsea cables, in accordance with BOEM recommendations within the COP Guidelines (BOEM 2016).

8.10.3.2.2 Operations and Maintenance

During operations, the potential impact-producing factors to marine energy and infrastructure may include:

- The presence of Project-related cables and associated remedial cable surface protection.

The following impacts may occur as a consequence of the factors identified above:

- Restricted access for inspection, maintenance, and repairs to existing cables and pipelines; and
- Damage to existing cables and pipelines from Project-related vessels (e.g., anchor snags, jack-up footings) during routine and unscheduled maintenance.

Restricted access to existing cables and pipelines. During operations, Empire's submarine export cables will be permanently installed over existing cables and pipelines along the submarine export cable routes. The crossings on the submarine export cable routes will have been installed in accordance with the crossing agreements between Empire and the owner of the crossed asset. The crossing will result in new cable protection material and cables to be located on the seabed and over the cables and pipelines at the crossing. In the unlikely event of a fault to the existing third-party cables and pipelines, the presence of Empire's new cable protection material and submarine export cables will make it more difficult to make the necessary repairs. Empire proposes to implement the following measures to avoid, minimize, and mitigate impacts:

- Negotiated agreements will be in place with the asset owner of any cable or pipeline to be crossed, which will use industry-standard techniques to protect both the existing cable or pipeline and the submarine export cables during all routine maintenance activities; and
- Crossing locations and methodology will be microsited and engineered to avoid or minimize to the extent practicable the potential impacts to any critical features of the crossed asset of concern to the asset owner, such as anodes on a pipeline, or repeaters or other optical bodies in telecommunications cables.

Disturbance to existing cables and pipelines. During operations, Project-related vessels are proposed to occur within the Lease Area and along the submarine export cable routes during routine and unscheduled maintenance activities. These potentially seabed-disturbing activities have the potential to inadvertently impact existing, unidentified cables and pipelines, though this is unlikely, due to the extensive survey reconnaissance performed by Empire.

All known cables and pipelines potentially impacted by the Project will have engineered crossing methodologies established and documented through crossing agreements that will be in place during operations. Therefore, impacts to existing assets are not anticipated. As described in **Appendix H**, Empire has conducted extensive high-resolution geophysical survey, including seabed side-scan sonar imagery, marine magnetic mapping, and sub-bottom profiling throughout the Lease Area and along the submarine export cable routes to confirm the location of known assets and identify any unknown or mis-charted cables or pipelines. Inadvertent impacts to unknown seabed assets are not anticipated.

8.10.3.2.3 Decommissioning

Impacts during decommissioning are expected to be similar or less than those experienced during construction, as described in Section 8.10.3.2.1. 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 additional information on the decommissioning activities that Empire anticipates for the Project, please see **Section 3**.

8.10.3.3 Summary of Avoidance, Minimization, and Mitigation Measures

In order to mitigate the potential impact-producing factors described in Section 8.10.3.2, Empire is proposing to implement the following avoidance, minimization, and mitigation measures.

8.10.3.3.1 Construction

During construction, Empire will commit to the following avoidance, minimization, and mitigation measures to mitigate the impacts described in Section 8.10.3.2.1:

- The siting of the offshore components to minimize and avoid cable and pipeline crossings to the extent practicable;
- When avoidance is not feasible, negotiated crossing agreements with the asset owner of any cable and pipeline to be crossed, which will use industry-standard techniques to protect both the existing cable or pipeline and the submarine export cables;
- When avoidance is not feasible, crossing of cables and pipelines at as close to right angles as possible following industry best practice;
- Crossing locations and methodology will be microsited and engineered to avoid or minimize to the extent practicable the potential impacts to any critical features of the crossed asset, such as anodes on a pipeline, or repeaters or other optical bodies in telecommunications cables. In addition, the crossing methodologies will be engineered to minimize shoaling of the water depth to reduce the navigational risk to mariners;
- Pre- and post-installation surveys at cable and pipeline crossing;
- Briefings with supporting charts and/or geospatial data of Project-related installation vessels of the location of existing cables and pipelines to be avoided during anchoring and jack-up operations; and
- Provision of adequate notice to the asset owner and allowance of representation during installation activities at a crossed cable or pipeline.

8.10.3.3.2 Operations and Maintenance

During operations, Empire will commit to the following avoidance, minimization, and mitigation measures to mitigate the impacts described in Section 8.10.3.2.2:

- Briefings with supporting charts and/or geospatial data for Project-related operations and maintenance vessels on the location of existing cables and pipelines to be avoided during anchoring and jack-up operations;
- Periodic inspections of cable and pipeline crossings to verify integrity of crossing materials and protection; and
- Inclusion of industry-standard terms of engagement, techniques for notification, and access requirements for scheduled and unscheduled maintenance, as part of the negotiated crossing agreement with the asset owner of any cable and pipeline to be crossed.

8.10.3.3.3 Decommissioning

Avoidance, minimization, and mitigation measures proposed to be implemented during decommissioning are expected to be similar to those implemented during construction and operations, as described in Section 8.10.3.3.1 and Section 8.10.3.3.2. A full decommissioning plan will be approved by BOEM prior to any decommissioning activities, and avoidance, minimization, and mitigation measures for decommissioning activities will be proposed at that time.

8.10.4 Scientific Research and Surveys

8.10.4.1 Affected Environment

Within New York Bight, various federal and state organizations regularly conduct scientific research, including aerial and ship-based scientific surveys. NYSERDA has conducted, and continues to conduct, a variety of pre-development, environmental, economic, infrastructure, social, and regulatory studies in support of offshore wind development (NYSERDA 2019). The majority of these studies cover all of New York Bight, which includes the Lease Area. Additionally, extensive studies of the area have been conducted by NOAA and USACE, including seafloor substrate mapping and fisheries studies, which required ship-based surveys. Additional information on NOAA studies conducted in the Lease Area are discussed in **Section 5.5 Benthic Resources and Finfish, Invertebrates, and Essential Fish Habitat**.

8.10.4.2 Impacts Analysis for Construction, Operations, and Decommissioning

The potential impacts resulting from the construction, operations, and decommissioning of the Project are based on the maximum design scenario from the PDE (for a complete description of the construction, operations, and decommissioning activities that Empire anticipates for the Project, see **Section 3**). For scientific research and surveys, the maximum design scenario is the maximum number of wind turbines, submarine export cables, and interarray cables and therefore fixed and buried structures in the water, as described in **Table 8.10-3**. The parameters provided in **Table 8.10-3** represent the maximum potential impact from full build-out of the Lease Area build-out of EW 1 and EW 2 and incorporates a total of up to 149 foundations at any of 176 locations within the Lease Area (made up of up to 147 wind turbines and 2 offshore substations) with two export cable routes to EW 1 and EW 2.

Table 8.10-3 Summary of Maximum Design Scenario Parameters for Scientific Research and Surveys

Parameter	Maximum Design Scenario	Rationale
Construction		
Offshore structures	Based on full build-out of EW 1 and EW 2 (147 wind turbines and 2 offshore substations). EW 1: 57 wind turbines and 1 offshore substation. EW 2: 90 wind turbines and 1 offshore substation.	Representative of the maximum number of structures for EW 1 and EW 2.
Wind turbine foundation	Monopile	Representative of the foundation option that has an installation method that would result in the maximum introduction of underwater noise.
Wind turbine foundation Installation method Underwater noise	Pile driving	Representative of the installation method that would result in the loudest underwater noise generated.
Safety zones Project-related vessels and structures	Based on full build-out of EW 1 and EW 2. Based on the maximum number of structures (147 wind turbines and two offshore substations) and maximum number of associated vessels and safety zones. 1,640 ft (500 m) around relevant structures, activities, and vessels.	Representative of the maximum cumulative area and duration, which has the potential to impact marine users, who will be restricted from entering these areas.
Duration Offshore construction	Based on full build-out of EW 1 and EW 2. Based on the maximum number of structures (147 wind turbines and 2 offshore substations) and maximum period of cumulative duration for installation.	Representative of the maximum period required to install the offshore components, which has the potential to impact resources in, access to, or enjoyment of the Project Area.
Submarine export cables	Based on full build-out of EW 1 and EW 2. EW 1: 40 nm (74 km). EW 2: 26 nm (48 km).	Representative of the maximum length of new submarine export cables to be installed.
Interarray cables	Based on full build-out of EW 1 and EW 2, with the maximum number of structures (147 wind turbines and two offshore substations) to connect. EW 1: 116 nm (214 km). EW 2: 144 nm (267 km).	Representative of the maximum length of interarray cables to be installed.

Table 8.10-3 Summary of Maximum Design Scenario Parameters for Scientific Research and Surveys (continued)

Parameter	Maximum Design Scenario	Rationale
Operations		
Loss of habitat Foundation type	Based on the maximum overall footprint (147 x 39,902 ft^2 [3,707 m^2] for monopiles with scour protection and 2 x 93,560 ft^2 [8,692 m^2] for piled jackets with scour protection). Total 6,052,714 ft^2 (562,315 m^2, 139 acres, 56.2 ha) including scour protection.	Representative of the maximum long-term loss of seabed habitat.
Project-related vessels Collision risk	Based on full build-out of EW 1 and EW 2, including foundations (147 wind turbines and 2 offshore substations), submarine export and interarray cables, and associated vessels. EW 1: 57 wind turbines and 1 offshore substation. EW 2: 90 wind turbines and 1 offshore substation.	Representative of the maximum predicted Project-related vessels for collision risk.
Submarine export cables	Based on full build-out of EW 1 and EW 2. EW 1: 40 nm (74 km). EW 2: 26 nm (48 km).	Representative of the maximum number and length of submarine export cables to be installed.
Interarray cables	Based on full build-out of EW 1 and EW 2, with the maximum number of structures (147 wind turbines and two offshore substations) to connect. EW 1: 116 nm (214 km). EW 2: 144 nm (267 km).	Representative of the maximum length of interarray cables to be installed.

8.10.4.2.1 Construction

During construction, the potential impact-producing factors to scientific and research activities may include:

- Construction of the offshore components, including the foundations, wind turbines, offshore substations, submarine export cables, and interarray cables.

The following impacts may occur as a consequence of the factors identified above:

- Short-term displacement of scientific and research activities due to the implementation of safety zones around Project-related vessels and structures;
- Short-term increase in Project-related vessel traffic during construction;
- Short-term disturbance of local species targeted by scientific and research activities; and
- Short-term seabed disturbance in the Project Area.

Displacement of scientific and research activities due to the implementation of temporary safety zones. Safety zones will likely be implemented around construction activities, as applicable, to ensure the safety

of local mariners, the work crew, and all equipment. Empire proposes to utilize 1,640-ft (500-m) safety zones around relevant structures, activities, and vessels in a dynamic approach, as previously defined for the Block Island Wind Farm (81 FR 31862). Should USCG Safety Zone authorities not extend beyond 12 nm (22 km) at the time of construction, Empire will utilize a combination of safety vessels, LNMs, and COLREGS to promote both awareness of these activities and the safety of the construction equipment and personnel. All areas will be marked and lit in accordance with USCG requirements and monitored by a project support vessel that will be available to assist local mariners. The locations of the safety zones will be posted in LNMs, as well as on the Project website. Vessels will likely not be permitted to enter the safety zone; however, this restrictions will only be short-term. Empire proposes to implement the following measures to avoid, minimize, and mitigate impacts:

- Regular updates to the local marine community through social media, the USCG LNM, and active engagement with applicable stakeholders;
- Use highly visible marking and lighting of active construction sites;
- Implement up to a 1,640-ft (500-m) safety zones around active construction sites; and
- Operate security vessels to monitor and communicate with vessels operating in the area, as necessary.

Increase in Project-related construction vessel traffic. An increase in Project-related construction and support vessel traffic transiting to, from, and within the Lease Area and the submarine export cable routes is anticipated during construction due to the presence of Project-related construction vessels. This increase has the potential to impact the frequency of vessel collisions as a result of the temporary increased congestion of the waterway. Project-related vessels are expected to travel in the existing traffic patterns and within the TSS lanes as much as possible to minimize impacts to the other marine users and to be consistent with other waterway usage. Vessel traffic related to the Project is expected to be minimal in relation to the existing vessel traffic. In addition, no Project activities so far have resulted in interactions with scientific research and surveys in the Lease Area. Empire proposes to implement the following measures to avoid, minimize, and mitigate impacts:

- Project vessels will utilize transit lanes, fairways, and predetermined passage plans consistent with existing waterway uses, to the extent practicable;
- Regular communications and updates with scientific research and survey stakeholders, such as NYSERDA and NOAA Fisheries, on Project-related construction vessel activities; and
- Regular updates to the local marine community through social media, the USCG LNM, and active engagement with applicable stakeholders.

Disturbance of local species targeted by scientific and research activities. Construction activities may also temporarily disturb the distribution of local species, such as birds, marine mammals, and fish, which may therefore impact the results of scientific surveys and research activities. As these species are mobile, they may relocate to nearby areas in order to avoid construction-related noise during these activities. This disturbance will only be temporary, and the species are expected to return to all areas following the completion of construction. See **Section 5.3 Avian Species, Section 5.4 Bat Species, Section 5.5, Section 5.6 Marine Mammals**, and **Section 5.7 Sea Turtles** for additional information on the species that have the potential to be temporarily disturbed during Project activities. In summary, it is expected that displaced mobile species will temporarily relocate to other suitable habitat areas within the wider Study Area and with similar accessibility for the scientific research and survey activities. Impacts to Commercial and Recreational Fishing are discussed in **Section 8.8**.

Disturbance of the seafloor. Installation of the foundations, wind turbines, offshore substations, submarine export cables, and interarray cables will result in the temporary disturbance of the seafloor. As safety zones will

be implemented during construction activities, marine users are expected to be outside of this potential area of effect and are therefore not anticipated to be affected by this temporary disturbance in the Project Area, other than temporarily being restricted from accessing these areas during construction activities.

8.10.4.2.2 Operations and Maintenance

During operations, the potential impact-producing factors to scientific research and surveys may include:

- The presence of fixed structures (e.g., wind turbines and offshore substations); and
- Operations and maintenance vessel traffic.

The following impacts may occur as a consequence of the factors identified above:

- Long-term modification of existing water uses;
- Long-term increase in vessel traffic; and
- Long-term presence of new fixed structures (e.g., wind turbines and offshore substations) in the Lease Area.

Modification of existing water uses. The operation of the wind farm will create a new permanent navigational pattern within the Lease Area (see **Section 8.7 Marine Transportation and Navigation** and **Appendix DD Navigation Safety Risk Assessment** for a discussion of navigation safety). While marine users will be free to transit throughout the wind farm, existing scientific research and surveys may be required to modify patterns. Given the significant lead-time in the process prior to operations, however, federal and state organizations should have ample time to re-adjust patters and activities to be able to work within the wind farm. No changes to existing uses are expected along the submarine export cable routes.

Temporary, localized safety zones may also be implemented around vessels during operations and maintenance activities (e.g., inspections and repairs), as well as a requirement for access of Project-related vessels and personnel to turbine access platforms during routine inspection and maintenance activities. Empire will regularly update the local marine community of temporary safety zones and wind turbine access requirements through the USCG LNM and active engagement with applicable stakeholders. In addition, Empire will mark wind turbines and offshore substations in accordance with IALA O-139, USCG requirements, and the 2021 BOEM Lighting/Marking Guidance, unless a variance is approved by the applicable agency prior to construction (see **Section 3** for additional details on the proposed marking and lighting measures).

Presence of new fixed structures. The presence of new fixed structures within the Lease Area has the potential to attract new and/or additional scientific research and surveys. The foundations may act as artificial reefs and attract marine life, creating new opportunities for scientific research and surveys. This was observed following the installation of the Block Island Wind Farm (Brunetti 2018).

Empire is not proposing to implement exclusion zones within the operational wind farm, with requested "clearance" zones limited to access ladders and platforms on the wind turbines and offshore substations. Empire will supply the positions of fixed structures and safety and clearance zones for the inclusion in navigational charts.

8.10.4.2.3 Decommissioning

Impacts during decommissioning are expected to be similar or less than those experienced during construction, as described in Section 8.10.4.2.1. 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 additional information on the decommissioning activities that Empire anticipates for the Project, please see **Section 3**.

8.10.4.3 Summary of Avoidance, Minimization, and Mitigation Measures

In order to mitigate the potential impact-producing factors described in Section 8.10.4.2, Empire is proposing to implement the following avoidance, minimization, and mitigation measures.

8.10.4.3.1 Construction

During construction, Empire will commit to the following avoidance, minimization, and mitigation measures to mitigate the impacts described in Section 8.10.4.2.1:

- Regular updates to the local marine community through social media, the USCG LNM, and active engagement with applicable stakeholders;
- Use highly visible marking and lighting of active construction sites;
- Implement up to a 1,640-ft (500-m) safety zones around active construction sites; and
- Operate security vessels to monitor and communicate with vessels operating in the area, as necessary.

8.10.4.3.2 Operations and Maintenance

During operations, Empire will commit to the following avoidance, minimization, and mitigation measures to mitigate the impacts described in Section 8.10.4.2.2:

- Provide the location of all above water structures for inclusion in NOAA charts;
- Properly mark wind turbines and offshore substations in accordance with IALA O-139, USCG requirements, and the 2021 BOEM Lighting/Marking Guidance, unless a variance is approved by the applicable agency prior to construction (see **Section 3** for additional details on the proposed marking and lighting measures); and
- Regularly update the local marine community through the USCG LNM and active engagement with applicable stakeholders.

8.10.4.3.3 Decommissioning

Avoidance, minimization, and mitigation measures proposed to be implemented during decommissioning are expected to be similar to those implemented during construction and operations, as described in Section 8.10.4.3.1 and Section 8.10.4.3.2. A full decommissioning plan will be approved by BOEM prior to any decommissioning activities, and avoidance, minimization, and mitigation measures for decommissioning activities will be proposed at that time.

8.10.5 References

Table 8.10-4 Data Sources

Source	Includes	Available at	Metadata Link
BOEM	Lease Area	https://www.boem.gov/BOEM-Renewable-Energy-Geodatabase.zip	N/A
BOEM	State Territorial Waters Boundary	https://www.boem.gov/Oil-and-Gas-Energy-Program/Mapping-and-Data/ATL_SLA(3).aspx	http://metadata.boem.gov/geospatial/OCS_SubmergedLandsActBoundary_Atlantic_NAD83.xml

Table 8.10-4 Data Sources (continued)

Source	Includes	Available at	Metadata Link
BOEM	Sand and Gravel Borrow Area	http://www.boem.gov/Oil-and-Gas-Energy-Program/Mapping-and-Data/Federal-Sand-n-Gravel-Lease-Borrow-Areas_gdb.aspx	https://mmis.doi.gov/boemmmis/metadata/PlanningAndAdministration/LeaseAreas.xml
BOEM	Aliquots with Sand Resources	https://www.boem.gov/Sand-Aliquots-Shapfile/	https://mmis.doi.gov/boemmmis/metadata/PlanningAndAdministration/ATLSandAliquots.xml
BOEM	BOEM Planning Area	https://www.boem.gov/Oil-and-Gas-Energy-Program/Mapping-and-Data/ATL_PLAN(3).aspx	http://metadata.boem.gov/geospatial/ATL_PLAN.xml
BOEM	Area of Interest	https://www.boem.gov/BOEM-Renewable-Energy-Geodatabase.zip	N/A
BOEM	Wind Lease Area	https://www.boem.gov/BOEM-Renewable-Energy-Geodatabase.zip	N/A
NOAA	Dredged Material Disposal Site	ftp://ftp.coast.noaa.gov/pub/MSP/OceanDisposalSites.zip	https://inport.nmfs.noaa.gov/inport/item/54193
NOAA NCEI	Bathymetry	https://www.ngdc.noaa.gov/mgg/coastal/crm.html	N/A

BOEM (Bureau of Ocean Energy Management). 2014. "BOEM and New York State Sign Agreement to Identify Sand Resources for Coastal Resilience and Restoration Planning." Available online at: https://www.boem.gov/press05202014/. Accessed June 26, 2019.

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BOEM. 2018b. Marine Minerals: Requests and Active Leases. Last updated August 27, 2018. Available online at: https://www.boem.gov/Requests-and-Active-Leases/. Accessed June 26, 2019.

BOEM. 2021. *Guidelines for Lighting and Marking of Structures Supporting Renewable Energy Development.* Available online at: https://www.boem.gov/sites/default/files/documents/renewable-energy/2021-Lighting-and-Marking-Guidelines.pdf.

Brunetti, M. 2018. Nations First Wind Farm Creates Fishing, Tourism Hot Spot. Press of Atlantic City. Available online at: https://www.pressofatlanticcity.com/news/breaking/nation-s-first-wind-farm-creates-fishing-tourism-hot-spot/article_8f9ba597-0675-5afe-a08c-6bee92d6b918.html. Accessed July 15, 2019.

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NJGWS (New Jersey Geologic and Water Survey). 2019. Survey Programs. Available online at: https://njgeology.org/functions/index.htm. Accessed June 26, 2019.

NYSERDA (New York State Energy Research and Development Authority). 2019. Studies and Surveys. Available online at: https://www.nyserda.ny.gov/All-Programs/Programs/Offshore-Wind/Studies-and-Surveys. Accessed June 25, 2019.

New York State. 2019. Governor Andrew M. Cuomo. Available online at: https://www.governor.ny.gov/news/governor-cuomo-joined-billy-joel-signs-bill-ban-offshore-drilling-new-york-waters. Accessed June 26, 2019.

State of New Jersey. 2018. Assembly, No. 839. Available online at: https://www.njleg.state.nj.us/2018/Bills/A1000/839_R2.PDF. Accessed June 26, 2019.

White House. 2021. "FACT SHEET: Biden Administration Jumpstarts Offshore Wind Energy Projects to Create Jobs." Available online at: https://www.whitehouse.gov/briefing-room/statements-releases/2021/03/29/fact-sheet-biden-administration-jumpstarts-offshore-wind-energy-projects-to-create-jobs/. Accessed April 6, 2021.

8.11 Other Coastal and Marine Uses

This section describes other coastal and marine resources, including offshore wildlife viewing, underwater recreational activities (e.g., diving), surface-based marine recreational activities, and recreational boating. Potential impacts to coastal marine uses resulting from construction, operations, and decommissioning of the Project are discussed. Proposed project specific measures adopted by Empire are also described, which are intended to avoid, minimize, and/or mitigate potential impacts to coastal and marine resources.

Other marine uses discussed in separate sections include:

- Recreation and Tourism (Section 8.3);
- Marine Transportation and Navigation (Section 8.7);
- Commercial and Recreational Fishing (Section 8.8); and
- Marine Energy and Infrastructure (Section 8.10).

This section also addresses public enjoyment of natural and cultural resources that are further described and evaluated in the following sections:

- Water Quality (e.g., water activities) (Section 4.2);
- Avian Species (e.g., birds) (Section 5.3);
- Marine Mammals (e.g., whales) (Sections 5.6);
- Marine Cultural Resources (e.g., shipwrecks) (Section 6.1); and
- Visual Resources (Section 7).

Data Relied Upon and Studies Completed

For the purposes of this section, the Study Area includes the offshore waters and coastlines within and in the vicinity of the Lease Area and the EW 1 and EW 2 submarine export cable routes (see **Figure 8.11-1**).

This section relied upon regional sources, including the Northeast Ocean Data Portal and the Mid-Atlantic Data Portal, and local state sources, including local press articles, the NYSERDA New York State Offshore Wind Master Plan studies and appendices, the NJDEP Division of Fish and Wildlife, and the New Jersey Audubon.

8.11.1 Affected Environment

The affected environment is defined as the coastal and offshore areas that have the potential to be directly affected by the construction, operations, and decommissioning of the Project. This includes the Lease Area and the submarine export cable routes. Permits necessary for the improvement of port and construction/staging facilities will be the responsibility of the owners of these facilities. Empire expects such improvements will broadly support the offshore wind industry and will be governed by applicable environmental standards, which Empire will comply with in using the facilities.

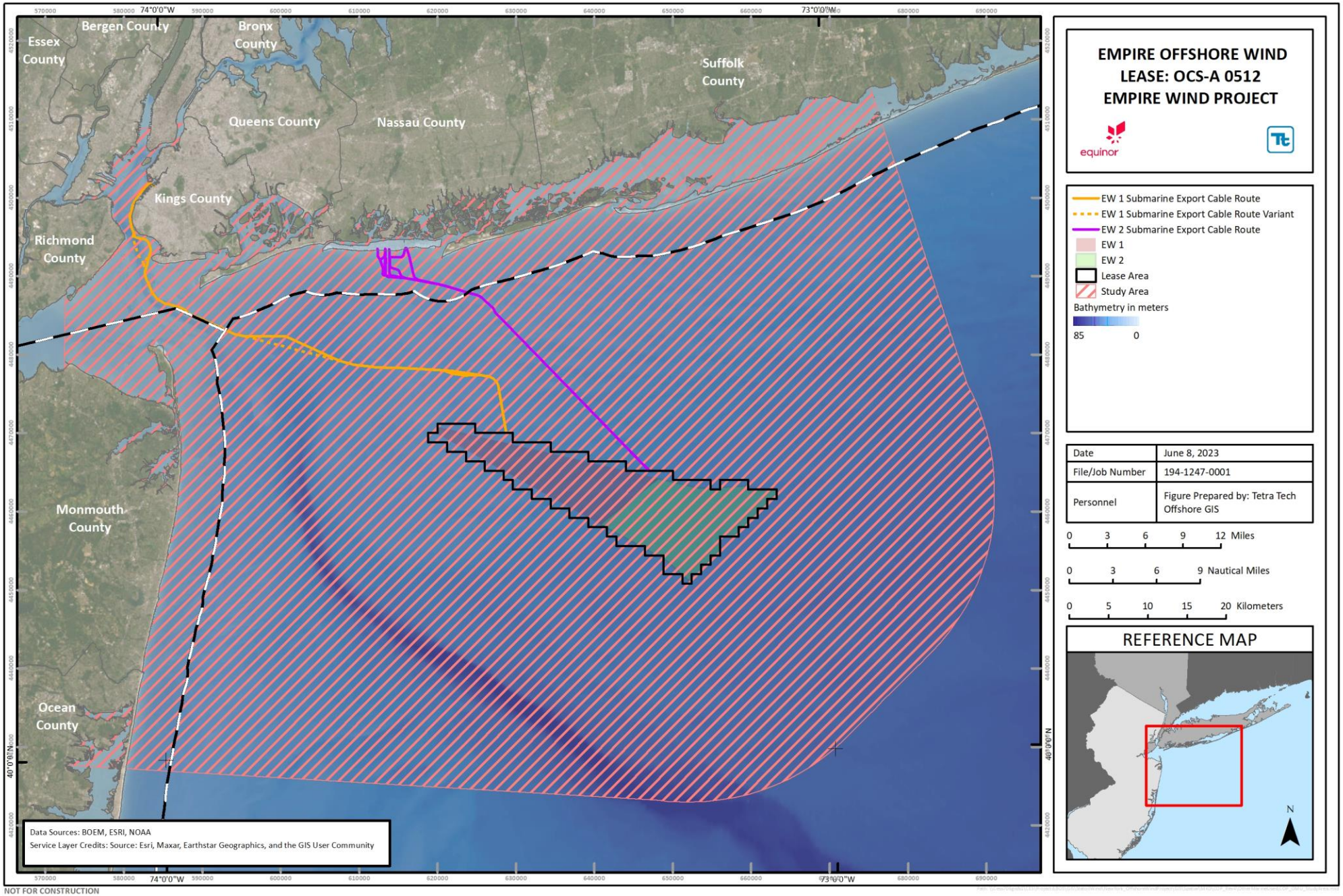

Figure 8.11-1 Other Coastal and Marine Uses Study Area

8.11.1.1 Offshore Wildlife Viewing

Offshore wildlife viewing, specifically for birds and whales, is a popular activity off the coasts of New York and New Jersey between the spring and fall migrations. Offshore wildlife viewing occurs both from onshore locations as well as through chartered trips. **Figure 8.11-2** shows areas identified as popular wildlife viewing sites in relation to and within the vicinity of the Study Area.

Within and surrounding the Study Area, offshore bird watching is typically conducted in conjunction with recreational boating and fishing activities and/or charter wildlife viewing activities (see **Figure 8.11-2)**. Most charters take place during the seasonal bird migratory period starting in the spring and ending in the fall, though occasionally trips take place in January and February (NYSERDA 2017). Charters that take place following storms are also popular, as strong winds are known to bring rare offshore species in closer to shore (NYSERDA 2017). In New Jersey, winds from the west are known to push migrating birds towards the coast during the spring and fall (White 2016). In the winter, the peninsula in Sandy Hook is a popular site to observe species offshore (White 2016).

While most bird watching occurs offshore, shore-based bird watching is also a popular activity. Popular shore-based bird watching areas extend from Jones Beach to the Fire Island National Seashore in New York and across the Gateway National Recreation Area, which includes Jamaica Bay and the Sandy Hook peninsula (White 2016).

Whale watching in the vicinity of the Project Area predominately extends out from New York Harbor and throughout New York Bight (see "General" commercial whale watching areas in **Figure 8.11-2**). Charters occur between the spring and fall migrations. Early in the season (i.e., spring), charters routinely frequent areas off the coast of New Jersey and transition to areas off the coast of Long Island later in the season, as sightings off New Jersey decline (see "Dominant" commercial whale watching areas in **Figure 8.11-2**) (Radel 2019; NYSERDA 2017). Due to good weather and an increased chance of viewing whales, July and August are the busiest months for whale watching (NYSERDA 2017). Off the coast of New Jersey, whale watching peaks again in November, during the fall migration south to warmer waters (Goldman 2017). During this peak season, vessels can make between three to five trips per day, most days of the week. Typically, whale watching charter vessels in the vicinity of the Project Area are greater than 65 ft (20 m) and hold between 100 to 300+ passengers (NYSERDA 2017). Whale watching is more frequent in the vicinity of the submarine export cable routes, as compared to the Lease Area (**Figure 8.11-2**).

8.11.1.2 Underwater Recreation

In the waters off New York and New Jersey, underwater recreation (e.g., diving and snorkeling) occurs year-round, although most activity occurs between May and October, when visibility is good (NYSERDA 2017; Nagiewicz and Segars 1986). Shore-based diving may extend into November (NYSERDA 2017). Most of the underwater recreation in the vicinity of the Project Area is located within 12 nm (22 km) of the coast and outside of the Lease Area (NYSERDA 2017).

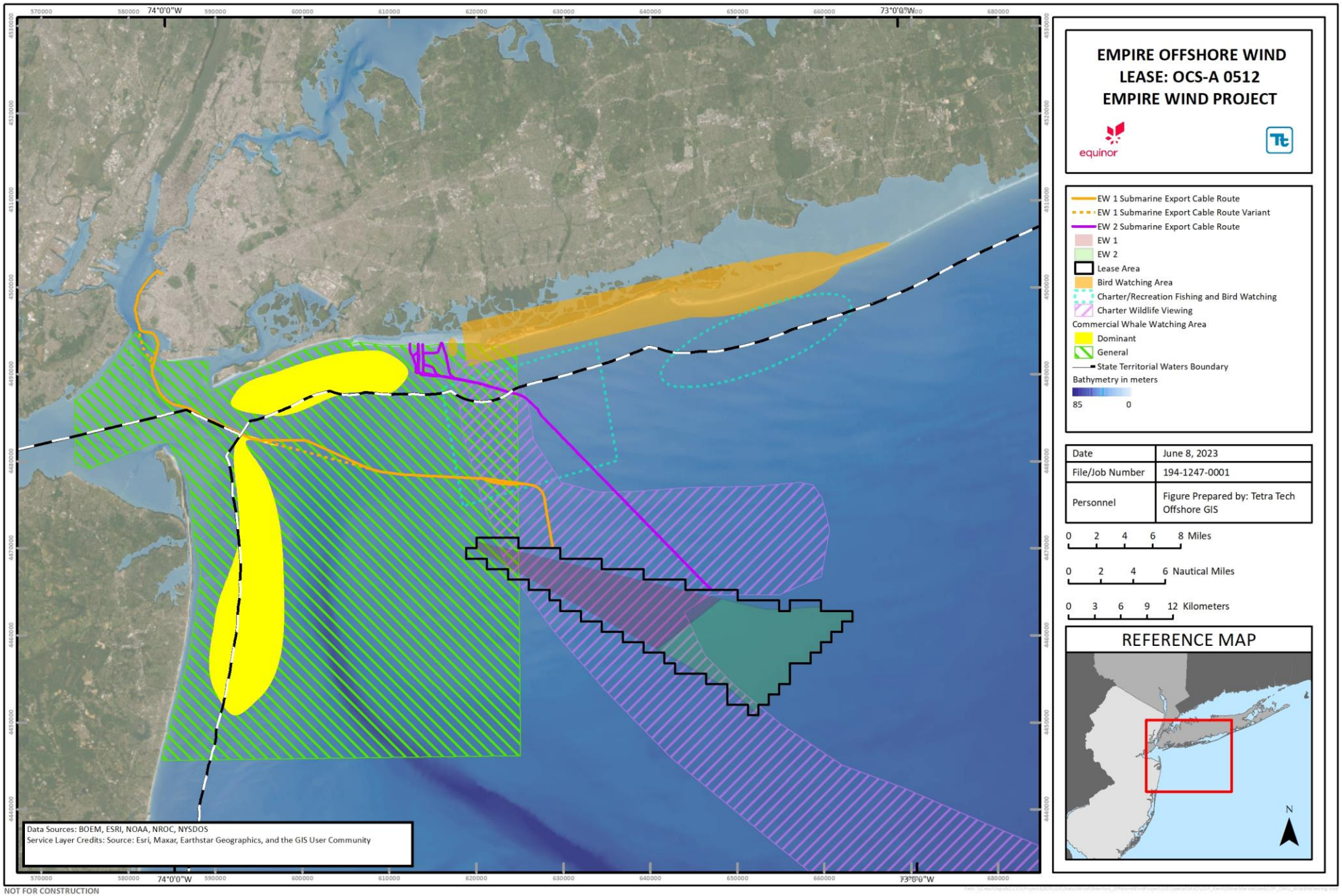

Figure 8.11-2 Wildlife Viewing

Note that as the data in this figure is provided by the NYSDOS, it is not inclusive of all areas in New Jersey.

Recreational divers typically target shipwrecks, artificial reefs, canyons, and underwater wildlife to engage in photography, exploration, and fishing (NYSERDA 2017). Popular recreational diving reefs can be found off the coast of New York and New Jersey and are typically located around or within the 3-nm (5.6-km) boundary. Offshore diving in the vicinity of the Project Area, however, is centered around wrecks, with new artificial reefs actively being created through both New York and New Jersey state programs (New Jersey Division of Fish & Wildlife 2019; Galiano 2018). In August 2019, New York launched the second largest artificial reef expansion in state history (Office of Governor Cuomo 2019). Throughout New York Bight, there is an estimated 4,000 to 7,000 shipwrecks (Galiano 2018). Within the Hudson Shelf Valley, a zone stretching from Long Island to Brooklyn into northern New Jersey and known as Wreck Valley, hundreds of shipwrecks exist (Bennet 2008). In a study completed by the Surfrider Foundation in 2014, it was reported that a majority of dive sites record at least 50 visitors per year (Surfrider Foundation 2014). Popular reef and wreck sites are shown in relation to the Project Area in **Figure 8.11-3.**

8.11.1.3 Surface-Based Marine Recreation

Surface-based marine recreation (e.g., swimming, surfing, kayaking/paddle boarding, windsurfing, and kite boarding) is popular along the New York coast. Similar to underwater recreation, surface-based marine recreation can occur year-round; however, most activity occurs in the summer months (Diamond 2019; NYSERDA 2017). Locations and intensity of surface water-based activities in relation to the Project are shown in **Figure 8.11-4**; intensity of use is based upon the number of responses that NYSERDA received that reported water-based recreation within each block (NYSERDA 2017).

In New York, most of the surface-based marine recreation occurs off Long Island, with high density use recorded along the Rockaways, Long Beach, Jones Beach, and Fire Island (NYSERDA 2017). Surfing along the New York coastline is popular along Long Beach, the western edge of Jones Beach Island, Cedar Beach, and Robert Moses State Park (Mid-Atlantic Ocean Data Portal 2018).

8.11.2 Impacts Analysis for Construction, Operation, and Decommissioning

The potential impacts resulting from the construction, operations, and decommissioning of the Project are based on the maximum design scenario from the PDE (for a complete description of the construction, operations, and decommissioning activities that Empire anticipates for the Project, see **Section 3**). For marine and coastal uses, the maximum design scenario is based on the full build-out of the Lease Area of EW 1 and EW 2 and incorporates a total of up to 149 foundations at any of 176 locations within the Lease Area (made up of up to 147 wind turbines and 2 offshore substations) with 2 submarine export cable routes to EW 1 and EW 2, as described in **Table 8.11-1**.

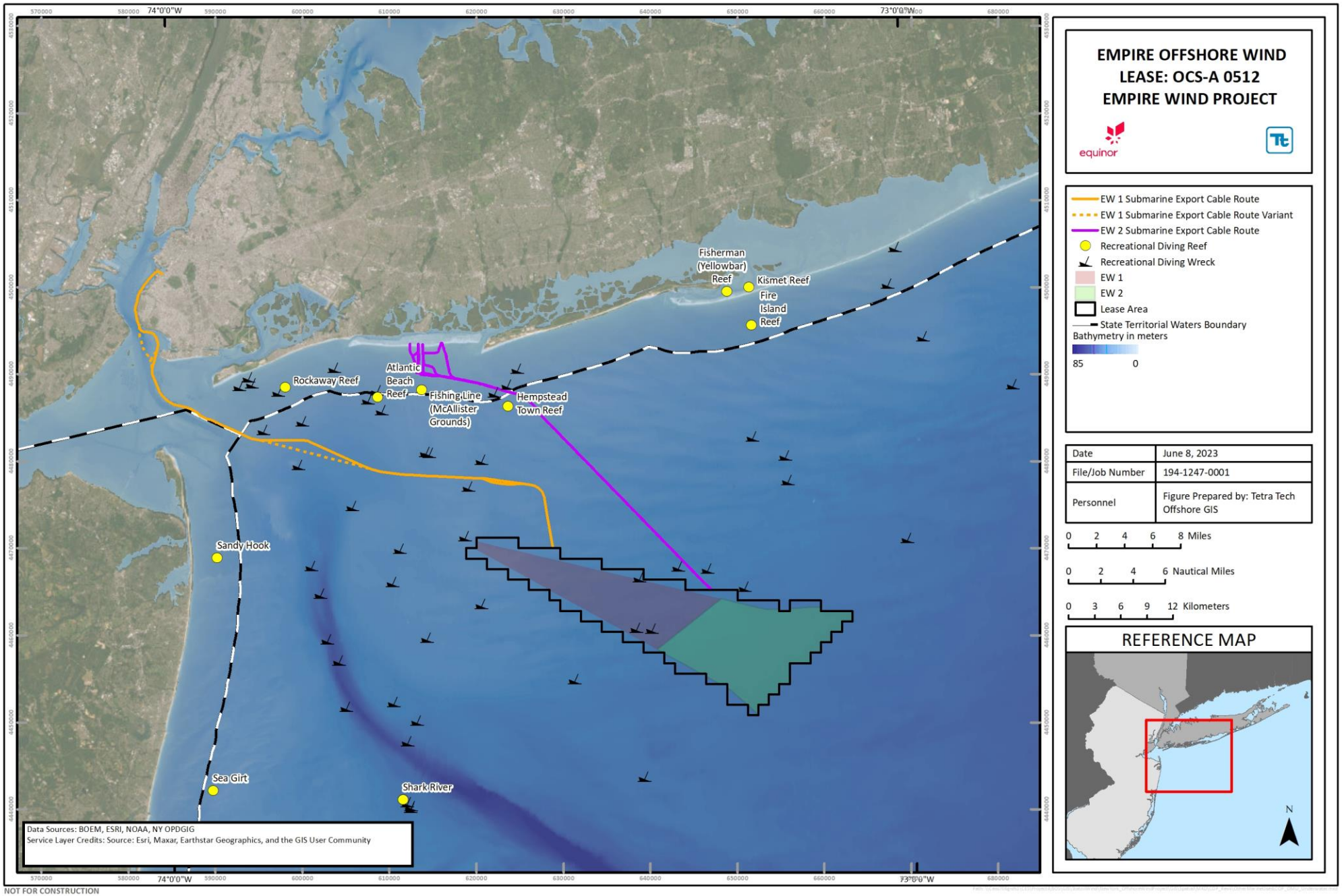

Figure 8.11-3 Underwater-Based Activities

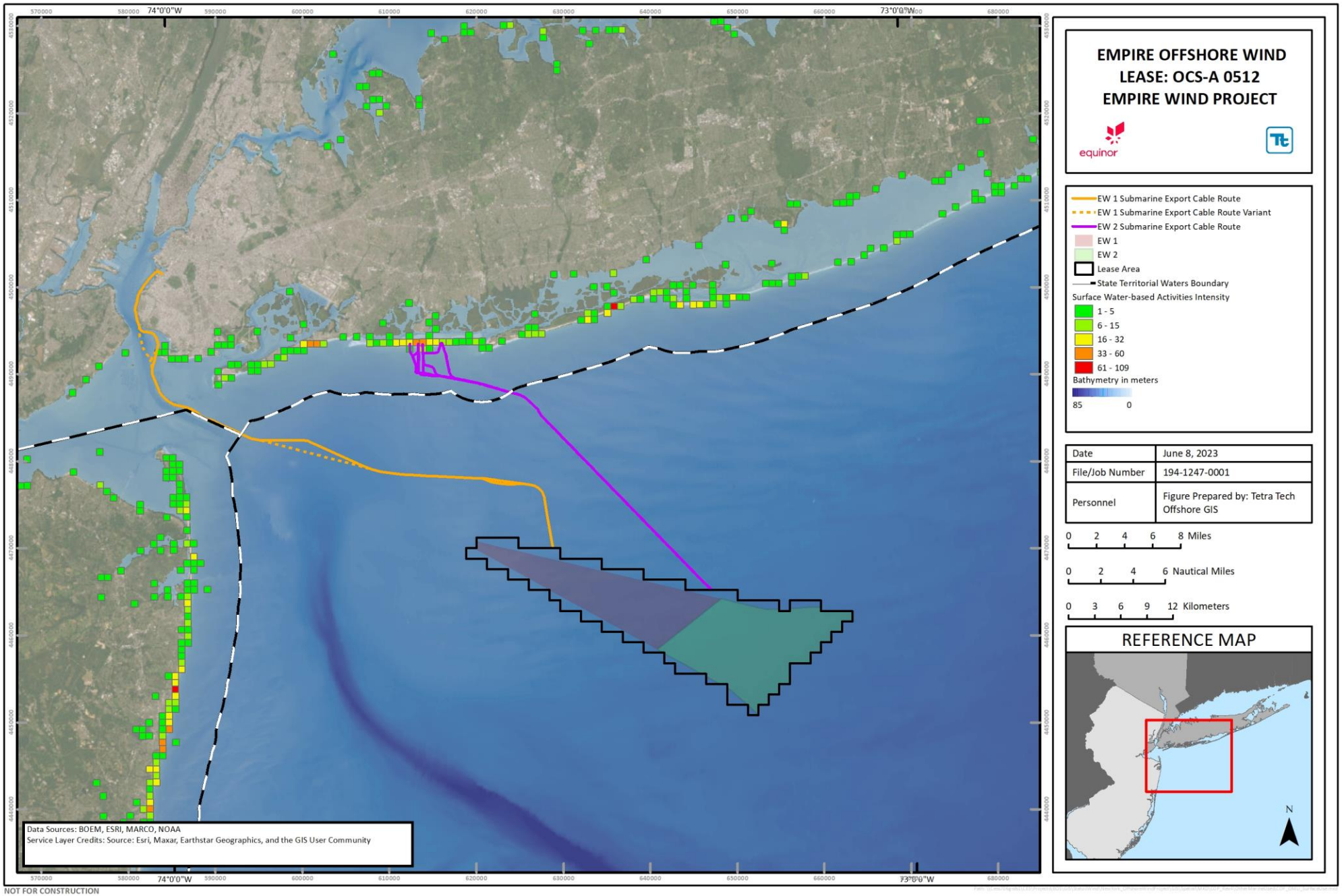

Figure 8.11-4 Surface Water-Based Activities

Table 8.11-1 Summary of Maximum Design Scenario Parameters for Marine and Coastal Uses

Parameter	Maximum Design Scenario	Rationale
Construction		
Offshore structures	Based on full build-out of EW 1 and EW 2 (147 wind turbines and 2 offshore substations). EW 1: 57 wind turbines and 1 offshore substation. EW 2: 90 wind turbines and 1 offshore substation.	Representative of the maximum number of structures for EW 1 and EW 2.
Wind turbine foundation	Monopile	Representative of the foundation option that has an installation method that would result in the maximum introduction of underwater noise.
Wind turbine foundation Installation method Underwater noise	Pile driving	Representative of the installation method that would result in the loudest underwater noise generated.
Nearshore Export cable landfall installation	Trenching and cofferdams	Representative of the maximum disturbance associated with export cable landfall installation, which would potentially impact the enjoyment of nearshore resources.
Safety zones Project-related vessels and structures	Based on full build-out of EW 1 and EW 2, including foundations (147 wind turbines and 2 offshore substations), submarine export and interarray cables, and maximum number of associated vessels and safety zones. EW 1: 57 wind turbines and 1 offshore substation. EW 2: 90 wind turbines and 1 offshore substation. 1,640 ft (500 m) around relevant structures, activities, and vessels.	Representative of the maximum cumulative area and duration, which has the potential to impact recreation and tourism users, who will be restricted from entering marine areas.
Duration Offshore construction	Based on full build-out of EW 1 and EW 2, including foundations (147 wind turbines and 2 offshore substations), submarine export and interarray cables, and associated vessels. EW 1: 57 wind turbines and 1 offshore substation. EW 2: 90 wind turbines and 1 offshore substation.	Representative of the maximum period required to install the offshore components, which has the potential to impact resources in, access to, or enjoyment of the Project Area.

Table 8.11-1 Summary of Maximum Design Scenario Parameters for Marine and Coastal Uses (continued)

Parameter	Maximum Design Scenario	Rationale
Operations		
Offshore Structures	Based on full build-out of EW 1 and EW 2 (147 wind turbines and 2 offshore substations). EW 1: 57 wind turbines and 1 offshore substation. EW 2: 90 wind turbines and 1 offshore substation.	Representative of the presence of new fixed structures in an area that previously had none.
Project-related vessels Collision risk	Based on full build-out of EW 1 and EW 2, including foundations (147 wind turbines and 2 offshore substations), submarine export and interarray cables, and associated vessels. Based on maximum number of vessels and movements for servicing and inspections.	Representative of the maximum predicted Project-related vessels for collision risk.
Offshore O&M activities	Based on full build-out of EW 1 and EW 2, including foundations (147 wind turbines and 2 offshore substations), submarine export and interarray cables, and the maximum amount of Project-related activities expected per year.	Representative of the maximum amount of activities from the Project during the O&M phase.

8.11.2.1 Construction

During construction, the potential impact-producing factors to marine uses may include:

- Construction of the offshore components, including the foundations, submarine export cables, and interarray cables; and
- Construction of the export cable landfall, including open cut trenching, HDD, or Direct Pipe installation.

The following impacts may occur as a consequence of the factors identified above:

- Short-term increase in Project-related vessel traffic during construction;
- Short-term displacement of marine users due to the implementation of safety zones around Project-related vessels and structures;
- Short-term disturbance of and restriction to nearshore and beach areas during export cable installation;
- Short-term changes in water quality;
- Short-term disturbance and displacement of local species targeted for wildlife viewing; and
- Short-term habitat disturbance in the Project Area.

Increase in construction vessel traffic. An increase in Project-related construction and support vessel traffic transiting to, from, and within the Lease Area and submarine export cable routes is anticipated during construction. Project-related vessels are expected to travel in the existing traffic patterns and within the TSS lanes as much as possible to minimize impacts to the other marine users and to be consistent with other waterway usage. In addition, Empire proposes to utilize 1,640-ft (500-m) safety zones around relevant structures, activities, and vessels in a dynamic approach, as previously defined for the Block Island Wind Farm (81 FR 31862). Should USCG Safety Zone authorities not extend beyond 12 nm (22 km) at the time of

construction, Empire will utilize a combination of safety vessels, LNMs, and COLREGS to promote both awareness of these activities and the safety of the construction equipment and personnel. Potential impacts from an increase in Project-related vessel traffic to commercial and recreational vessel traffic are further discussed in **Section 8.7 Marine Transportation and Navigation and Appendix DD Navigation Safety Risk Assessment**. As described further in **Section 8.7**, the change in vessel numbers transiting to/from the Lease Area against baseline levels is anticipated to be negligible and is unlikely to be noticed or felt by other marine users during construction.

Empire will provide regular updates of construction activities and potentially closed areas to the local marine community through the Project website, social media, the USCG LNM and active engagement with other stakeholders.

Displacement of marine users due to the implementation of temporary safety zones. Empire proposes to utilize 1,640-ft (500-m) safety zones around relevant structures, activities, and vessels in a dynamic approach, as previously defined for the Block Island Wind Farm (81 FR 31862). Should USCG Safety Zone authorities not extend beyond 12 nm (22 km) at the time of construction, Empire will utilize a combination of safety vessels, LNMs, and COLREGS to promote both awareness of these activities and the safety of the construction equipment and personnel. Construction safety zones and/or partially installed structures will be marked and lit in accordance with USCG requirements and where appropriate as determined by task specific risk assessments, monitored by a project support vessel that will be available to assist local mariners. The locations of the safety zones will be posted in USCG LNMs, as well as on the Project website. Pending expansion of existing USCG authorities, vessels will not be permitted to enter the safety zone without express consent from Empire. This is intended for the safety of all marine users. Marine users associated with the "affected environment" will likely be restricted from accessing marine locations by the application of these safety zones; however, these restrictions will be short-term, localized, and temporary. Empire is considering safety zones as part of ongoing engagement with maritime users, to minimize the extent of the affected area at any point in time.

Empire will provide regular updates of construction activity and safety zones to the local marine community through the Project website, social media, the USCG LNM and active engagement with other stakeholders.

Short-term disturbance of and restriction to nearshore and beach areas during export cable installation. During construction, nearshore and beach areas may be temporarily disturbed for the installation of the export cables. As the preferred method of installation for EW 2 is trenchless (HDD or Direct Pipe), disturbance should be limited to the onshore HDD/Direct Pipe work area, avoiding beach areas to the extent practicable. Impacts to associated parking lots will be minimized to the extent practicable. However, the EW 2 Landfall C proposes to utilize the Lido Beach West Town Parking lot and Park for the onshore landfall work area and a portion of the onshore export cable. While the preferred installation method for EW 1 is open-cut trench, the export cable landing is proposed to occur on a privately owned property and activities will be consistent with other industrial activities that may be occurring in this area; therefore, access to the public should not be restricted. In addition, whereas the EW 2 nearshore areas are used for recreational bathing, surfing and other recreation watersports, the EW 1 nearshore area does not support these recreational activities. To ensure the safety of the public during onshore construction activities, safety zones around the construction staging areas will be set up, which the public will not be allowed to enter for their own safety. These safety zones will be temporary. Empire will also provide regular updates on construction activity and safety zones to the community through the Project website, social media, the USCG LNM and active engagement with Maritime Association of the Port of New York / New Jersey Harbor Safety, Navigation, and Operations Committee.

Short-term decreases in water quality. During construction, water quality has the potential to be impacted through the potential introduction of constituents of concern, including through the potential disturbance of seafloor sediment, potential for oil and fuel spills and releases, and the potential for inadvertent returns associated with HDD activities (see **Section 4.2 Water Quality** for additional information). Potential impacts to water quality during construction are expected to be short-term and localized, however. Project-related vessels will be subject to USCG regulations about wastewater and discharges and will operate in compliance with oil spill prevention and response plans that meet USCG requirements. Empire has also developed an Oil Spill Response Plan (**Appendix F**) and an Inadvertent Return Plan, which detail all measures proposed to avoid inadvertent releases and spills and a protocol to be implemented should a spill event occur. Decreases in water quality has the potential to impact marine users along the EW 2 nearshore areas, as these areas are used for recreational bathing, surfing, and other recreation watersports. As these areas do not contain known constituents of concern, impacts are expected to be negligible. As the EW 1 nearshore area does not support these recreational activities, impacts to marine users are not anticipated. Additional information can be found in **Section 8.12 Public Health and Safety**.

Disturbance of local species of interest. Construction activities may temporarily disturb the distribution of local species, such as birds, marine mammals, and fish, which may therefore impact the ability for marine users to enjoy these species. Short-term disturbance of these resources and the mitigation applied to avoid, reduce or mitigate impacts are described further in **Section 5 Biological Resources and Habitats**. In summary, it is expected that displaced mobile species will temporarily relocate to other suitable habitat areas within the wider Study Area and with similar accessibility for the marine user groups. Impacts to commercial and recreational fishing are discussed in **Section 8.8 Commercial and Recreational Fishing**.

Short-term disturbance of habitat. Installation of the foundations, wind turbines, offshore substations, submarine export cables, and interarray cables will result in the temporary disturbance of the seafloor. **Section 5.5 Benthic Resources and Finfish, Invertebrates, and Essential Fish Habitat** describes how potential impacts to habitats through disturbance will be addressed; for example, Empire will site Project-related components to avoid sensitive habitats, wrecks, reefs, and other structures that support offshore marine uses to the extent practicable.

8.11.2.2 Operations and Maintenance

During operations, the potential impact-producing factors to marine and coastal uses may include:

- The presence of fixed structures (e.g., wind turbines, offshore substations, submarine export cables, and interarray cables); and
- Operations and maintenance vessel traffic.

The following impacts may occur as a consequence of the factors identified above:

- Long-term modification of existing water uses;
- Long-term increase in vessel traffic; and
- Long-term presence of new fixed structures (e.g., wind turbines and offshore substations) in the Lease Area.

Modified existing water uses. The operation of the Project will create a new permanent navigational pattern within the Lease Area (see **Section 8.7** and **Appendix DD** for a discussion of navigation safety). As recreational marine users will be free to transit throughout the wind farm, however, existing uses will be able to continue. No changes to existing uses are expected along the submarine export cable routes. In addition, the presence of

Project-related vessels in close proximity to the operational wind farm will provide a positive beneficial impact through the provision of immediate emergency assistance to marine users in distress in the event of an emergency situation.

During operations and maintenance activities, Empire also proposes to utilize 1,640-ft (500-m) safety zones around relevant structures, activities, and vessels in a dynamic approach, as previously defined for the Block Island Wind Farm (81 FR 31862). Should USCG Safety Zone authorities not extend beyond 12 nm (22 km) at the time of construction, Empire will utilize a combination of safety vessels, LNMs, and COLREGS to promote both awareness of these activities and the safety of the Project-related equipment and personnel. Empire will regularly update the local marine community of temporary safety zones and wind turbine access requirements through the USCG LNM and active engagement with Maritime Association of the Port of New York/New Jersey Harbor Safety, Navigation, and Operations Committee. In addition, Empire will mark wind turbines and offshore substations in accordance with IALA O-139, USCG requirements, and the 2021 BOEM Lighting/Marking Guidance, unless a variance is approved by the applicable agency prior to construction (see **Section 3** for additional details on the proposed marking and lighting measures).

Increase in vessel traffic. During operations and maintenance, Empire is proposing to utilize a combination of CTVs and SOVs to complete operations and maintenance activities. The increase is negligible in comparison to the average traffic observed in the Study Area due to the presence of high traffic shipping lanes throughout the New York Bight (see **Section 8.7** and **Appendix DD** for additional information). In addition, the presence of Project-related vessels is also deemed to have positive beneficial impacts, for example in the provision of trained first response to marine users in distress.

Presence of new fixed structures. The presence of new fixed structures within the Lease Area has the positive beneficial potential to attract new and/or additional marine users to the area. The wind turbines may create a new demand for sightseeing trips and charter tours. This was observed following the installation of the Block Island Wind Farm, with local vessel owners using their vessels full-time to take tourists to view the windfarm (Brunetti 2018). The presence of the new fixed structures is also not anticipated to impact surface-based marine activities reliant on wind and other ocean conditions (e.g., surfing) due to wake effects (for additional information on wake effect impacts is provided in **Section 4.1 Physical and Oceanographic Conditions).**

Impacts to existing wildlife viewing activities are not anticipated, on the basis that the Lease Area is not located within the dominant whale and bird watching areas (see **Section 8.11.1** and **Figure 8.11-2**) and that the operational export cables will not affect access opportunities. Additionally, the foundations may act as artificial reefs and attract marine life, creating new recreational dive sites and recreational fishing destinations. Empire is not proposing to implement exclusion zones within the operational wind farm, with requested "clearance" zones limited to access ladders and platforms on the wind turbines and offshore substations when in use. Empire will supply the positions of fixed structures and safety and clearance zones for the inclusion in navigational charts.

8.11.2.3 Decommissioning

Impacts during decommissioning are expected to be similar or less than those experienced during construction, as described in Section 8.11.2.1. 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 additional information on the decommissioning activities that Empire anticipates for the Project, please see **Section 3**.

8.11.3 Summary of Avoidance, Minimization, and Mitigation Measures

In order to mitigate the potential impact-producing factors described in Section 8.11.2, Empire is proposing to implement the following avoidance, minimization, and mitigation measures.

8.11.3.1 Construction

During construction, Empire will commit to the following avoidance, minimization, and mitigation measures to mitigate the impacts described in Section 8.11.2.1:

- Implement safety zones up to 1,640 ft (500 m) around active construction sites;
- Operate security/support vessels, where appropriate, to monitor and communicate with vessels operating in the area during periods of construction activity;
- Use highly visible marking and lighting of active construction sites;
- Regular updates to the local marine community through Project websites, social media, the USCG LNM and active engagement with other stakeholders; and
- Site Project-related components to avoid sensitive habitats, wrecks, reefs, and other structures that support offshore marine uses to the extent practicable.

8.11.3.2 Operations and Maintenance

During operations and maintenance, Empire will commit to the following avoidance, minimization, and mitigation measures to mitigate the impacts described in Section 8.11.2.2:

- Marking of wind turbines and offshore substations in accordance with IALA O-139, USCG requirements, and the 2021 BOEM Lighting/Marking Guidance, unless a variance is approved by the applicable agency prior to construction (see **Section 3** for additional details on the proposed marking and lighting measures);
- Vessels will not be restricted from entering the operational wind farms areas, and as a result these structures may attract local charters for sightseeing and recreational fishing;
- Provision of locations of structures for inclusion in NOAA charts; and
- Regular updates to the local marine community through the USCG LNM and active engagement with other stakeholders.

8.11.3.3 Decommissioning

Avoidance, minimization, and mitigation measures proposed to be implemented during decommissioning are expected to be similar to those implemented during construction and operations, as described in Section 8.11.3.1 and Section 8.11.3.2. A full decommissioning plan will be approved by BOEM prior to any decommissioning activities, and avoidance, minimization, and mitigation measures for decommissioning activities will be proposed at that time.

8.11.4 References

Table 8.11-2 Data Sources

Source	Includes	Available at	Metadata Link
BOEM	Lease Area	https://www.boem.gov/BOEM-Renewable-Energy-Geodatabase.zip	N/A
	State Territorial Waters Boundary	https://www.boem.gov/Oil-and-Gas-Energy-Program/Mapping-and-Data/ATL_SLA(3).aspx	http://metadata.boem.gov/geospatial/OCS_SubmergedLandsActBoundary_Atlantic_NAD83.xml
MARCO	Surface Water-based Activities Intensity	http://portal.midatlanticocean.org/static/data_manager/data-download/Zip_Files/Recreation/CoastalRecSurvey/REG_Surfacewater_PUG_final.zip	http://portal.midatlanticocean.org/static/data_manager/metadata/html/CoastalRec_REG_Surfacewater_PUG_final.html
NOAA	Recreational Diving Reef	ftp://ftp.coast.noaa.gov/pub/MSP/ArtificialReefs.zip	https://inport.nmfs.noaa.gov/inport/item/54191
NOAA NCEI	Bathymetry	https://www.ngdc.noaa.gov/mgg/coastal/crm.html	N/A
Northeast Ocean Data	Commercial Whale Watching Area	http://www.northeastoceandata.org/files/metadata/Themes/Recreation.zip	http://www.northeastoceandata.org/files/metadata/Themes/Recreation/CommercialWhaleWatchingAreas.pdf
NY OPDGIG	Recreational Diving Wreck	https://opdgig.dos.ny.gov/	http://opdgig.dos.ny.gov/geoportal/catalog/search/resource/detailsnoheader.page?uuid={4990846B-A419-486B-AA9F-A7D770382832}
NY OPDGIG	Recreational Wildlife Viewing	http://opdgig.dos.ny.gov/	http://opdgig.dos.ny.gov/geoportal/catalog/search/resource/detailsnoheader.page?

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8.12 Public Health and Safety

This section describes the public health and safety issues relevant to the Project, including accidents, public access, hazardous materials, non-routine events, and electric and magnetic fields (EMF). Potential impacts to public health and safety resulting from construction, operation, and decommissioning of the Project are discussed. Proposed measures adopted by Empire, which are intended to avoid, minimize, and/or mitigate potential impacts to public health and safety, are also described.

Other sections in which public health and safety issues are discussed include:

- Physical Oceanography and Meteorology (Section 4.1.1);
- Water Quality (Section 4.2);
- Air Quality (Section 4.3);
- Land Transportation and Traffic (Section 8.5);
- Aviation (Section 8.6);
- Marine Transportation and Navigation (Section 8.7);
- Marine Energy and Infrastructure (Section 8.10);
- Oil Spill Response Plan (Appendix F);
- Safety Management System (Appendix G);
- Navigation Safety Risk Assessment (Appendix DD);
- Offshore Electric and Magnetic Field Assessment (Appendix EE); and
- Offshore Electric and Magnetic Field Assessment (Appendix FF).

Data Relied Upon and Studies Completed

For the purposes of this section, the Study Area includes the offshore waters and onshore areas within and in the vicinity of the Lease Area and submarine export cables (Offshore Study Area; **Figure 8.12-1**) and a 0.25-mi (0.4-km) buffer around the EW 1 and EW 2 onshore export and interconnection cable routes, onshore substations, and O&M Base[19] (Onshore Study Areas; **Figure 8.12-2**, and **Figure 8.12-3**).

In order to fully evaluate the potential impacts to public health and safety, the Project completed an EMF assessment for both the offshore and onshore components. The assessment utilized Project-specific details to model the magnetic-field levels associated with the operation of the submarine export cables, interarray cables, and onshore export cables that will transport the electricity generated by the Project (see **Appendix EE Offshore Electric and Magnetic Field Assessment** and **Appendix FF Onshore Electric and Magnetic Field Assessment** for additional information).

[19] 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.

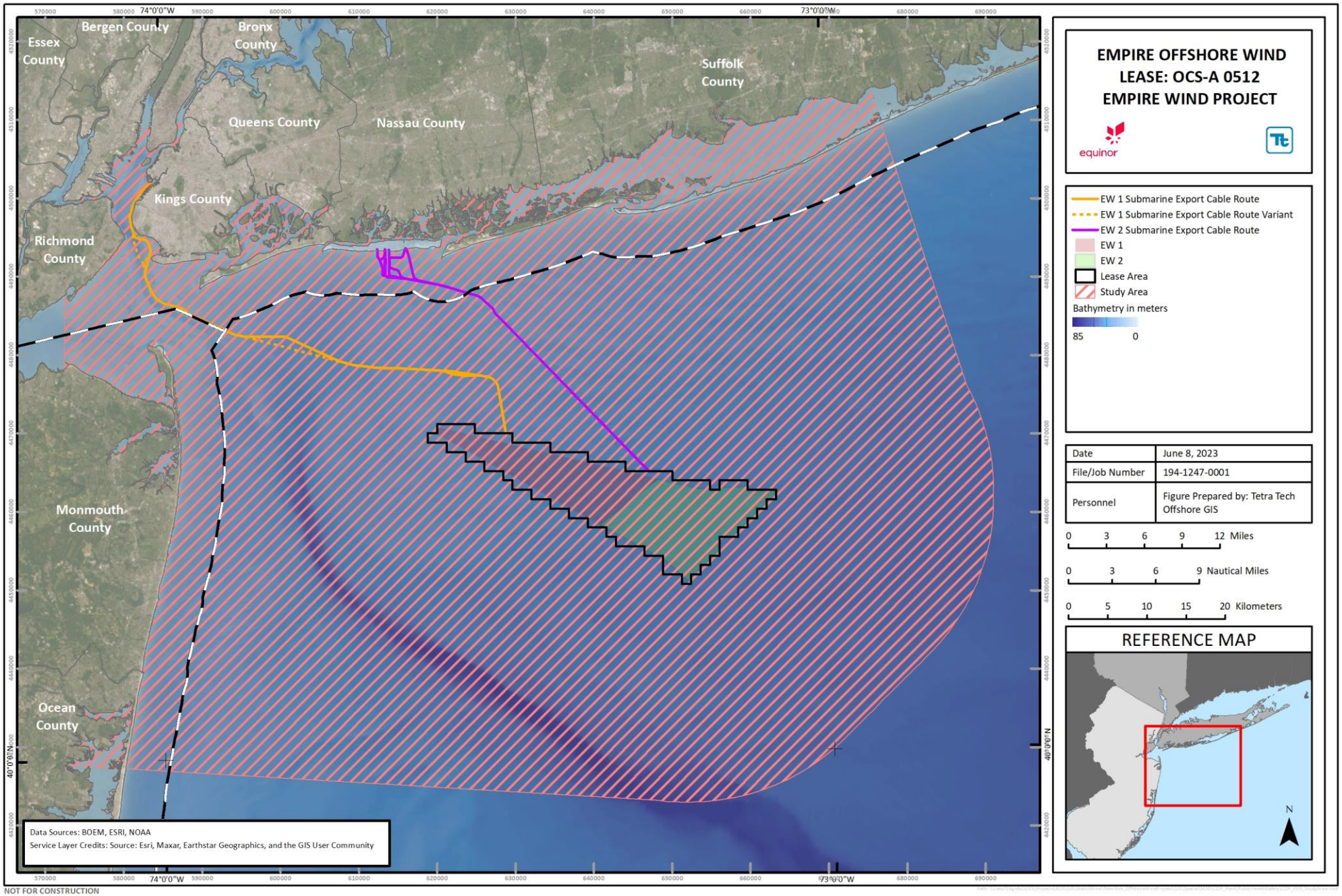

Figure 8.12-1 Public Health and Safety Offshore Study Area

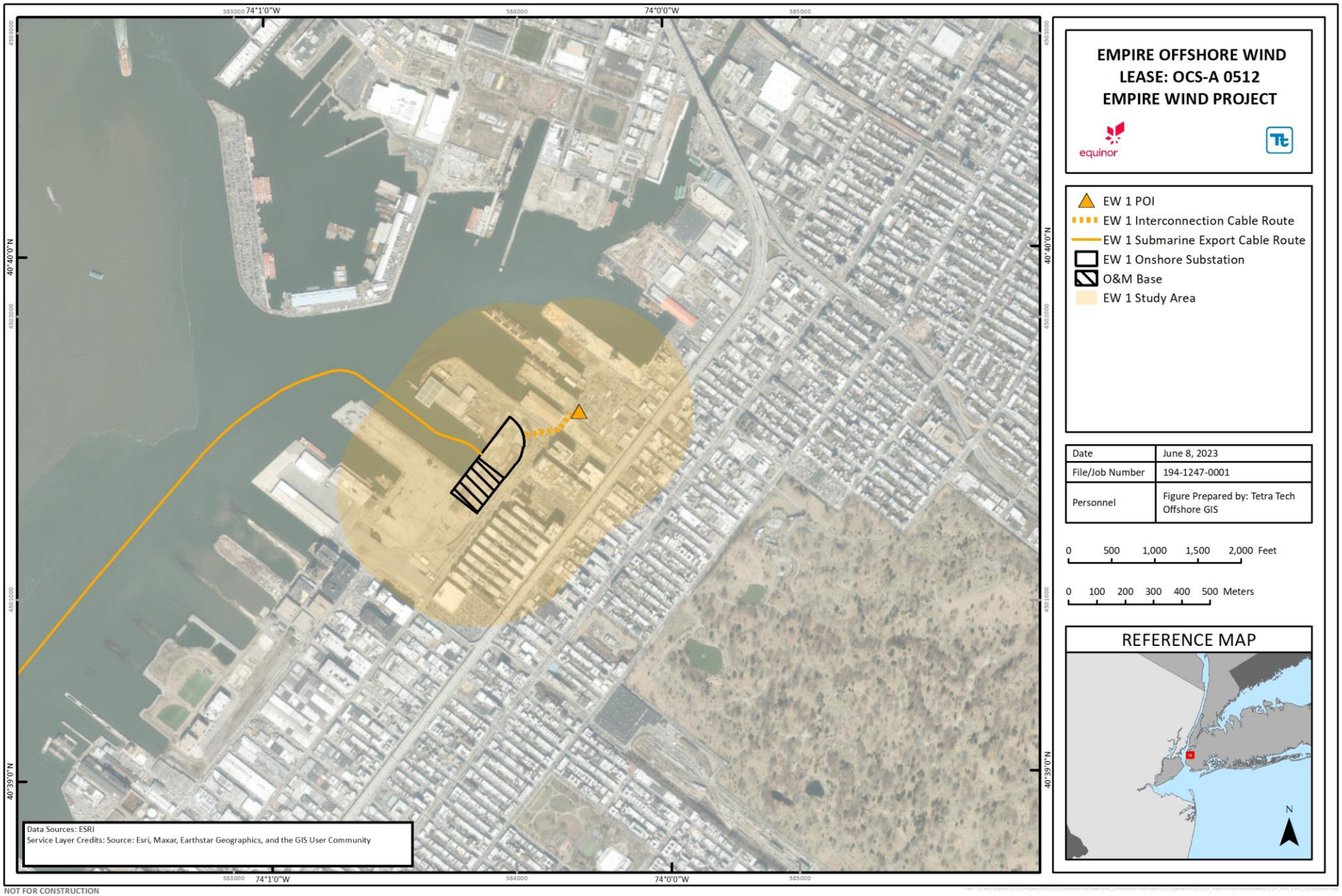

Figure 8.12-2 EW 1 Public Health and Safety Onshore Study Area

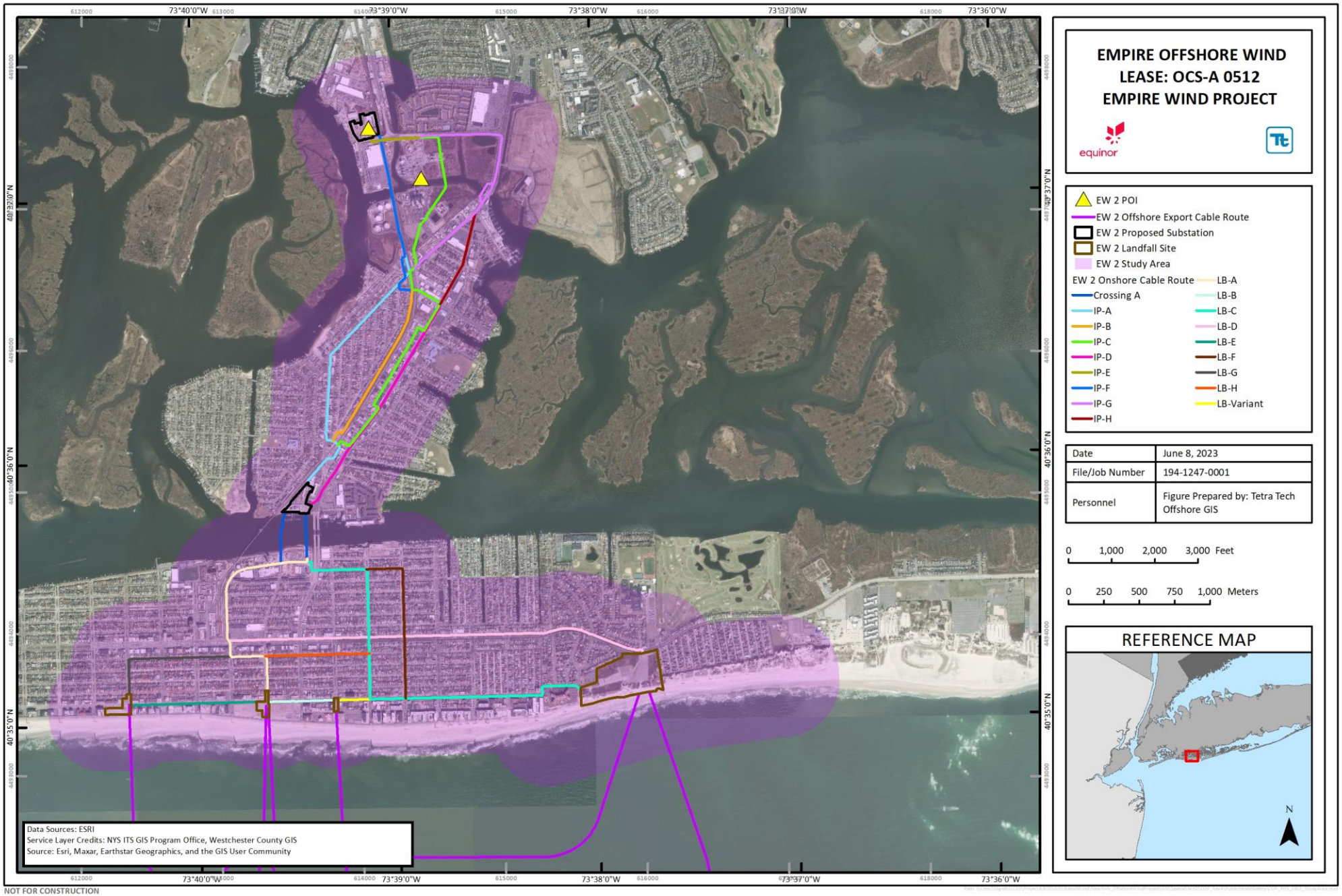

Figure 8.12-3 EW 2 Public Health and Safety Onshore Study Area

8.12.1 Affected Environment

The affected environment is defined as the onshore and offshore areas that have the potential to be directly affected by the construction, operation, and decommissioning of the Project. The affected environment as it relates to public health and safety depends on the location of facilities in relation to existing infrastructure, public areas, and user and community groups that may be affected by health and safety risks associated directly or indirectly with the Project. This includes the Lease Area and associated infrastructure (e.g., the foundations, wind turbines, offshore substations, and submarine export and interarray cables), and the onshore areas around the EW 1 and EW 2 onshore export and interconnection cables, onshore substations, and O&M Base (see **Figure 8.12-2** and **Figure 8.12-3**).

In addition, Empire intends to utilize several local ports and construction and staging areas to support construction and operation activities, as well as maintaining a staffed O&M Base. Permits necessary for the improvement of port and construction/staging facilities will be the responsibility of the owners of these facilities. Empire expects such improvements will broadly support the offshore wind industry and will be governed by applicable environmental standards, which Empire will comply with in using the facilities (see **Section 3.4** and **3.5** for additional information).

8.12.2 Impacts Analysis for Construction, Operations, and Decommissioning

The potential impacts resulting from the construction, operations, and decommissioning of the Project are based on the maximum design scenario from the PDE (for a complete description of the construction, operations, and decommissioning activities that Empire anticipates for the Project, see **Section 3**). For the purposes of this section, the maximum design scenario is based on the full build-out of the Lease Area of EW 1 and EW 2 and incorporates a total of up to 149 foundations at any of 176 locations within the Lease Area (up to 147 wind turbines and 2 offshore substations), with export cable routes to EW 1 and EW 2 and the associated onshore facilities. **Table 8.12-1** summarizes the maximum design scenario parameters for public health and safety.

Table 8.12-1 Summary of Maximum Design Scenario Parameters for Public Health and Safety

Parameter	Maximum Design Scenario	Rationale
Construction		
Submarine export cables	Based on full build-out of EW 1 and EW 2. EW 1: 40 nm (74 km). EW 2: 26 nm (48 km).	Representative of the maximum length of new submarine export cables to be installed.
Interarray cables	Based on full build-out of EW 1 and EW 2, with the maximum number of structures (147 wind turbines and 2 offshore substations) to connect. EW 1: 116 nm (214 km). EW 2: 144 nm (267 km).	Representative of the maximum length of interarray cables to be installed.

Table 8.12-1 Summary of Maximum Design Scenario Parameters for Public Health and Safety (continued)

Parameter	Maximum Design Scenario	Rationale
Offshore structures	Based on full build-out of EW 1 and EW 2 (147 wind turbines and two offshore substations). EW 1: 57 wind turbines and 1 offshore substation. EW 2: 90 wind turbines and 1 offshore substation.	Representative of the maximum number of structures.
Wind turbine foundation	Monopile	Representative of the foundation option that has an installation method that would result in the maximum introduction of underwater noise.
Wind turbine foundation Installation method Underwater noise	Pile driving	Representative of the installation method that would result in the loudest underwater noise generated.
Duration Offshore construction	Based on full build-out of EW 1 and EW 2, including foundations (147 wind turbines and 2 offshore substations), submarine export and interarray cables, and maximum period of cumulative duration for installation. EW 1: 57 wind turbines and 1 offshore substation. EW 2: 90 wind turbines and 1 offshore substation.	Representative of the maximum period required to install the offshore components, which has the potential to impact access to the Project Area.
Project-related vessels Collision risk	Based on full build-out of EW 1 and EW 2, including foundations (147 wind turbines and 2 offshore substations), submarine export and interarray cables, and associated vessels. EW 1: 57 wind turbines and 1 offshore substation. EW 2: 90 wind turbines and 1 offshore substation.	Representative of the maximum predicted Project-related vessels for collision risk.
Onshore export and interconnection cables	Based on the development of EW 1 and EW 2. EW 1: 0.2 mi (0.4 km). EW 2: 5.6 mi (9.1 km).	Representative of the maximum length of onshore export and interconnection cables to be installed.
Onshore substations	Based on the development of EW 1 and EW 2. EW 1: 10.8-ac (4.4-ha) area. EW 2: 6.4-ac (2.6-ha) area.	Representative of the maximum area to be utilized to facilitate the construction of the onshore substation(s).

Table 8.12-1 Summary of Maximum Design Scenario Parameters for Public Health and Safety (continued)

Parameter	Maximum Design Scenario	Rationale
O&M Base	6.5-ac (2.6-ha) area.	Representative of the maximum area to be utilized to facilitate the construction of the O&M Base.
Onshore construction Duration	Based on EW 1 and EW 2. Construction and installation of two export cables landfalls, onshore export and interconnection cables, onshore substations, and O&M Base.	Representative of the maximum period required to install the onshore components, which has the potential to temporarily impact resources in the Project Area.
Staging and construction areas, including port facilities, work compounds, and lay-down areas	Based on EW 1 and EW 2. Maximum number of work compounds and lay-down areas required. Ground disturbing activities are not anticipated. Independent activities to upgrade or modify staging, construction areas, and ports prior to Project use will be the responsibility of the facility owner.	Representative of the maximum area required to facilitate the offshore and onshore construction activities.
Operations and Maintenance		
Submarine export cables	Based on full build-out of EW 1 and EW 2. EW 1: 40 nm (74 km). EW 2: 26 nm (48 km).	Representative of the maximum number and length of submarine export cables installed.
Interarray cables	Based on full build-out of EW 1 and EW 2, with the maximum number of structures (147 wind turbines and 2 offshore substations) to connect. EW 1: 116 nm (214 km). EW 2: 144 nm (267 km).	Representative of the maximum length of interarray cables installed.
Offshore structures	Based on full build-out of EW 1 and EW 2 (147 wind turbines and 2 offshore substations). EW 1: 57 wind turbines and 1 offshore substation. EW 2: 90 wind turbines and 1 offshore substation.	Representative of the maximum number of structures for EW 1 and EW 2.
Project-Related O&M Vessels	Based on a full build-out of EW 1 and EW 2 (147 wind turbines, 2 offshore substations, submarine export cable routes, and associated interarray cables). Based on maximum number of vessels and movements for servicing and inspections.	Representative of the maximum condition for the peak number of O&M vessels affecting the area.

Table 8.12-1 Summary of Maximum Design Scenario Parameters for Public Health and Safety (continued)

Parameter	Maximum Design Scenario	Rationale
Offshore O&M activities	Based on a full build-out of EW 1 and EW 2 (147 wind turbines, 2 offshore substations, submarine export cable routes, and associated interarray cables) and the maximum amount of Project-related activities expected per year.	Representative of the maximum amount of activities from the Project during the O&M phase.
Onshore substations	Based on EW 1 and EW 2. EW 1: 4.8-ac (1.9-ha) area. EW 2: 6.4-ac (2.6-ha) area.	Representative of the presence of a new structure in an area where there was previously none.
O&M Base	4.5-ac (1.8-ha) area.	Representative of the presence of a new structure in an area where there was previously none.
Onshore export and interconnection cables	Based on EW 1 and EW 2. EW 1: 0.2 mi (0.4 km). EW 2: 5.6 mi (9.1 km).	Representative of the maximum length of new onshore export and interconnection cables installed.
Onshore O&M activities	Based on EW 1 and EW 2. Longest operational duration, with the maximum amount of Project-related activities expected per year.	Representative of the maximum amount of activities from the Project during the O&M phase, which would have the potential to impact local traffic patterns and available parking in the Project Area.

8.12.2.1 Construction

During construction, the potential impact-producing factors to public health and safety may include:

- Construction and installation of the offshore components, including foundations, wind turbines, offshore substations, and submarine export and interarray cables; and
- Construction and installation of the onshore components, including onshore export and interconnection cables, onshore substations, O&M Base, and other ancillary facilities.

The following impacts may occur as a consequence of factors identified above:

- Unauthorized access to Project construction sites;
- Accidental releases of hazardous materials;
- Non-routine events (e.g., extreme weather events, fire and gas leaks, and terrorist attacks); and
- Accidents.

Unauthorized access to Project construction sites. During construction, Project sites could present danger to public health and safety if not managed properly, both onshore and offshore. Potential dangers include public users coming in close proximity to the Project construction vessels and equipment, while in use and while inactive. Offshore, potential risks include allision with Project structures and equipment, including foundations and jack-up barges (see **Appendix DD Navigation Safety Risk Assessment** for additional information). Other risks include access to and/or on these structures for activities such as fishing. In order to de-risk this potential danger, where deemed appropriate, Empire proposes to utilize 1,640-ft (500-m) safety zones around relevant structures, activities, and vessels in a dynamic approach, as previously defined for the Block Island Wind Farm (81 FR 31862). Should USCG Safety Zone authorities not extend beyond 12 nm (22 km) at the time of construction, Empire will utilize a combination of safety vessels, LNMs, and COLREGS to promote both awareness of these activities and the safety of the construction equipment and personnel. Furthermore, access to Project-related structures will be restricted. All offshore construction sites will also be properly marked and lighted.

Onshore, Empire proposes to implement safety zones around active construction sites and employ the use of local liaison officers and security to help manage public access in the area. During inactive periods, Empire proposes to secure sites with fences and locks to prevent unauthorized access and potential injury from excavated grounds and/or Project-related equipment. Furthermore, only authorized and qualified personnel will be allowed on-site at all times. Access at port facilities will be managed by the owners of such facilities, and Empire will comply with or assist in implementing access restrictions at the site.

Accidental releases of hazardous materials. Construction activities will involve the use of various products that may contain chemicals or other potentially hazardous materials, which may present a danger to public health if they are improperly managed or released to the environment. Accidental releases can occur during Project activities such as vessel or equipment refueling and non-routine events occurring at or in proximity to the Project (see Non-Routine Events and Accidents for additional information on these non-routine events). Hazardous materials that may be used during construction of the Project are provided in **Section 3**.

The potential impact of a hazardous material depends on the quantity, concentration, and characteristics of the hazardous material. In order to de-risk this potential danger both offshore and onshore, construction personnel will also undergo training prior to the commencement of activities. As necessary, Project construction sites will use secondary containment for oils and greases in accordance with state and federal regulations, as well as contain spill response kits. In addition, hazardous materials will be transported to and from site in water-tight containers.

Non-routine events. Non-routine events are events that, while they could occur, are unlikely to occur during the construction of the Project. Non-routine events may include:

- Extreme weather, including hurricanes and lightning strikes;
- Fire and gas leaks; and/or
- Terrorist attack or sabotage.

While Empire cannot implement measures to de-risk all potential non-routine events, ERPs or similar type documents will be developed to address the possibility of these events occurring. Relevant personnel will be provided training on the details on the ERPs, including the site-specific emergency evacuation routes, warning signals, locations of fire extinguishers and first aid kits, as well as the chain of command. Weather-related measures are addressed in **Section 4.1.1 Physical Oceanography and Meteorology**.

Accidents. Accidents during construction, such as equipment failure, could potentially cause injury, damage property, and/or harm the environment. In order to re-risk potential accidents, Empire proposes to utilize 1,640-ft (500-m) safety zones around relevant structures, activities, and vessels in a dynamic approach, as previously defined for the Block Island Wind Farm (81 FR 31862). Should USCG Safety Zone authorities not extend beyond 12 nm (22 km) at the time of construction, Empire will utilize a combination of safety vessels, LNMs, and COLREGS to promote both awareness of these activities and the safety of the construction equipment and personnel. Onshore, Empire proposes to implement safety zones around active construction sites and employ the use of local liaison officers and security to help manage public users in the area. All construction sites will be clearly marked and lighted in a manner sufficient to safeguard personnel and public safety, with onshore sites enclosed by fences, where possible. Furthermore, all personnel will undergo a thorough health and safety training prior to the commencement of construction, to become familiar with the Project-specific activities and environment in which they are working (e.g., the handling of contaminated soils and rough sea conditions).

8.12.2.2 Operations and Maintenance

During operations, the potential impact-producing factors to public health and safety may include:

- The presence of fixed structures offshore (e.g., wind turbines, submarine export and interarray cables, and offshore substations);
- The presence of fixed structures onshore (e.g., onshore export and interconnection cables, onshore substations, and the O&M Base); and
- Operations and maintenance of the Project, both offshore and onshore.

The following impacts may occur as a consequence of factors identified above:

- EMF associated with export cables and substations;
- Unauthorized access to Project facilities;
- Accidental releases of hazardous materials;
- Non-routine events (e.g., extreme weather events, fire and gas leaks, and terrorist attacks); and
- Accidents.

EMF associated with export cables and substations. As discussed in **Appendix EE** and **Appendix FF**, the transmission of the electricity generated by the Project causes electric and magnetic fields to be produced in the space surrounding the submarine export, interarray, offshore substations, onshore export cables, interconnection cables, and onshore substations. The anticipated EMF associated with these Project-related infrastructures can present a risk to human health and/or safety if exposure to a significant level of these fields occurs. In order to determine whether EMF fields associated with the offshore and onshore Project-specific components have the potential to impact public health and safety, modeling was completed to calculate the potential level of EMF that would result from the operations of the Project. While there are no federal standards, the calculated magnetic field levels generated were below the limits published by the International Committee on Electromagnetic Safety and International Commission on Non-Ionizing Radiation for both onshore and offshore (ICES 2005; ICNIRP 2010). In addition, the calculated fields offshore are below the thresholds for effects on the behavior of magneto-sensitive marine organisms. Target burial depths for cables are such that potential impacts associated with EMF are minimized. At the offshore and onshore substations, public access will be restricted, and personnel access limited to O&M activities; no impacts to the public or personnel resulting from Project-related EMF are anticipated.

Unauthorized access to Project facilities. During operations, public access to the Project facilities could present danger to public health and safety if not managed properly (e.g., falling from height, exposure to equipment, etc.). Offshore, access to the wind turbines and offshore substations will be restricted from public use, such as fishing and mooring of vessels. All access points into the wind turbines and offshore substations will be locked at all times, and only trained and qualified personnel will have the ability to access inside.

Onshore, Empire will de-risk this potential danger by securing the onshore substation and O&M Base with a fence and lock and security surveillance to prevent unauthorized access; only authorized and qualified personnel will be allowed to enter. Onshore cables will be buried underground to de-risk the potential for access.

Accidental releases of hazardous materials. Operations and maintenance activities will involve the use of various hazardous materials, which may present a danger to public health if they are improperly managed or released to the environment. Accidental releases can occur during Project activities such as vessel refueling, routine maintenance, and non-routine events occurring at or in proximity to the Project (see Non-Routine Events and Accidents for additional information on these non-routine events). While unlikely, it is also possible that hazardous materials may leak from the wind turbines, offshore substations, and onshore substations. Hazardous materials that may be used during operation of the Project are found in **Section 3**.

The potential impact of a hazardous material depends on the quantity, concentration, and characteristics of the hazardous material. In order to de-risk this potential danger both offshore and onshore, Empire proposes to develop and implement a Project-specific Spill Prevention, Control, and Countermeasures (SPCC) Plan for onshore activities and Oil Spill Response Plan (OSRP) for offshore activities that will be provided for agency review and approval, as applicable. All O&M personnel will undergo a training prior to the commencement of activities. As part of the SPCC Plan and OSRP, Project-related sites will use secondary containment for oils and greases in accordance with state and federal regulations, as well as contain spill response kits. In addition, hazardous materials will be transported to and from site in water-tight containers. Accidental releases from wind turbines, offshore substations, and onshore substations will be de-risked through the implementation of secondary containment systems and routine checks and inspection of these structures for integrity and evidence of wear.

Non-routine events. Non-routine events are events that, while could occur, are unlikely to occur during the construction of the Project. Non-routine events may include:

- Extreme weather, including hurricanes and lightning strikes;
- Fire and gas leaks; and/or
- Terrorist attack or sabotage.

While Empire will implement measures in the design phase to de-risk these potential non-routine events to the extent practicable (e.g., by designing Project components to withstand site specific conditions), it is possible that some non-routine events will be outside Empire's control. To prepare for these non-routine events, ERPs will be developed to address the possibility of these events occurring and all personnel will be provided training on the details on the ERPs, including the site-specific emergency evacuation routes, warning signals, locations of fire extinguishers and first aid kits, as well as the chain of command. Furthermore, all wind turbines, offshore substations, onshore substations, and O&M Base will be designed to withstand extreme weather conditions and will be protected both externally and internally by a lightning protection system (see **Section 3** for additional information).

Accidents. During O&M, accidents such as failure or collapse of Project-related facilities and/or equipment, could potentially cause injury, damage property, and/or harm the environment. In order to de-risk potential

accidents offshore and onshore, all personnel will undergo a thorough health and safety training prior to the commencement of O&M activities, to become familiar with the Project-specific activities and environment in which they are working (e.g., rough sea conditions). Furthermore, Empire proposes to develop and implement an ERP. All personnel will be trained on how to handle these emergency situations, including next steps and the chain of command.

8.12.2.3 Decommissioning

Impacts to public health and safety during decommissioning are expected to be similar or less than those experienced during construction, as described in Section 8.12.2.1. 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 additional information on the decommissioning activities that Empire anticipates for the Project, please see **Section 3**.

8.12.3 Summary of Avoidance, Minimization, and Mitigation Measures

The overall risks to public health and safety will be managed under a Project-specific SMS developed in accordance with 30 CFR §§ 585.810, 585.11, 585.627 (d), 614(b) and 651. The goal of the SMS is to identify Project-related activities that have the potential to affect human health or the environment and to provide the means in which to address them. The Project SMS will be a living document, which manages activities in respect to hazard identification, risk management and control procedures, and protection of personnel, contractors, and the public. A draft of the Project SMS is included in **Appendix G Safety Management System**.

Pursuant to 30 CFR § 585.627 (d), the SMS will address the following:

- Project health and safety policy for personnel and the public near or within Project facilities;
- Remote monitoring, control, and shutdown capabilities;
- Emergency Response Procedures;
- Fire suppression equipment;
- Testing procedures and schedule; and
- Training procedures and schedule.

In addition, the SMS will also address:

- Safe work practices;
- Standards and procedures;
- Transportation and logistics;
- Monitoring and implementation; and
- Other Project safety requirements.

The draft SMS will be finalized prior to construction in consultation with relevant regulatory agencies, including but not limited to the Occupational Safety and Health Administration, BOEM, the Bureau of Safety and Environmental Enforcement, and the USCG. In accordance with 30 CFR § 585.11, approval of the SMS will be contingent upon Empire demonstrating that the SMS is fully functional.

In order to further mitigate the potential impact-producing factors described in Section 8.12.2, Empire is proposing to implement the following avoidance, minimization, and mitigation measures.

8.12.3.1 Construction

During construction, Empire will commit to the following avoidance, minimization, and mitigation measures to mitigate the impacts described in Section 8.12.2.1:

- Project infrastructure and equipment will be designed to be able to withstand extreme conditions, and will be protected both externally and internally by a lightning protection system;
- Development and implementation of an emergency evacuation plan that will be incorporated into the overall site ERP;
- Restrict access to both onshore and offshore work sites to authorized and qualified personnel;
- Implement up to a 1,640-ft (500-m) safety zone around active offshore construction sites;
- Implement safety zones around active onshore construction sites;
- Secure onshore construction sites with a fence and lock to prevent unauthorized access;
- Securing construction equipment within fenced work areas;
- Use of security to monitor both onshore and offshore construction sites;
- Construction sites will contain spill response kits;
- Use of secondary containment for oils and greases in accordance with all state and federal regulations;
- Transport hazardous materials in water-tight containers;
- Train Project personnel, as applicable, in accordance with relevant regulations and company policy, including the site-specific emergency evacuation routes, warning signals, locations of fire extinguishers and first aid kits, as well as the chain of command;
- Construction sites will be clearly marked and lighted, in a manner sufficient to safeguard personnel and public safety; and
- Development and implementation of a Project specific SMS.

8.12.3.2 Operations and Maintenance

During operations, Empire will commit to the following avoidance, minimization, and mitigation measures to mitigate the impacts described in Section 8.12.2.2:

- Implementation of a SPCC Plan for onshore activities and OSRP for offshore activities that will be provided for agency review and approval, as applicable;
- Project infrastructure and equipment will be designed to be able to withstand extreme conditions and will be protected both externally and internally by a lightning protection system;
- Implementation of an emergency evacuation plan that will be incorporated into the overall site ERP;
- Secure the onshore substation and O&M Base with a fence and lock to prevent unauthorized access;
- Use of secondary containment for oils and greases in accordance with all state and federal regulations;
- Transport hazardous materials in water-tight containers;
- Train Project personnel, as applicable, in accordance with relevant regulations and company policy, including the site-specific emergency evacuation routes, warning signals, locations of fire extinguishers and first aid kits, as well as the chain of command;
- Marking of wind turbines and offshore substations in accordance with IALA O-139, USCG requirements, and the 2021 BOEM Lighting/Marking Guidance, unless a variance is approved by the applicable agency prior to construction (see **Section 3** for additional details on the proposed marking and lighting measures);

- Use of appropriate, agency-approved marking and lighting around the onshore substations and O&M Base;
- Restrict access to the interior of the wind turbines and offshore substations by a locked door at the base of the tower;
- Only trained and qualified personnel will be allowed access to the onshore substations, wind turbines, and offshore substations to perform O&M activities;
- Project sites will contain spill response kits; and
- Implementation of a Project-specific SMS.

8.12.3.3 Decommissioning

Avoidance, minimization, and mitigation measures proposed to be implemented during decommissioning are expected to be similar to those implemented during construction and operations, as described in Section 8.12.3.1 and Section 8.12.3.2. A full decommissioning plan will be approved by BOEM prior to any decommissioning activities, and avoidance, minimization, and mitigation measures for decommissioning activities will be proposed at that time.

8.12.4 References

Table 8.12-2 Data Sources

Source	Includes	Available at	Metadata Link
BOEM	Lease Area	https://www.boem.gov/BOEM-Renewable-Energy-Geodatabase.zip	N/A
BOEM	State Territorial Waters Boundary	https://www.boem.gov/Oil-and-Gas-Energy-Program/Mapping-and-Data/ATL_SLA(3).aspx	http://metadata.boem.gov/geospatial/OCS_SubmergedLandsActBoundary_Atlantic_NAD83.xml
NOAA NCEI	Bathymetry	https://www.ngdc.noaa.gov/mgg/coastal/crm.html	N/A

BOEM (Bureau of Ocean Energy Management). 2021. *Guidelines for Lighting and Marking of Structures Supporting Renewable Energy Development.* Available online at: https://www.boem.gov/sites/default/files/documents/renewable-energy/2021-Lighting-and-Marking-Guidelines.pdf.

ICES (International Committee on Electromagnetic Safety). 2005. IEEE Standard for Safety Levels with Respect to Human Exposure to Electromagnetic Fields 0 to 3 kHz. Piscataway, NJ: IEEE. 2002, reaffirmed 2005.

ICNIRP (International Commission on Non-ionizing Radiation Protection). 2010. "Guidelines for limiting exposure to time-varying electric and magnetic fields (1 Hz to 100 kHz)." *Health Phys 99:818-836*.