Empire Offshore Wind LLC

Empire Wind 1 Project

Article VII Application

Exhibit E-6

Effect on Transportation

June 2021

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TABLES

FIGURES

ACRONYMS AND ABBREVIATIONS

AADT	Average Annual Daily Traffic
AIS	Automatic Identification System
BOEM	Bureau of Ocean Energy Management
ConEdison	Consolidated Edison Company of New York, Inc.
Empire, the Applicant	Empire Offshore Wind LLC
EW 1	Empire Wind 1
ft	foot
HVAC	high-voltage alternating-current
HVDC	high-voltage direct-current
km	kilometer
kV	kilovolt
Lease Area	Bureau of Ocean Energy Management-designated Renewable Energy Lease Area OCS-A 0512
m	meter
mi	mile
MLLW	Mean Lower Low Water
MTA	Metropolitan Transportation Authority
nm	nautical mile
NOAA	National Oceanic and Atmospheric Administration
NYCDOT	New York City Department of Transportation
NYCDEP	New York City Department of Environmental Protection
NYISO	New York Independent System Operator, Inc.
NYNJR	New York New Jersey Railroad
NYSPSC or Commission	New York State Public Service Commission
PANYNJ	Port Authority of New York and New Jersey
POI	Point of Interconnection at the Gowanus 345-kV Substation
Project	EW 1 Project transmission facilities in New York
PSL	New York Public Service Law
SBMT	South Brooklyn Marine Terminal
TMP	Traffic Management Plan
USACE	U.S. Army Corps of Engineers
USCG	U.S. Coast Guard
VTSNY	USCG Vessel Traffic Service New York

EXHIBIT E-6: EFFECT ON TRANSPORTATION

E-6.1 Introduction

Empire Offshore Wind LLC (Empire, or the Applicant) proposes to construct and operate the Empire Wind 1 (EW 1) Project as one of two separate offshore wind projects to be located within the Bureau of Ocean Energy Management (BOEM) designated Renewable Energy Lease Area OCS-A 0512 (Lease Area). The proposed transmission system for the EW 1 Project will connect the offshore wind farm to the point of interconnection (POI), and will include 230-kilovolt (kV) export and 345-kV interconnection lines traversing a total of approximately 17.5 miles (mi) (15.2 nautical miles [nm], 28.2 kilometers [km]) within the State of New York. An electric transmission line with a design capacity of 125 kV or more, extending a distance of one mile or more, is subject to review and approval by the New York State Public Service Commission (Commission or NYSPSC) as a major electric transmission facility. This application is being submitted to the Commission pursuant to Article VII of the New York Public Service Law (PSL) for the portions of the EW 1 Project transmission system that are located within the State of New York (collectively, the Project).

The Project will interconnect to the New York State Transmission System operated by the New York Independent System Operator, Inc. (NYISO) at the Gowanus 345-kV Substation (the point of interconnection, or POI). The Gowanus 345-kV Substation is owned by the Consolidated Edison Company of New York, Inc. (ConEdison). The Project's onshore facilities, including the onshore cable route, onshore substation, and the POI, are located entirely within Brooklyn, Kings County, New York.

The Article VII components of the EW 1 Project include:

- Two three-core 230-kV high-voltage alternating-current (HVAC) submarine export cables located within an approximately 15.1-nm (27.9-km)-long, submarine export cable corridor from the boundary of New York State waters 3 nm (5.6 km) offshore to the cable landfall in Brooklyn, New York;
- A 0.2-mi (0.3-km)-long onshore cable route and substation including:
    - Two three-core 230-kV HVAC EW 1 onshore export cables buried underground from the cable landfall either directly to the cable terminations or to a vault within the onshore substation;
    - An onshore substation located at the South Brooklyn Marine Terminal (SBMT), which will increase the voltage to 345 kV for the onshore interconnection cables; and
    - Two 345-kV cable circuits, each with three single-core HVAC onshore interconnection cables, buried underground from the onshore substation to the POI.

This Exhibit addresses the requirements of 16 New York Codes, Rules and Regulations § 88.6 and provides a statement describing the anticipated effects of the proposed line and its related facilities on airports, railroads and other transportation systems. Information provided in this Exhibit is based on a review of publicly available data of roadway, rail, air, and waterborne transportation.

E-6.2 Roadway Transportation

This section presents the existing roadway network adjacent to the onshore substation parcel and along the onshore cable corridor. This section also describes the potential impacts of the construction, operation, and maintenance of the Project to area roadways, as well as proposed mitigation measures that will be used to minimize impacts.

E-6.2.1 Existing Roadway Conditions

The onshore Project facilities are located within Brooklyn, a borough of New York City. The Project cable landfall, EW 1 onshore export cables and onshore substation are located within SBMT. SBMT is located adjacent to 2nd Avenue between 29th and 39th Streets, along Gowanus Bay. The SBMT parcel, including rights within the pierhead line, is owned by New York City and leased to the New York City Economic Development Corporation. The Sustainable South Brooklyn Marine Terminal operates the portion of the SBMT where the Project will be located, and the Applicant will sublease the requisite areas from Sustainable South Brooklyn Marine Terminal.

The onshore interconnection cable route travels from the onshore substation to the POI at ConEdison's existing Gowanus 345-kV Substation. Leaving SBMT, the interconnection cable route crosses 29th Street and continues northeast towards the Gowanus 345-kV Substation via 2nd Avenue. A joint bay (manhole) may be located within 2nd Avenue; however, if possible, the cable will be pulled from the onshore substation without a vault. Second Avenue is a local, city-owned, two-lane roadway running generally northeast-southwest. The onshore interconnection cable will also cross 28th Street along 2nd Avenue before entering the POI. The Applicant understands that this portion of 28th Street is gated along the ConEdison property and is not a public right-of-way. The Brooklyn roadway network in this area is shown in **Figure E-6.2-1.** A summary of road crossings is provided in **Table E-6.2-1**.

Table E-6.2-1 Summary of Project Roadway Crossings

Project Facility	Road Name a/	Roadway Width	Number of Lanes	Average Annual Daily Traffic (volume in 24 hrs)	Project Length within Roadway
Onshore Interconnection Cables	29th Street	72 ft (22 m)	2	Not available	120 ft (37 m)
Onshore Interconnection Cables	2nd Avenue	80 ft (24 m)	2	8,482	263 ft (89 m)

Note:
a/ 28th Street, although named, is not included, due to the lack of public right-of-way in this area.

The Average Annual Daily Traffic (AADT) volume provides 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. 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 2016). Considerably higher or lower values often result in areas of seasonal activities and/or when comparing weekend versus weekday traffic (NYSDOT 2017).

Based on the most recent New York State Department of Transportation AADT data, the 2019 AADT value for the 24 hour volume for 2nd Avenue was 8,482 (NYSDOT 2020). However, that includes daily traffic for the entirety of 2nd Avenue from 65th Avenue to the dead-end by Gowanus POI (approximately 1.9 mi [3.1 km]), and not just the segment traversed by the onshore interconnection cable route. It is likely that the northern terminus of 2nd Avenue near Gowanus POI experiences less traffic. AADT data for 29th and 28th Streets are not available.

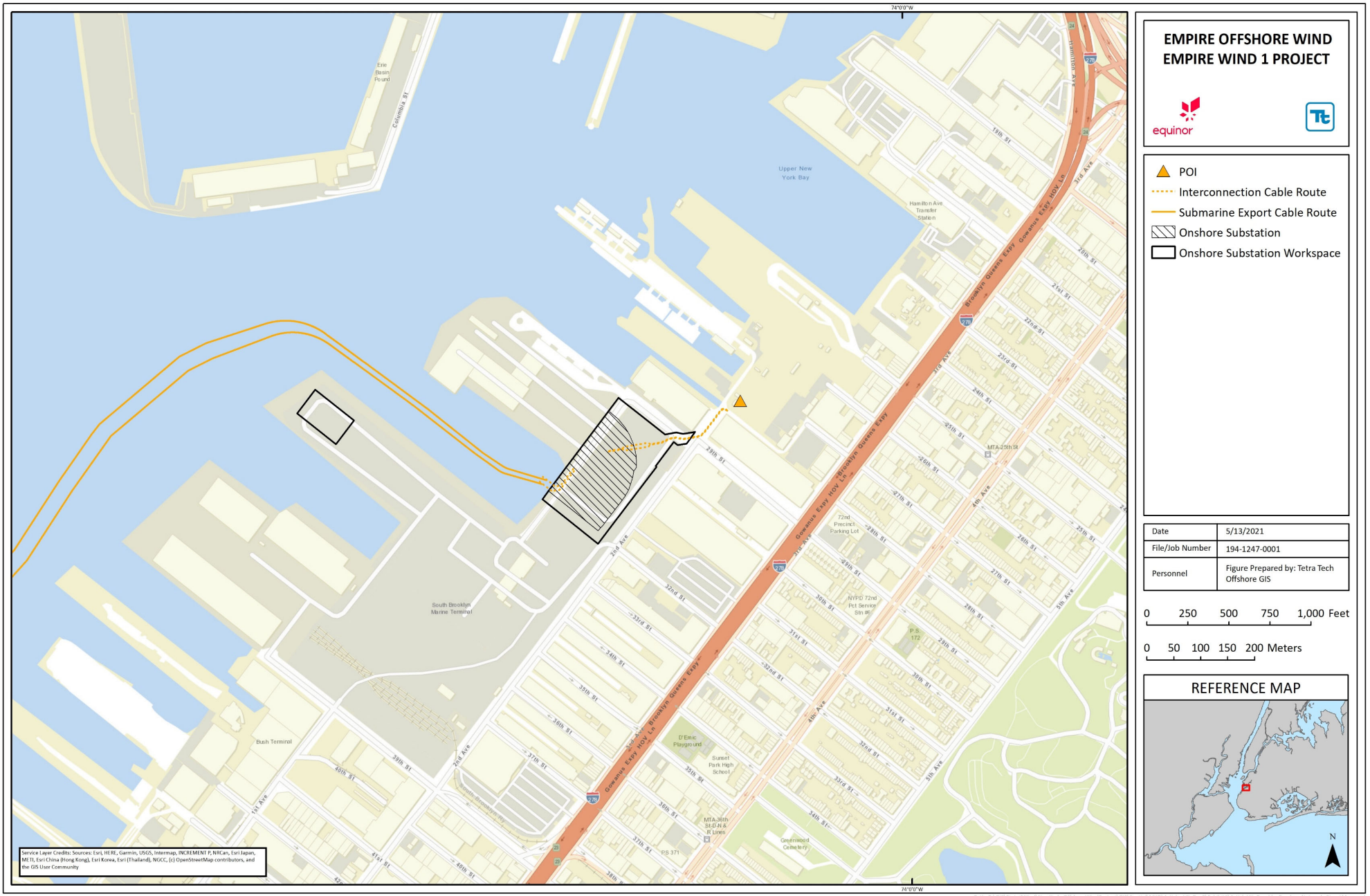

Figure E-6.2-1 Roadway Network in the Vicinity of the Project

E-6.2.2 Potential Roadway Impacts and Proposed Mitigation

During construction, the potential impact-producing factors to existing roadways will include construction of the onshore components, including onshore cables, duct banks and splice bays, and construction of the new onshore substation.

An increase in Project-related construction, support, and workforce vehicle traffic is anticipated during construction. Construction crews and equipment will utilize existing roadway systems for the interconnection cable installation and to access SBMT for the cable landfall transition, EW 1 onshore export cable installation, and onshore substation construction. Due to the relatively small number of workers expected, the potential impact of construction vehicle traffic on land transportation and local traffic during construction activities is anticipated to be minor, and similar in nature to other utility installations or road improvement work carried out in these locations.

Installation of the onshore interconnection cables in 29th Street and 2nd Avenue could result in the temporary closure of roads or some traffic lanes during construction. Roadways would be closed and/or blocked for only short periods of time to allow for local vehicular traffic patterns to be maintained to the greatest extent practicable. Should road or lane closures be necessary, the Applicant's contractor will use traffic control measures, such as signage and traffic flaggers, to ensure safety. The Applicant will coordinate with New York City Department of Transportation (NYCDOT) officials to schedule closures to reduce impacts to roadway traffic and to avoid peak hours. However, given the short length of interconnection cable to be installed at the terminus of 2nd Avenue, these impacts are anticipated to be minor and localized.

The onshore substation will be unmanned during routine operations and will only be inspected periodically; therefore, the number of workers transiting by vehicle during such periods is anticipated to be low. Personnel will be on site as necessary for any maintenance and repairs. The onshore substation will contain sufficient parking on-site to support onshore operations and maintenance workers, which will further avoid, minimize, and mitigate impacts. Accordingly, ongoing operations are not expected to result in a noticeable increase to SBMT's existing regular vehicle traffic volumes.

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

- The development of a Traffic Management Plan (TMP), in coordination with the NYCDOT, as applicable;
- The development of Project-related vehicle routes to construction areas, which are consistent with existing traffic, to the extent practicable;
- Sufficient parking on-site to support workers;
- Regular updates to the local community through social media, public notices, and/or other appropriate communications tools (see also **Appendix D Public Involvement Plan**);
- Temporary, localized construction zones to minimize areas or sections of road closure; and
- Highly visible marking and lighting of active construction sites, as needed.

The TMP will be provided as part of the Project's Environmental Management and Construction Plan, and will address the management of roadway transportation during construction activities. The Applicant will also coordinate with local government with regard to the scheduling of construction activities as it relates to traffic impacts. Upon completion of cable installation, all roadway conditions will be restored to pre-construction conditions, as applicable.

During operations, the onshore interconnection cable will operate underground within the roadway, and is not anticipated to impact general day-to-day traffic in the area. Routine maintenance, inspection of the cable system, or vault access may be required periodically, and may result in short-term and minor impacts to daily traffic along 2nd Avenue. Maintenance and inspection events are anticipated to be localized and will be coordinated with NYCDOT and other applicable agencies, should there be an anticipated impact on roadway transportation.

Air quality related impacts associated with traffic for the construction and operation of the Project are addressed in Section 4.13 of **Exhibit 4: Environmental Impact**.

E-6.3 Rail, Marine Rail and Bus Routes

This section details the existing rail and bus systems in the vicinity of the Project, as well as potential impacts and mitigation to rail and bus routes resulting from the construction, operation, and maintenance of the Project.

E-6.3.1 Existing Rail and Bus Routes

New York City has an extensive rail and bus system that interconnects the boroughs of Manhattan, the Bronx, Brooklyn, and Queens, with separate rail services on Staten Island. The Metropolitan Transportation Authority (MTA), specifically the MTA New York City Transit Authority, operates the rail (subway) and bus system. The MTA subway system typically runs 24 hours a day, 7 days a week. The bus system provides service along routes not accessible or serviced by the subway system. The buses provide varying hours of service depending on the route, with some routes operational 24 hours a day.

Three subway lines running under 4th Avenue are located approximately 0.3 mi (0.5 km) southeast of where the Project is located along 2nd Avenue. These subways are the N (Broadway Express), the R (Queens Boulevard/ Broadway/4 Avenue Local), and the D (6 Avenue Express) lines. These lines provide varying levels of access between Brooklyn, Manhattan, the Bronx, and Queens. The subway lines are accessible via four subway stations within approximately 0.5 mi (0.8 km) of the Project. All four subway stations are located along 4th Avenue and include 45th Street Station, which services the N and R lines, 36th Street Station, 25th Street Station, and Prospect Avenue Station, which service the D, N, and R lines (MTA 2020). **Figure E-6.3-1** shows the subway routes in the vicinity of the Project.

The 65th Street Railyard is located approximately 1.4 mi (2.3 km) south of SBMT along the Brooklyn waterfront between 65th and 63rd Streets, connecting to the Long Island Rail Road's Bay Ridge Branch. Formerly the Long Island Rail Road's Bay Ridge Yard, the 65th Street Railyard was renovated by the New York City Economic Development Corporation in 2000. The railyard is now maintained and operated by the New York New Jersey Railroad (NYNJR). The NYNJR was established in 2005 and acquired by the Port Authority of New York and New Jersey (PANYNJ) in 2008. The NYNJR also operates out of the 51st Street Railyard, which is located at Bush Terminal, east of Bush Terminal Park, approximately 0.5 mi (0.8 km) south of SBMT.

The NYNJR provides rail service along 1st Avenue in Sunset Park from 65th Street Railyard via 51st Street Railyard to the SBMT, serving Bush Terminal and Sims Municipal Recycling. Additionally, NYNJR has a marine rail division, which operates a carfloat route across New York Harbor to transport freight rail. Float barges operate between the 65th Street and 51st Street Railyards and the NYNJR Greenville Yard in New Jersey. The South Brooklyn Railway, a freight rail owned by the MTA, connects SBMT to the New York City Transit 36-38th Street Railyard, approximately 0.7 mi (1.1 km) east. **Figure E-6.3-1** shows the railway routes in the vicinity of the Project.

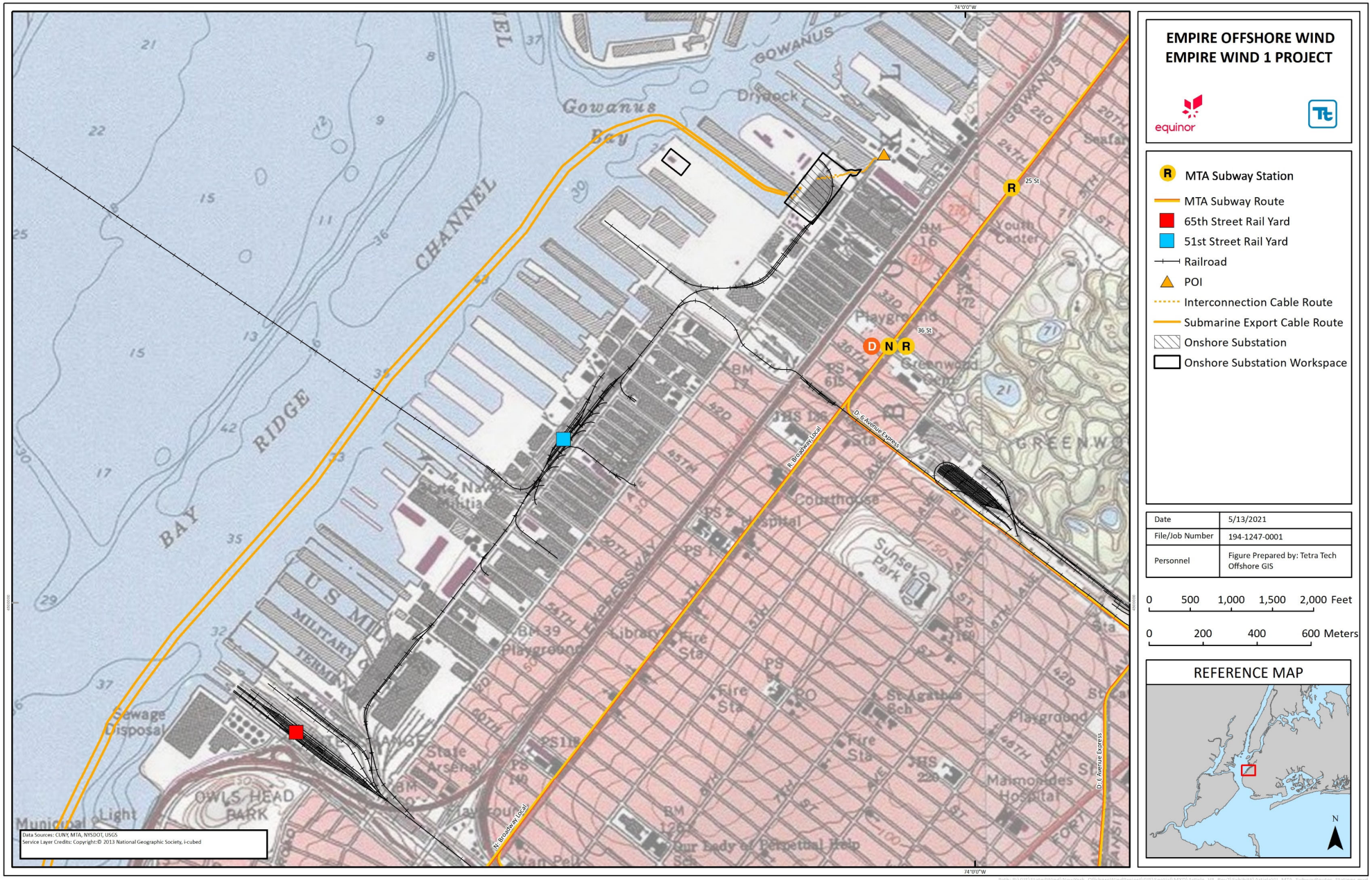

Figure E-6.3-1 Subway and Railroad Network in the Vicinity of the Project

There are no MTA bus routes along the onshore interconnection cable route or immediately adjacent to SBMT. There are five bus routes to the east that use 3rd Avenue and the Gowanus Expressway (I-278), approximately 0.2 mi (0.3 km) from the Project (**Figure E-6.3-2).** There is one bus stop in this area, located at 3rd Avenue and 39th Street. This stop services the B37 local Brooklyn Bus. Four express buses utilize the Gowanus Expressway to transport passengers between Brooklyn and Manhattan. There are no bus stops for the express routes in this area. **Table E-6.3-1** summarizes the bus routes and stops located within the area (MTA 2020). In addition to these public bus routes, it is also expected that certain school bus routes may operate along 2nd Avenue during the school year.

Table E-6.3-1 Public Bus Routes in the vicinity of the Project.

Bus Route #	Bus Route Description	Type of Service
B37	Bay Ridge – Boerum Hill	Local Brooklyn Bus
X27	Bay Ridge - Downtown/ Midtown	Express Bus Route to Manhattan
X28	Sea Gate/Bensonhurst - Downtown/ Midtown	Express Bus Route to Manhattan
X37	Bay Ridge – Midtown	Express Bus Route to Manhattan
X38	Sea Gate/ Bensonhurst - Midtown	Express Bus Route to Manhattan

E-6.3.2 Potential Rail and Bus System Impacts and Proposed Mitigation

The Project is not anticipated to impact the existing rail and bus system or transportation. The subway lines are outside of the Project's onshore interconnection cable corridor. Bus routes are also outside of the onshore interconnection cable corridor and 2nd Avenue is not typically used by MTA buses. Road or lane closures during installation of the onshore interconnection cables, if necessary, are not anticipated to impact bus routes. The Applicant will coordinate with NYCDOT prior to Project construction and will prepare a TMP as described in Section E-6.2.

The Project will cross the railroad tracks where the NYNJR provides rail service to SBMT; however, the Applicant is proposing to use trenchless construction (jack and bore installation) along the onshore interconnection cable route in order to cross the railroad. Cable installation methods are described in **Exhibit E-3: Underground Construction**. Trenchless construction would avoid interference with the railroad tracks or active rail service, and the Applicant will coordinate with applicable stakeholders regarding requirements for the crossing. The submarine export cable corridor would also cross the NYNJR carfloat route; however, construction activities will be coordinated to minimize disruption to marine transportation, as further described in Section E-6.5.

Transportation of land-based equipment and construction materials to the Project is not anticipated to impact the rail or bus systems. The Applicant will coordinate with applicable stakeholders regarding vehicle access, equipment, and deliveries within SBMT, including vehicle or equipment access across the rail lines, prior to construction. The Applicant understands that transportation along the existing rail is relatively infrequent. During operations, any vehicle or equipment access is anticipated to use the proposed permanent access road crossing.

The onshore interconnection cable route does not cross the subway or bus routes, and the onshore cable crossing of the railroad within SBMT would be entirely underground, so no operational impacts to rail or bus systems are anticipated. Workers involved in the construction or operation of the Project may utilize public transportation such as the subways or buses to access the Project; however, this is not anticipated to represent a significant increase in demand on the transportation infrastructure.

Figure E-6.3-2 Public Bus Routes in the Vicinity of the Project

E-6.4 Airports, Heliports, and Seaplane Bases

This section details the existing air transportation services (airports, heliports, and seaplane bases) within the vicinity of the Project as well as potential impacts and mitigation associated with construction, operation, and maintenance of the Project.

E-6.4.1 Existing Air Transportation Conditions

Several commercial and private air transportation services are located within the area surrounding the Project, including airports, heliports, and seaplane bases (**Figure E-6.4-1**). Approximate distances from the onshore substation to each air facility are presented in **Table E-6.4-1**.

Table E-6.4-1 Airports, Heliports and Seaplane Bases within 10 mi (16 km) of Project Components

Name	Location	Type	Distance (miles) a/	Direction
Airports				
Newark Liberty International Airport	Newark, NJ	Airport	8.2	West
John F. Kennedy International Airport	Queens, NY	Airport	9.1	East
LaGuardia Airport	Queens, NY	Airport	9.6	Northeast
Heliports				
PANYNJ Downtown Manhattan / Wall Street Heliport	New York, NY	Heliport	2.7	Northwest
Liberty State Park Heliport	Jersey City, NJ	Heliport	3.5	Northwest
One Police Plaza Heliport	New York, NY	Heliport	3.5	North
Taylor Field at Fort Hamilton Heliport	Brooklyn, NY	Heliport	3.8	Southwest
Paulus Hook Pier Heliport	Jersey City, NJ	Heliport	3.8	Northwest
Liberty National Golf Club Heliport	Jersey City, NJ	Heliport	4.3	Northwest
Bayonne Golf Club Heliport	Bayonne, NJ	Heliport	4.4	West
Newport Helistop	Jersey City, NJ	Heliport	4.5	Northwest
East 34th Street Heliport / Atlantic Metroport	New York, NY	Heliport	5.9	Northeast
West 30th Street Heliport	New York, NY	Heliport	6.4	North
Staten Island University Hospital Heliport	Staten Island, NY	Heliport	6.5	Southwest
NYPD Air Operations (Floyd Bennett Field) Heliport	New York, NY	Heliport	7.0	Southeast
Kearny Helistop	Kearny, NJ	Heliport	7.0	Northwest
Lincoln Tunnel Heliport	Weehawken, NJ	Heliport	7.2	Northwest
Helo Kearny Heliport	Kearny, NJ	Heliport	7.5	Northwest
Essex Generating Station Heliport	Newark, NJ	Heliport	7.9	Northwest
Port Newark Helistop	Newark, NJ	Heliport	8.0	Northwest
Albert Guido Memorial Heliport	Kearny, NJ	Heliport	8.8	Northwest

Name	Location	Type	Distance (miles) a/	Direction
Palisades General Hospital Heliport	North Bergen, NJ	Heliport	9.0	Northwest
Corporate Park of Staten Island Heliport	Staten Island, NY	Heliport	9.3	Southwest
Meadowlands Hospital Medical Center Heliport	Secaucus, NJ	Heliport	9.6	Northwest
Astoria Heliport	New York, NY	Heliport	9.9	Northeast
Seaplane Bases				
New York Skyports Inc. Seaplane Base	New York, NY	Seaplane Base	5.3	Northeast
Private Seaplanes-Jamaica Bay Seaplane Base	Brooklyn, NY	Seaplane Base	6.6	Southeast

Note:
a/ Distance from airport/heliport measured from nearest edge of air facility property to the approximate onshore substation location.

E-6.4.2 Potential Air Transportation Impacts and Proposed Mitigation

Construction and operation of the Project will not impact air transportation activities. The submarine export cable will be buried below the seabed and no above-water structures are proposed within state waters. The onshore cables will be installed underground, and no transmission towers are proposed. The only proposed aboveground component is the onshore substation. Vertical construction of the onshore substation will not impact or interfere with air traffic or communications and will meet industry standards regarding electrical interference (see **Exhibit E-5: Effect on Communications**); therefore, no mitigation for air transportation is proposed.

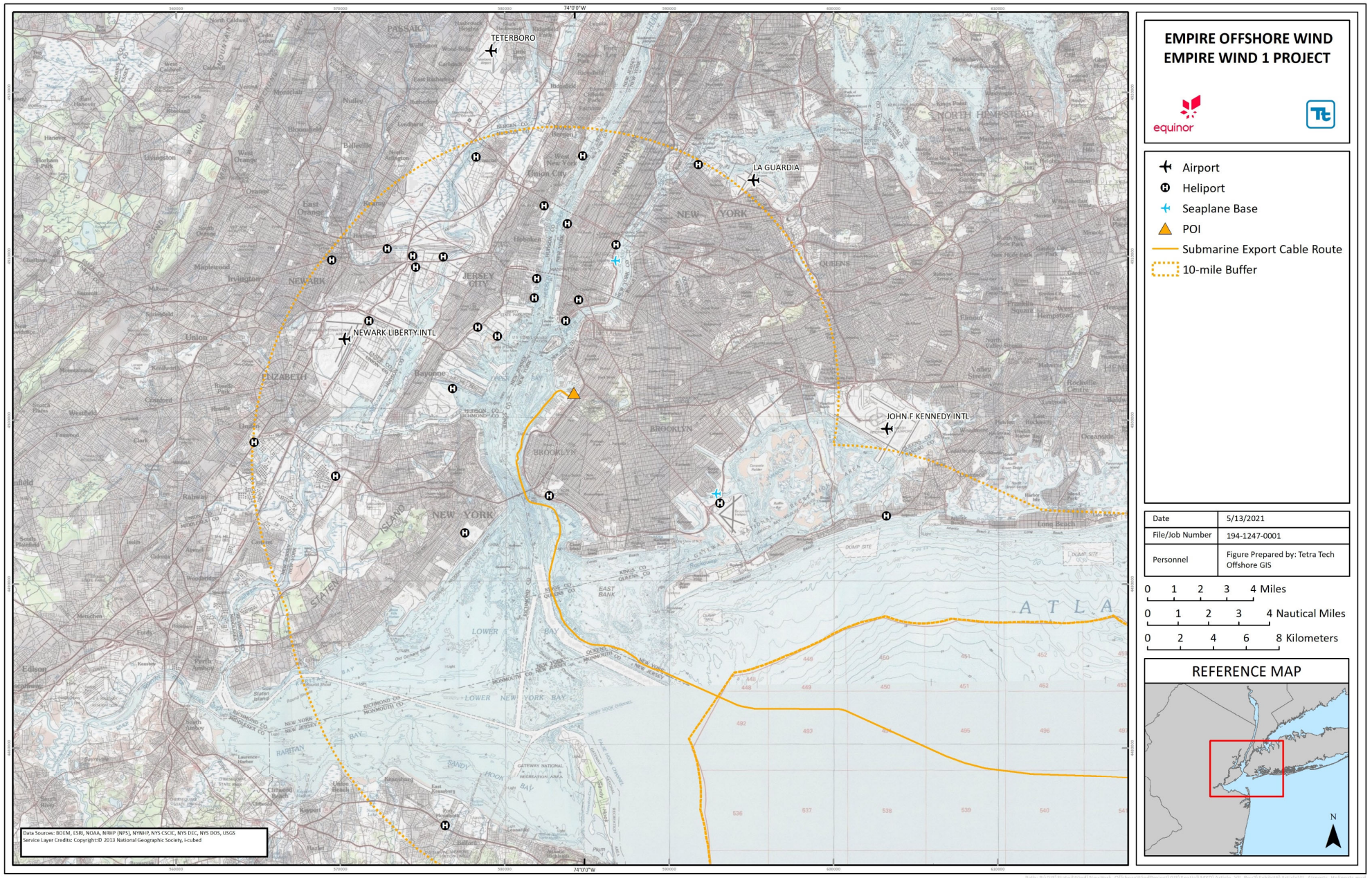

Figure E-6.4-1 Airports, Heliports, and Seaplane Bases in the Vicinity of the Project

E-6.5 Marine Navigation

This section details the navigable waterways traversed by the Project's submarine export cable route. Potential impacts and mitigation to navigation resulting from construction, operation, and maintenance of the submarine export cable are also discussed.

E-6.5.1 Existing Marine Navigation Conditions

The submarine export cable corridor lies within National Oceanic and Atmospheric Administration (NOAA) Nautical Chart 12327 New York Harbor (NOAA 2017). The submarine export cable transits from the 3 nm (5.6 km) state boundary generally northwest into Lower New York Bay, traversing Gravesend Bay and through the Narrows under the Verrazzano-Narrows Bridge. From there, the submarine export cable route heads northeast into the Upper New York Bay. This area is heavily traversed by commercial and recreational vessels throughout the year. Within the vicinity of the Project there are federal navigation channels, anchorages, and navigational channels for commercial shipping and recreational use, as well as passenger ferry routes used for commuting and recreation.

As described in Section E-6.3-1, the NYNJR also operates a carfloat route across New York Harbor to transport freight rail. Float barges operate between the 65th Street and 51st Street Railyards and the NYNJR Greenville Yard in New Jersey.

Project installation activities will be closely coordinated with local, state, and federal agencies including the U.S. Army Corps of Engineers (USACE); U.S. Coast Guard (USCG) Sector New York; USCG Sector Long Island; USCG Vessel Traffic Service New York (VTSNY); and the New York Harbor Safety, Operations and Navigation Committee of New York/New Jersey. Local Notices to Mariners will be posted with in-water installation activities and schedules.

E-6.5.1.1 Ferry Terminals and Routes

Twenty-nine ferry terminals are located within 5 mi (8 km) of the Project in Lower New York Bay and Upper New York Bay (**Figure E-6.5-1**). These ferry terminals are listed in **Table E-6.5-1**.

There are four terminals located within the vicinity of the submarine export cables and cable landfall in Upper New York Bay. These terminals include IKEA Landing (0.8 mi [1.3 km] northwest of SBMT), Sunset Park/Brooklyn Army Terminal (1.3 mi [2.1 km] southwest of SBMT), Bay Ridge Terminal (2.1 mi [3.4 km] southwest of SBMT), and St. George Ferry Terminal (3.5 mi [5.6 km] southwest of SBMT, across Upper New York Bay in Staten Island) (NYC DoITT et al. 2010).

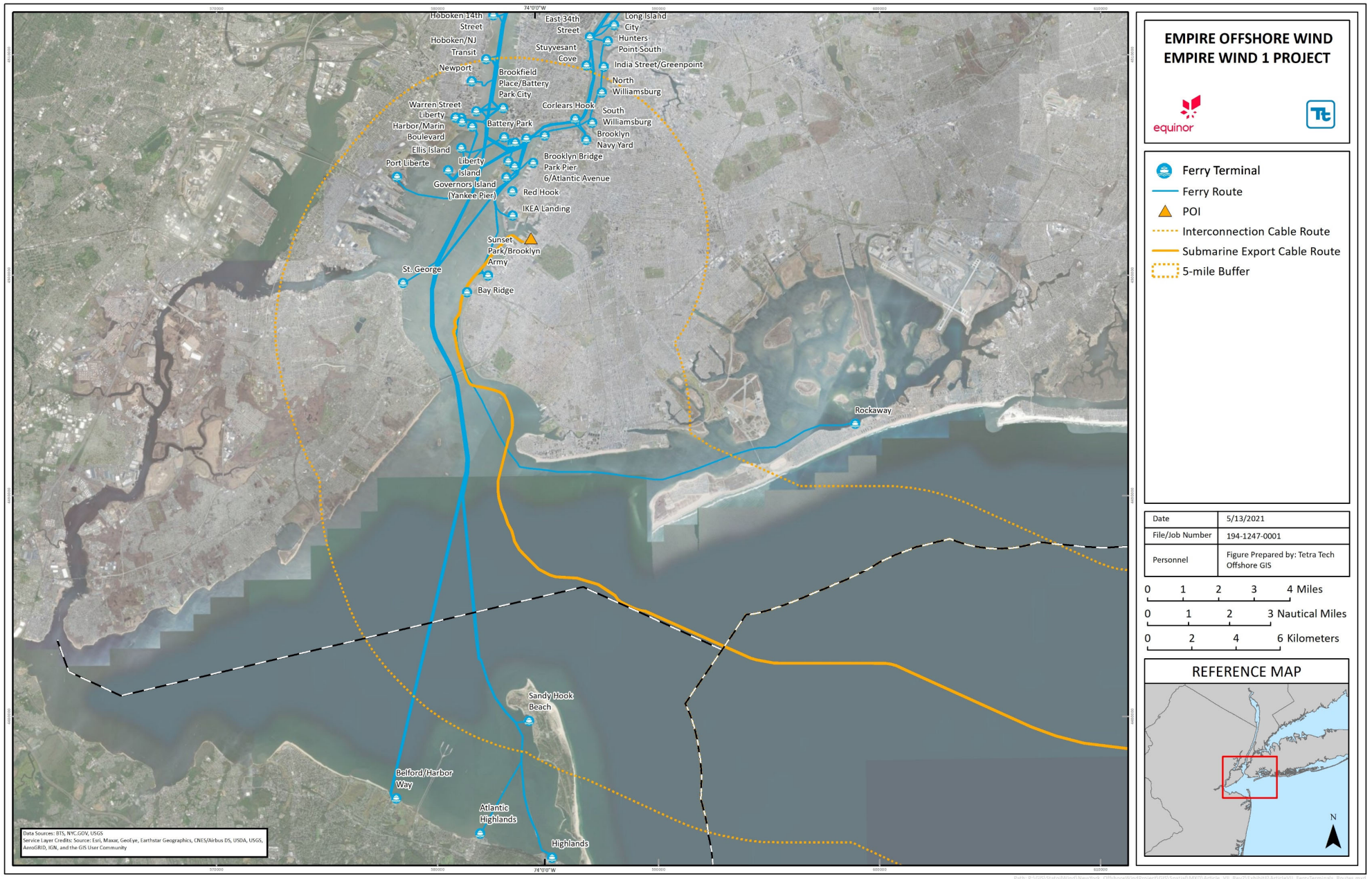

Figure E-6.5-1 Ferry Terminals and Routes within the Vicinity of the Project

Table E-6.5-1 Ferry Terminals within 5 mi (8 km) of the Project

Ferry Terminals	
Battery Park	Liberty State Park
Bay Ridge	Newport
Brookfield Place/Battery Park City	North Williamsburg
Brooklyn Bridge Park Pier 6/Atlantic Avenue	Paulus Hook
Brooklyn Navy Yard	Pier 11/Wall Street
Corlears Hook	Port Liberte
DUMBO/BBP Pier 1	Red Hook
Ellis Island	Sandy Hook Beach
Governors Island	Slip 5 Battery Maritime Building
Governors Island	South Williamsburg
Governors Island (Yankee Pier)	St. George
IKEA Landing	Sunset Park/Brooklyn Army
Jersey City/Liberty Landing	Warren Street
Liberty Harbor/Marin Boulevard	Whitehall
Liberty Island	

Several ferry services operate throughout Sandy Hook Bay, Lower New York Bay, Upper New York Bay, the Hudson River, and the East River. These include NYC Ferry (operated by Hornblower), New York Waterway, and Seastreak Ferries. These ferry services range from commuter ferries to tours and events.

Ferry routes crossed by or within the immediate vicinity of the submarine export cable route include the following:

- World Financial Center – Sandy Hook;
- Pier 11/Wall Street – Highlands;
- Belford/Harbor Way – Pier 11/Wall Street;
- Belford/Harbor Way – World Financial Center;
- Belford/Harbor Way – Midtown/West 39th;
- Belford/Harbor Way – Paulus Hook;
- Pier 11/Sunset Park – Rockaway (NYC Ferry);
- East 35th Street, New York City – Highlands, NJ (Seastreak); and
- Pier 11/Sunset Park – Bay Ridge.

These schedules vary based on time of year, week, and day (New York Waterway 2020; NYC Ferry 2020; Seastreak Ferries 2020).

E-6.5.1.2 Navigation Channels and Anchorages

The submarine export cable route has been carefully sited to minimize impact to federal navigation channels and anchorages to the extent practicable; the siting process is further described in **Exhibit 3: Alternatives**. Based upon guidance provided by the USACE in letters dated September 20, 2018 and August 20, 2020, and from the USCG in a letter dated December 15, 2020, submarine export cables will be buried to a minimum target burial depth of 15 feet (ft, 4.7 meters [m]) below the current (and future) authorized depth or depth of existing seabed (whichever is deeper) of federally maintained navigation features (e.g. anchorages and shipping channels).

The submarine export cable route runs parallel to, and outside of, an unofficial anchorage area, known as the "Ambrose anchorage" used by tanker and cargo vessels that are waiting to enter the PANYNJ. The submarine export cable route also runs parallel to the Ambrose shipping channel, along the eastern side of the channel. Ambrose Channel is a federal navigation channel located within Lower New York Harbor, south of the Verrazzano-Narrows Bridge. The Ambrose Channel is 2,000 ft (610 m) wide with an authorized depth of 53 ft (16.2 m) Mean Lower Low Water (MLLW). The offset for the submarine export cables is well outside of the approximately 150-ft (45-m) offset from the toe-of-slope that the USACE has indicated corresponds to the 3:1 side slope associated with the channel (USACE 2018).

There are two discrete segments where the submarine export cable route may cross federally designated anchorages or channels: Gravesend Bay and the Bay Ridge Channel. Within Gravesend Bay, the federally designated USACE anchorage area (Gravesend Anchorage) lies within the larger charted Anchorage #25 area identified by NOAA Chart 12402 for the Port of New York (USCG Anchorage #25). The authorized depth in the Gravesend Anchorage is 47 ft (14.3 m) MLLW (USACE 2019a,b). The USACE has prepared a General Reevaluation Report to evaluate environmental impacts from reasonable project alternatives related to the improvement of the anchorage(s) included in the New York and New Jersey Harbor Federal Navigation Project (USACE 2020). Included within this analysis is the potential deepening and expansion of the federally designated USACE Gravesend Anchorage. Inside of Gravesend Bay and inside of USCG Anchorage #25, the USACE-designated anchorage has an authorized depth of 47 ft (14.3 m); the most likely alternative identified in the General Reevaluation Report includes deepening this to 50 ft (15.2 m).

To account for routing constraints in and around Gravesend Bay, three minor route variations were considered in this area. These route variations are described in **Exhibit 3.** The preferred route is the easternmost route, which is designed to avoid the deeper federally designated USACE Gravesend Anchorage and its potential expansion area, based on publicly released USACE documentation (USACE 2020). It also avoids traversing of an area of the larger USCG Anchorage #25 that experiences the most usage, based on analysis of Automatic Identification System (AIS) data.

As the submarine export cable continues north towards the landfall, it enters the southern end of the Bay Ridge Channel, a federally authorized project. The submarine export cable remains within the channel in Reaches A, B and C for approximately 2.5 nm (4.6 km) as it heads north. Authorized depths within these reaches is 40 ft (12.2 m) MLLW (USACE 2019c). The submarine export cable corridor exits the channel as it turns towards SBMT at the mouth of Gowanus Bay.

Additionally, the Applicant is also aware that the USACE has recently signed a project partnership agreement with the PANYNJ 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 feasibility study will most likely take a minimum of three years and will be dependent upon both scope and resource availability.

E-6.5.1.3 Cables and Pipelines

Several charted cables and pipelines are crossed by the Project within New York State waters. Four pipeline areas and two cables areas are charted on the NOAA nautical charts (NOAA 2013, 2016). Approximately 1.6 nm (3 km) northwest of the New York State waters boundary, the submarine export cable route crosses southeast to northwest through a charted pipeline area (approximately 1,240 ft [378 m]). This is the Transco Lower New York Bay Lateral gas pipeline, which is buried in this area. The submarine export cable route also crosses a 1,500-ft (457-m) existing pipeline area west of Brooklyn between 92nd Street and 88th Street, a 620-ft (189-m) existing pipeline area west of Brooklyn between 87th Street and Shore Road Lane, and a 620-ft (189-m) pipeline area, west of Brooklyn between 80th Street and 78th Street.

West of Coney Island and southwest of Gravesend Bay, the submarine export cable route perpendicularly crosses (south-north) through an approximately 2,400-ft (732-m) NOAA charted cable area, roughly linking Swinburn Island and Norton Point on Coney Island. There is no evidence in the USACE survey data of scars from cable installation or any operational changes to the maintenance dredging by the USACE at this location. South of the Verrazzano-Narrows Bridge, the submarine export cable route perpendicularly (south-north) crosses an approximately 3,100-ft (945-m) cable area.

Figure 2.2-5 in **Exhibit 2: Location of Facilities** depicts approximately 19 known active and potential out-of-service cable and pipeline crossings, which have been identified in Project survey activities or through permit review. The Applicant continues to consult with asset owners to confirm the locations of submarine cable assets, including any active and out-of-service cables and pipelines.

Based on review of available data sources, 11 potential existing or out-of-service cable crossings have been identified within New York State waters:

- One bundle of two 345-kV HVAC transmission lines buried in the New York Harbor southern utility corridor (treated as one crossing);
- Two 138-kV HVAC transmission cable bundles buried in the New York Harbor northern utility corridor (treated as two crossings);
- The high-voltage direct-current (HVDC) Neptune Regional Transmission System (Sayerville Converter to Duffy Ave. Converter Station, 500 kV); and
- A possible New York Telephone Cable between Fort Hamilton and Fort Wadsworth, which was identified during a USACE Freedom of Information Act request but not found during the high-resolution geophysical survey campaigns – status unconfirmed.
- An additional six likely abandoned cables, as depicted in **Figure 2.2-5**.

In addition to these identified potential asset crossings, the proposed Poseidon Transmission Cable (HVDC) is documented to closely follow the Neptune cable route and would also be crossed in a similar orientation, if installed before Project construction. The Bayonne Energy Center to Gowanus Gas Turbines 345 kV cables are to the north of the Project and are not crossed by the Project's submarine export cable route.

Eight pipeline crossings in New York State waters have been identified:

- The Transco Lower New York Bay Lateral gas pipeline;

- One pipeline buried in northern New York Harbor utility corridor;
- Two gas pipelines buried in southern New York Harbor utility corridor;
- One petroleum product pipeline buried in southern New York Harbor utility corridor;
- The deeply tunneled New York City Department of Environmental Protection (NYCDEP)'s replacement Brooklyn-Staten Island water siphon; and
- Two retired and partially dismantled NYCDEP Brooklyn-Staten Island water siphons.

The route also crosses the location of the planned Transco Raritan Bay Loop pipeline project. The Applicant's current understanding is that this project is moving forward.

E-6.5.2 Potential Construction Impacts and Proposed Mitigation

Potential impacts to marine navigation associated with the submarine export cable installation are anticipated to be short-term (approximately three months) and localized. An increase in vessel traffic associated with Project-related construction and support vessels along the submarine export cable route 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 or allision risk, as well as the direct risk of collisions with Project vessels. Approximately nine vessels are anticipated to be required for cable laying and associated activities, though there may be fewer present depending on the stage of cable laying. Once pre-installation activities are completed, the installation of the submarine export cables is expected to take less than one month per cable for the submarine export cable route in New York. The cable installation timeframe including pre-lay and post-lay activities such as survey, pre-sweeping and pre-trenching activities, vessel and material transit, and cable protection installation will be approximately three months per cable.

During submarine export cable installation, temporary vessel or channel access restrictions may be imposed by the USCG or VTSNY. Cable installation in New York State waters may be conducted from anchored cable lay barges, which would involve additional anchor handling vessels to reposition the anchors as installation moves along the submarine export cable corridor. This activity may also result in temporary disruption or displacement of marine activities within New York Harbor.

In order to avoid, minimize, and mitigate impacts to marine transportation during construction, the Applicant will implement the following measures:

- Continued consultation regarding best practices with stakeholders, including but not limited to the USCG, New York Vessel Traffic Service, PANYNJ, and the USACE;
- Highly visible marking and lighting of active construction sites;
- Compliance by vessels associated with the Project with international and flag state regulations including the International Regulations for Preventing Collisions at Sea and the International Convention for the Safety of Life at Sea;
- Utilization of existing Traffic Separation Schemes, 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 within port approaches;
- Empire will include 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 Local Notices to Mariners, 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.

All in-water installation activities will be closely coordinated with the USCG, VTSNY, and USACE; and Local Notice to Mariners will be posted as required. In-water activities will also be coordinated with New York Waterway to avoid or minimize conflicts with ferry schedules.

E-6.5.2.1 Cable and Pipeline Crossings

Where pipeline crossings are required, the specific crossing methodology will be developed and engineered as the submarine export cable routes become finalized. Pipeline crossings will typically require a physical separation, such as a concrete mattress or an exterior protection product installed on the cable (see Section 4.1 of **Exhibit 4** for additional discussion of utility crossing methods).

The Applicant has evaluated a variety of submarine export cable crossing methods for cable and pipeline assets (see **Exhibit 3**). This included evaluation of in-water trenchless crossing methods, pile-supported bridges, artificial reef crossings and traditional crossings with cable protection measures including rock installation or concrete mattresses. In evaluating these methods, the Applicant considered technical feasibility and the potential to reduce impacts to marine navigation from shoaling. Based on challenges associated with other methods, traditional crossings, with either rock or mattress protection, are the preferred asset crossing methods. Additional discussion and cross-sections of asset crossing methods is provided in **Exhibit E-3**.

A traditional crossing with rock installation would consist of installation of rock at the base, cable lay, followed by another layer of rock protection on top. Rock installation provides protection for the cable against anchor drags or other external impacts. This method does result in approximately 4 to 6 ft (1.2 to 1.8 m) of shoaling on the seafloor. The Applicant is currently evaluating this method for asset crossings in the area of the Rockaway Sandbank (including the Neptune HVDC cable and the Transco Lower New York Bay Lateral pipeline) where water depths of 28 to 31 ft (8.5 to 9.4 m) and location minimize the potential for impact on marine navigation due to potential shoaling. Alternative methods are also under consideration and discussion with asset owners.

Within New York Bay, the Applicant is evaluating the use of a traditional crossing protected with mattresses filled with rock or concrete for asset crossings in the north and south utility corridors and at the two identified water siphons retired by NYCDEP. Potential crossing methods include either laying the cable directly on the seafloor with a protective mattress on top or laying the cable on top of a layer of mattress on the seafloor, and then adding a second protective mattress on top. These solutions do not cause significant shoaling, resulting in a less than 3 ft (0.9 m) reduction in water depth. In the area of identified asset crossings, water depths are 24 to 31 ft (7.3 to 9.4 m) and therefore the decrease in depth is not expected to result in vessel draft restrictions. Mattresses are also sometimes considered a concern for anchoring or fishing gear; however, no clam dredging or bottom fishing is expected in this area, and the mattresses proposed will be designed to allow for anchor pull to avoid vessel impacts in the case of anchor drag.

In certain cases, excavation of material at crossings of identified assets to facilitate installation may be conducted before the crossing installation to allow for sufficient burial of the submarine export cables and reduce the need for supplemental cable protection material or shoaling on the seabed. This method may not be feasible for installation due to the likely prohibitions or limitations on dredging in the vicinity of existing assets. The final depth of the dredged area would be governed by the vertical distance between the natural seabed and the assets to be crossed. If dredging is conducted for cable and pipeline crossings, the material is anticipated to be removed by suction hopper dredge and/or mass flow excavation at each crossing. Additional information on asset crossing methods is provided in **Exhibit E-3**.

E-6.5.3 Potential Operational Impacts and Proposed Mitigation

Upon completion of installation activities, the submarine export cable is not anticipated to impact marine navigation during operations, since the submarine export cables will be buried beneath the seafloor or will employ cable protection measures in limited areas where sufficient cable burial is not feasible. Where avoidance of maintained channels and anchorage areas is not feasible, further mitigation, such as deeper cable burial, will be 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 authorized depth within federally managed areas. Additionally, the Project will implement an additional target burial depth where appropriate. Target burial depths will be defined based on risk assessment, stakeholder feedback, and geotechnical conditions.

The submarine export cables will be designed with electrical shielding; therefore, the presence of the cables during operations will not interfere with GPS, radio, or navigational equipment (see **Exhibit E-5**). The submarine export cables will not result in compass deflection for vessels transiting over the cable.

Once installed, the submarine export cables will be charted by NOAA on the latest version of Nautical Charts for New York Harbor, Lower New York Bay, and Upper New York Bay. The Applicant anticipates that this cable area designation will be published in the Coastal Pilot and Local Notice to Mariners within New York Harbor.

The submarine export cables will be monitored during operations through Distributed Temperature and Distributed Vibration Sensing equipment. The Distributed Temperature Sensing system will be able to provide real time monitoring of temperature along the submarine export cable route, alerting the Applicant of temperature changes, which often is the result of scouring of material and cable exposure. The Distributed Vibration Sensing system will provide real time vibration monitoring close to the cables indicating potential dredging activities or anchor drag occurring close to the cables. Upon receiving any such alert, the Applicant will investigate the cable condition and identify and take corrective actions, if necessary. In the case that repair is needed to the submarine export cables or cable protection measures, or new cable protection is required, impacts associated with maintenance and repair activities will be similar to those described for construction activities, with a shorter duration and within a more limited area of the cable corridor.

E-6.6 References

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