

NOVEMBER, 2020
NEW YORK STATE DEPARTMENT OF STATE

MARITIME TECHNICAL WORKING GROUP SUPPORT

SUMMARY REPORT



COWI

NOVEMBER, 2020
NEW YORK STATE DEPARTMENT OF STATE

MARITIME TECHNICAL WORKING GROUP SUPPORT

SUMMARY REPORT

PROJECT NO.	DOCUMENT NO.
A128239	A128239-03-01

VERSION	DATE OF ISSUE	DESCRIPTION	PREPARED	CHECKED	APPROVED
1.0	November 11, 2020	Report	MGNN, BRCO	BRCO, CLWL	BRCO

NOTICE

This study was prepared by BTMI Engineering, PC (alternatively, COWI, or the “Contractor”) in the course of performing work contracted for and sponsored by the State of New York through its agencies and public-benefit corporations (the “State”).

The State and the Contractor make no warranties or representations, expressed or implied, as to the fitness for particular purpose or merchantability of any product, apparatus, or service, or the usefulness, completeness, or accuracy of any processes, methods, or other information contained, described, disclosed, or referred to in this study. The State and the Contractor make no representation that the use of any product, apparatus, process, method, or other information will not infringe privately owned rights and will assume no liability for any loss, injury, or damage resulting from, or occurring in connection with, the use of information contained, described, disclosed, or referred to in this study.

No State or Federal agency or entity has committed to any specific course of action with respect to the future development of offshore wind projects discussed in this study. This study does not commit any governmental agency or entity to any specific course of action, or otherwise pre-determine any outcome under State or Federal law. Any future offshore wind project will be required to meet all State and Federal permit or license approvals, including but not limited to under the Coastal Zone Management Act, prior to proceeding with development.

The State makes every effort to provide accurate information about copyright owners and related matters in the documents we publish. Contractors are responsible for determining and satisfying copyright or other use restrictions regarding the content of reports that they write, in compliance with State policies and Federal law. If you are the copyright owner and believe a study has not properly attributed your work to you or has used it without permission, please email print@nyserda.ny.gov.

Information contained in this study, such as web page addresses, are current at the time of publication.

CONTENTS

Version History	5
Abbreviations and Acronyms	5
1 Introduction and Background	10
1.1 Objective & Scope	11
2 Maritime Commerce Trends and Issues Related to Offshore Wind	13
2.1 Vessel Traffic Volume, Types, and Trends in and around New York Harbor	13
2.2 Vessel Traffic and Operations	15
2.4 Anchorage Areas and Anchoring	20
2.5 Offshore Wind Zone Draft Best Management Practices	21
2.6 Miscellaneous	24
2.7 Opportunities and Open Feedback	25
3 Literature Review Findings: Effective Management Options for Offshore Wind Facility Navigation	27
3.1 Basis	27
3.2 Evaluation, Assessment, and Management of Navigational Safety and Risk	28
3.3 Adjusting to Advances in Technology and New Information	38
3.4 Electrical Transmission System	41
4 Developer Roundtable	44
5 References	46

Version History

Version	Issue Date	Comments
1.0		Final Report
Notes:		

Abbreviations and Acronyms

ACPARS	Atlantic Coast Port Access Route Study
AIS	Automatic Identification System
ALARP	As Low As Reasonably Practicable
ATB	Articulated Tug-Barge (type of vessel)
BOEM	Bureau of Energy Management
CLPCA	Climate Leadership and Climate Protection Act
COLREGs	Convention on the International Regulations for Preventing Collisions at Sea, 1972
DOS	New York State Department of State
DNVGL	Det Norske Veritas Germanischer Lloyd
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
FSA	Formal Safety Assessment
GLA	General Light Authority
IALA	International Association of Lighthouse Authorities
IMO	International Maritime Organization
MAPONY/NJ	Maritime Association of the Port of New York and New Jersey
MARIPARS	Massachusetts and Rhode Island Port Access Routes Study
MCA	Maritime and Coastguard Agency (UK)
M-TWG	Maritime Technical Working Group
nm	nautical mile
NRA or NSRA	Navigation Risk Assessment or Navigation Safety Risk Assessment (abbreviation may change depending upon the country of origin)
NYS	New York State
NYSERDA	New York State Energy Research and Development Authority
OREI	Offshore Renewable Energy Installation

OSW	Offshore Wind
OWF	Offshore Wind Farm
PANYNJ	Port Authority of New York and New Jersey
PIANC	The World Association for Waterborne Transport Infrastructure
PMP	The PANYNJ Port Master Plan 2050
SMA	Seasonal Management Area
SOLAS	International Convention for the Safety of Life At Sea
SHPA	Sandy Hook Pilots Association
SUCLV	Super Ultra Large Container Vessel
TEU	Twenty-foot equivalent unit (method of measure container vessel size)
TSS	Traffic Separation Schemes
UCLV	Ultra Large Container Vessel
UNCLOS	United Nations Convention for the Law of the Sea
USACE	U.S. Army Corps of Engineers
USCG	U.S. Coast Guard
VHF	Very high frequency
VTSS	Vessel Traffic Service

EXECUTIVE SUMMARY

Recognizing that New York State has a substantial potential for offshore wind production, the Climate Leadership and Climate Protection Act (CLCPA) mandates 9,000 megawatts (MW) of offshore wind energy generating capacity by 2035. At the same time, New York Harbor is one of the busiest waterways in the world. The inter-state regional economy relies on the maritime industry to provide safe, reliable transportation of people and goods into and out of New York State; therefore, it is critical that offshore wind co-exist collaboratively with the existing maritime industry.

The Maritime Technical Working Group (M-TWG), led by the New York State Department of State (DOS) and supported by NYSERDA, is one of four Technical Working Groups established by New York State to cultivate a representative cross-section of stakeholder interests and expertise to ensure that the State's offshore wind program development and initiatives are informed by and founded upon constructive dialogue with stakeholders. The M-TWG is an unofficial, non-decision-making advisory entity which addresses this important outreach to the New York State and regional stakeholders with maritime responsibilities and interests impacting New York State's offshore wind mandate.

The intent of this report is to inform the offshore wind industry, maritime industry and other stakeholders of the findings of two key activities completed by the M-TWG up to the date of publication, specifically:

- > Interview NYS Maritime Stakeholders and summarize issues related to NY Bight shipping traffic as they relate to offshore wind (OSW).
- > Research, review, and summarize published literature of existing methods and effective management options as they relate to the interaction of the maritime and offshore wind industries.

The interview campaign revealed three primary areas of concern, which are outlined below along with key takeaways from the literature review. Collectively, these represent important considerations and viewpoints to inform the MTWG's continued discussions:

- > Offshore (Issues: offshore location, setback, offshore wind vessels entering and leaving navigation fairways)
 - > Transit of large ocean-going ships follows well-established routes. Short sea (intracoastal) transit of smaller vessels (e.g. tugs/barges) is less understood and the number of transits is forecast to increase.
 - > The current and planned Wind Energy Areas are located outside the geographic boundary of compulsory pilotage and Vessel Traffic System (VTS); therefore, these controls will not be directly applicable to the development of offshore wind farm sites. Extension of these services is challenging, given the need for both Federal and International Maritime Organization (IMO) approvals.

- > Various domestic and international guidelines require qualitative and/or quantitative means of evaluating the change in navigation safety risk due to installation and operation of the offshore wind farm and transmission (power) cable to shore. Within the U.S., there are guidelines to perform navigation safety risk assessments, but there are no quantitative guidelines for accepting additional risk; acceptance of additional risk is evaluated on a case-by-case basis.
- > Maritime industry representatives are concerned with the setback of the wind turbines from navigation fairways. Common interview responses requested 2 to 5 nautical mile (nm) setbacks. Based upon published literature, there is no internationally mandated minimum setback distance. Observed literature typically started at approximately 2 nm (and 5 nm at the entrance to Traffic Lanes) and provided guidance for potentially reducing the set-back distance on a project-by-project basis.
- > Inshore (Issues: Intra-harbor and river vessel traffic coordination)
 - > Increased vessel traffic due to construction and operation of offshore wind farms can likely be accommodated in New York Harbor, though careful coordination will be necessary to avoid negatively impacting existing traffic, especially with regard to Ultra Large Container Vessels (ULCV) and Super Ultra Large Container Vessels (SULCV), which are limited to transit waterways during specific tide/current windows.
 - > Increased vessel traffic due to fabrication and manufacturing in New York's Capital Region can likely be accommodated on the Hudson River, though maritime industry representatives are concerned that significant increases may require additional traffic controls, additional anchorage areas and/or traffic modeling and simulations.
 - > Additional anchorages are desirable to maritime industry representatives, both offshore of the entrance to New York Harbor and on the Hudson River.
- > Transmission (Issues: transmission [power] cable location, burial depth and cable protection)
 - > Maritime industry representatives are concerned with the location and installation (depth) of submarine cables, due to risks of anchor strikes causing damage to the cable or fouling vessels' anchors in case of loss of propulsion or steering emergencies. Maritime industry representatives are concerned about an equitable distribution in the responsibility for damaged cables and anchors. Other windfarms have typically buried cables 1-2m (3-6 ft) in general areas, with increasing cable burial depth in the vicinity of navigation channels or anchorage areas.

The M-TWG hosted a two-part Developer Roundtable on August 11 and August 14, 2020 to share a draft version of this report, as well as provide a forum for the U.S. Coast Guard to provide an update on recent Port Access Route Studies (PARS). Following a brief summary of the survey campaign and literature review, offshore wind developers were invited to share their initial feedback to the report. Day Two of the roundtable initiated a guided dialogue on certain key maritime topics of interest affecting maritime and offshore wind stakeholders, including wind farm setbacks between turbines and

vessel travel lanes, radar, transmission cable depths and routing, vessel traffic in New York Harbor and up the Hudson River and suggestions and recommendations for additional study. OSW developers were invited to share their feedback to this report. Highlights of that feedback are captured in section 4 and the detailed notes from the Developer Roundtable provided in Appendix C. In addition, the literature review was updated to reflect the latest editions of references.

1 Introduction and Background

New York State has adopted the most aggressive climate change legislation in the nation, the Climate Leadership and Climate Protection Act (CLCPA), which codifies Governor Cuomo's nation-leading goals as called for under his Green New Deal. It mandates that at least 70% of New York's electricity come from renewable energy sources such as wind and solar by 2030, and that the state's electrical system is 100% carbon neutral by 2040.

Recognizing that New York State has a substantial potential for offshore wind production, the CLCPA specifically confirms a 9,000 megawatts (MW) by 2035 mandate for the State's offshore wind program. The CLCPA builds on a legacy of more than three years of intensive study and stakeholder leadership efforts of the State. On January 29, 2018, New York State Energy Research and Development Authority (NYSERDA) released the New York State Offshore Wind Master Plan (Master Plan), which presents a comprehensive roadmap to encourage the development of 2,400 MW of offshore wind by 2030. The award-winning Master Plan includes more than 20 studies that gather data on environmental, social, economic, regulatory, and infrastructure issues relevant to offshore wind energy development, and cover a wide variety of topics related to siting, regulatory, wildlife, commercial, economic, and other important considerations. The Master Plan also includes the results of New York State's extensive outreach efforts with interested agencies, entities, communities, and individuals, undertaken to achieve a balanced evaluation of the potential for offshore wind development.

In tandem with the Master Plan's publication, New York State founded four Technical Working Groups (TWGs) to specifically support engagement with stakeholders from each of the Fishing, Environment, Jobs and Supply Chain, and Maritime communities. The TWGs are each responsible for cultivating a representative cross-section of stakeholder interests and expertise to ensure that the State's offshore wind program development and initiatives are informed by and founded upon constructive dialogue with stakeholders.

The offshore wind Maritime Technical Working Group (M-TWG), led by the New York State Department of State (DOS) and supported by NYSERDA, is an unofficial, non-decision-making advisory entity which fulfills this role for New York State and regional stakeholders with maritime responsibilities and interests impacting New York State's offshore wind mandate. Serving as a forum to provide input and inform New York via interaction with DOS, the M-TWG seeks to identify and understand maritime and commercial navigation concerns, especially as these issues relate to construction and operation of offshore renewable energy installations (OREIs).

The members of the M-TWG were selected by DOS to reflect diverse viewpoints from key areas of knowledge related to maritime issues in the New York Bight and include representatives from the U.S. Coast Guard (USCG), U.S. Army Corps of Engineers (USACE), Port Authority of New York and New Jersey (PANYNJ), Sandy Hook Pilots Association, Towboat and Harbor Carriers Association of New York and New Jersey, SUNY Maritime College, New York Shipping Association, Chamber of Shipping of America, and the Harbor Safety Committee of PANYNJ (ad hoc).

1.1 Objective & Scope

The work of the M-TWG is specifically focused on issues relating to commercial navigation. Issues relating to other waterway uses, such as commercial and recreational fishing, recreational boating, and other waterway uses are beyond the scope of the M-TWG and therefore specifically excluded from this study. BTMI Engineering, P.C. was retained on behalf of DOS by NYSERDA to provide technical support to the M-TWG.

This report summarizes the extent of that technical support. The scope of support consisted of three primary activities:

- > Interview NYS Maritime Stakeholders and summarize issues related to NY Bight shipping traffic as they relate to offshore wind (OSW). DOS is particularly keen to obtain an unfiltered understanding of Maritime Stakeholder viewpoints as they relate to key issues around offshore wind planning, construction and operation. Therefore, the surveys were targeted to existing maritime stakeholders, rather than seeking a wider range of survey participants.

COWI and NYSDOS developed a structured interview questionnaire meant to encourage discussion of trends and issues facing the maritime industry, especially as those issues may relate to offshore wind.

- > Research, review, and summarize published literature of existing methods and effective management options as they relate to the interaction of the maritime and offshore wind industries. Key literature sources are documents sourced from OSW-industry leading countries in Europe, other Bureau of Ocean Energy Management (BOEM) Wind Energy Areas (WEAs), and/or states related to the siting, development, and operation of OREIs and their related infrastructure. The literature review was focused on exploring three (3) key areas:

- > Evaluation, assessment, and management of navigation safety risk.

This section focuses on identifying, evaluating, and predicting the potential navigation safety risks of OREI and a comparative analysis of the change in vessel traffic before and after the construction of OREIs.

- > Adjusting to advances in navigation and offshore wind technology.

Offshore wind technology is changing rapidly and its impacts, including upon navigation, are not fully understood. This section compiles a range of possible implications of further advances in offshore wind turbine technology.

- > Electrical transmission system.

This section evaluates issues such as cable routing, burial, and protection issues as they relate to maritime navigation.

- > Disseminate findings.

- > DOS and COWI presented the preliminary findings of this report to the M-TWG in a virtual presentation on May 7, 2020, including high-level summaries of both the interview campaign and the literature review. M-TWG members were given an opportunity to provide comments to DOS.

- > In advance of final publication, a draft copy of this report was subsequently provided to a group of offshore wind developers and discussed in a two-part Developer Roundtable on August 11 and August 14, 2020. Notes from these presentations, as well as comments from the developers are included in Appendix C.

2 Maritime Commerce Trends and Issues Related to Offshore Wind

Through this study, DOS seeks to understand maritime commerce trends and navigation needs and challenges, especially as they relate to the offshore wind industry. A survey campaign was developed to determine and document key issues as reported by representatives of the New York maritime community. Survey questions were developed collaboratively by COWI and DOS and a pilot survey was initially conducted with members of the M-TWG in the fourth quarter of 2019.

Participants were provided an advanced copy of the survey questions at the time of survey request. Survey responses were primarily provided verbally during approximately one (1) hour long telephone interviews. Additional responses were provided in writing, either in direct response to the survey format or in free form responses by e-mail.

It was the intent of this study to reach a broader stakeholder group. However, due to complications associated with the COVID-19 pandemic, COWI received limited survey responses as potential participants were understandably focused on providing essential services. It was agreed between COWI and DOS to present the findings received and compiled to-date in order to continue progress of the working group and disseminate the collected information to industry members.

This section provides the generalized range of responses to specific subject matter questions from survey participants. Individual responses have been anonymized to protect responses from confidential participants. Specific responses have been included in Appendix A and Appendix B. Note that the discussion presented in this section reflects the opinions of one or more survey participants. This section does not reflect the opinions of COWI, NYSERDA or of DOS; the author and sponsors of this report do not guarantee the accuracy of all statements presented herein.

2.1 Vessel Traffic Volume, Types, and Trends in and around New York Harbor

Survey participants were asked to provide their observations of the volume, size, and type of vessel traffic within New York Harbor, approaching New York Harbor, and in tributary waterways (e.g. Hudson River).

Participants generally concurred that New York Harbor is one of the busiest waterways in the world. Participants frequently cited the Port Authority Of New York and New Jersey's (PANYNJ) recent Port Authority Master Plan 2050 (PMP) [1] for various statistics for the harbor's existing and projected traffic. According to the PANYNJ, the "PMP establishes a flexible roadmap outlining options for maximizing [investments in a variety of Port Authority transportation assets, including airports, tunnels, bridges, transit facilities and marine terminal properties across two states] and identifies the next generation of potential planning studies, land use, and infrastructure development projects."

2.1.1 Cargo & Vessel Types

The Port handles a wide variety of cargo including containerized cargo, liquid and dry bulk products, breakbulk/project cargo, cruise traffic, ferries and other assorted vessel types, as well as a wide variety of recreational vessels.

Most container traffic is handled by PANYNJ facilities at Port Newark and Elizabeth Port Authority Marine Terminal (PAMT) complex and the Howland Hook Marine Terminal, all of which are accessed by vessels sailing below the Verrazano-Narrows Bridge, through the Kill Van Kull, and below the Bayonne Bridge. Additional container capacity is provided by PANYNJ's Port Jersey PAMT, Brooklyn PAMT, and a number of private terminals.

A significant number of liquid bulk terminals, primarily handling petroleum products, are located along the Kill Van Kull and Arthur Kill waterways. Dry Bulk, Breakbulk, Recycling, Cruise, and Ferry marine terminal types are sited throughout New York Harbor and adjoining waterways.

2.1.2 Vessel Quantity

Most participants noted an increase in the number of vessel arrivals. Additionally, mixed use of the harbor continues to increase as the local population seeks to use the waterways for both commuting and recreational activities. Some participants cited the PANYNJ PMP 2050 as a good source of information for published statistics regarding international vessel calls. One participant noted that the PMP does not reflect the larger volume of Tug and Barge traffic or non-Port Authority Terminal ship berths in the Port of New York and its approaches. Tug and Barge navigation in the Port and its approaches account for a significantly greater quantity of vessel transits than the international vessels.

2.1.3 Vessel (Ship) Size

All survey respondents agreed that the size of many commercial freight vessels observed in New York Harbor continues to increase as technology drives economies of scale. Most participants observed that container vessels are experiencing the most rapid increase in size; some participants reported that liquid tanker vessels and car carriers and passenger vessels are also increasing in size, though not at the same rate as container vessels. Survey participants did not report specific observations of other vessel types.

New York is anticipating that 18000 TEU vessels will likely begin service in the harbor in 2020 or 2021. Certain operational limitations have been established in order to operate these large vessels safely. Some specific examples were observed by survey participants and have been further detailed in Section 2.3.1.

Vessel maximum size limitations are described in the following section.

2.1.4 Harbor Infrastructure and Vessel Size Limitations

In order to maintain New York's competitive edge, significant resources have been expended to maintain and improve harbor infrastructure. Notable recent investments include extending and

deepening the Ambrose channel, deepening the Kill Van Kull and Newark Bay from 35 ft deep to 50 ft deep and raising the Bayonne Bridge by 64 feet to a vertical clearance above mean high water of 215 ft (at peak height) to match the Verrazano-Narrows Bridge. These key investments and others allow for the latest generation container vessels to call at the Port of New York. These channel depth and air draft restrictions form the maximum size limitations for vessels entering into New York Harbor. Some participants have noted that there is a desire to complete further harbor deepening activities but acknowledged that those efforts would likely require a minimum of 6-10 years to be realized.

2.1.5 Short Sea Shipping (Barge Traffic)

Short sea shipping is an alternative form of cargo transportation that relies on inland and coastal waterways with the intent of reducing congestion due to trucking and rail traffic. For the purposes of this report within the U.S., short sea shipping and coastwise transits are similar. Multiple survey participants expect that the harbor will see an increase in short sea shipping barges and articulated tug-barges (ATB), as promoted by the U.S. DOT's America's Blue Highway program. One participant stated that the harbor is currently seeing close to 4,500 and 5,000 tug/barge moves per month.

Within the U.S., ATBs are already in use for liquid and dry bulk; they are becoming more common in New York Harbor as new ATB designs can venture further offshore. There are multiple new designs for ATBs that can move containers, though this class of ATB is not commonly seen in NY Harbor. Maritime industry representatives are expecting to see an increase in short sea shipping within the harbor as roadway traffic continues to worsen within the NYC boroughs.

Multiple survey participants also pointed out that existing routes and emerging routes are well known for larger ocean-going vessels (ships); however, future routes for shortsea shipping (barges and ATBs) are not yet well understood.

2.2 Vessel Traffic and Operations

Survey participants were asked a series of questions with regard to existing and future operational considerations. Those topic areas and observations obtained from participants are detailed within this section.

2.2.1 Traffic Controls

A number of systems have been put into place to assist with controlling vessel traffic in and around New York Harbor, including traffic separation schemes (TSS), vessel traffic systems (VTS), and seasonal management areas (SMA). Survey participants provided their observations with regards to these systems.

Traffic Separation Schemes

2.3 A traffic separation scheme is a regulated area of a waterway that has been designated as a traffic lane, with the intention that vessels within the "lane" are traveling in approximately similar direction. As defined in CFR 33 §167.150-155, New York has three (3) TSSs, which were typically reported by survey participants as very useful. The three existing TSSs are:

- > Nantucket to Ambrose/Ambrose to Nantucket traffic lane
- > Hudson Canyon to Ambrose/Ambrose to Hudson Canyon traffic lane
- > Barnegat to Ambrose/Ambrose to Barnegat traffic lane

Any changes to the TSSs would require analysis, justification, and negotiation and would have to be approved through the International Maritime Organization (IMO).

Generally, the tug and barge industry does not use the TSSs, although vessels of these types may cut across TSS areas when necessary (e.g., Atlantic City to Montauk sea buoy route).

Vessel Traffic System

The New York Vessel Traffic System (VTS) is a marine traffic monitoring system operated by the USCG with the stated missions of maximizing the safe and efficient use of the waterways and protecting the environment. Excerpts from the VTS New York Manual ref. [2] read:

"The primary function of VTS New York is to instill good order and predictability on the waters of the Port of New York and New Jersey. This is accomplished by coordinating vessel movements through the collection, verification, organization and dissemination of information."

"Under normal conditions VTS New York will manage traffic by INFORMING mariners of traffic to expect along their intended transit and MONITORING passing arrangements between vessels to ensure they are occurring, and can continue to occur, as intended. If VTS New York identifies a potentially unsafe situation, the Vessel Traffic Center (VTC) may RECOMMEND the vessel(s) reconsider an intended course of action. This recommendation is designed to heighten awareness and encourage the vessel(s) to review their actions in light of additional or improved information the VTC will provide. Recommendations may also include an alternative course of action. If conditions dictate, the VTC has authority to, and may DIRECT a vessel(s) by specifying when the vessel(s) may enter, move within or through, or depart from the VTS New York Area."

"It is important to note VTS New York DOES NOT DIRECT THE MANEUVERING (the ship handling required to execute the VTC's direction) of a vessel. The MANEUVERING of the vessel remains the sole responsibility of the Pilot/Master. The ultimate responsibility for safe navigation of the vessel always remains with the master."

The VTS area includes areas inshore of the Ambrose and Sandy Hook Channel entrance buoys, which are approximately 12 and 15 nautical miles (nm), respectively, inshore of the eastern-most edge of the Equinor lease area (OCS-A 0512). Typically, a vessel's first contact with VTS is after the pilot boards the vessel.

Survey participants commonly regard the VTS as a valuable system. With regard to offshore wind construction, participants noted the current system's inability to coordinate vessel activity in the OREI

areas, which are located further offshore than the area covered by VTS. Additional offshore wind specific VTS considerations are further presented in Section 2.5.3.

Some survey participants recommended that VTS protocols be amended to prioritize certain vessels, if movements of those vessels occur during limited traffic windows (e.g. Super Ultra Large Container Vessels transiting the Kill Van Kull). Traffic windows are limited times depending on tide and current that very large vessels are able to transit certain waterways; see section 2.3.1 for discussion of traffic windows on the Kill Van Kull.

Seasonal Management Area

A seasonal management area (SMA) has been established for offshore areas within a 20 nm radius of the Ports of New York and New Jersey to reduce the threat of ship collisions with endangered North American right whales. The SMA is in effect between November 1 and April 30 each year. When the SMA is in effect, vessels over 65 ft in length are required to travel at less than 10 knots.

Large vessels are able to maintain steerage (maneuverability) while accelerating or maintaining normal rates of speed. As a vessel decelerates when approaching a TSS or maintains a slow rate of speed, steerage can become difficult due to reduced water flow over the vessel rudder. Some survey participants noted that it may be difficult for larger ships to maintain less than 10 knots, as the slowest speed that some ships can maneuver at (dead slow) may exceed the speed limit. To comply with this regulation, ships must intermittently cut engine power and drift. During the period of deceleration or engine idling, the vessel has significantly less ability to steer.

Vessel Operations outside of Traffic Controls

Sailing order is generally on a first-come first-served basis, presuming berth space and tugs are available. Since large vessels meeting and passing is prohibited in certain waterways within the harbor, vessel order is determined by pilots (in coordination with vessels, tug pilot, berth, etc.) so that pilots are certain that vessels can proceed to the dock.

In the harbor, Sea-going ships have little or no choice but to maneuver in close quarters with the assistance of pilots and tugs. Out in the ocean, a typical vessel like an ATB would want at least 2 nm CPA (closest point of approach). Larger ships may prefer 5 nm or more CPA.

2.3.1 Operational Areas

As noted above, certain conditions exist in and around New York Harbor that can make navigation challenging. Survey participants provided observations of a few specific areas, detailed below.

Kill Van Kull

The Kill Van Kull is a waterway that connects Newark Bay to New York Harbor. It is the sole route of transit for the large container vessels calling at Port Newark and Port Elizabeth PAMT. The shoreline of the Kill Van Kull is also lined with a large number of private marine terminals that handle a wide variety of liquid/dry bulk and other miscellaneous products, as well as a major ship repair facility. Navigating the Kill Van Kull can be very challenging due to the waterway's narrow width, numerous turns, and current. The USCG and the Harbor Safety, Navigation, and Operations Committee ("Harbor

Ops") of the Maritime Association of the Port of New York/New Jersey (MAPONY/NJ) have published guidelines [3] for the passage of large ships through the Kill Van Kull. Those guidelines specify one-way traffic during large vessel moments, which are the times that ULCV (LOA = 997 ft. or greater and beam = 140 ft. or greater) and SULCV (Beam = 159 ft. or greater) may transit the Kill Van Kull (+/- 2 hours of slack water, i.e. maximum of 8 hours per day allowed for transit), the speed of the vessels, and the minimum number of tugs required to assist.

Howland Hook PAMT and the PANYNJ property at Port Ivory have been identified as potential terminal locations to support OREI construction staging. Use of those facilities would require careful coordination with the existing navigation community (e.g. container, tanker vessels and Tug/Barges) to ensure all vessels safe passage through the Kill Van Kull.

South Brooklyn

The South Brooklyn Marine Terminal property has been identified as a marine terminal likely to support significant OREI construction staging and potentially additional OSW-related activities to support one or more OSW developers.

Hudson River

A number of facilities have been identified on the Hudson River to potentially support the OREI industry. If one or more of these facilities are used, it may significantly increase vessel traffic on the Hudson River.

Multiple participants noted that an offshore wind developer has proposed building concrete gravity-based foundations (GBF) at the Port of Coeymans, in Coeymans, New York. Respondents stated that the 190 ft diameter GBF proposed by the developer are significantly wider than the beam of vessels typically transiting the river. One participant reported anticipating monopiles (large diameter steel tubes) may be exported from the Port of Albany. It is not anticipated that transportation of the GBF (in floating mode) or monopile tows down the Hudson River would be problematic with proper planning, cooperation, and modeling. However, transit of components or vessels exceeding normal widths would likely require modeling simulations, training and coordinating vessel stakeholders in some areas, e.g. Hyde Park to Albany, Newburgh - Stony Point, and Haverstraw Bay (Deep draft tows only). The Hyde Park to Albany area would likely require vessels to stay berthed at terminals or in an anchorage area south of Kingston to ensure commercial navigation safety.

At the current time there is one Federally Designated anchorage area on the Hudson. One participant noted that if infrastructure for offshore wind is to be brought down from upstate, the maritime industry will need additional Federal Designated anchorage areas, especially south of Kingston as the navigation channel north of Kingston becomes much narrower, approximately 400 ft wide. Transit of over width vessels and/or components will require carefully coordinated traffic movements for vessels transiting the river from Hyde Park to Albany.

There is currently no VTS available in the Hudson River, north of the Holland Tunnel; above this boundary, vessels operate on the basis of professional obligations and according to the general provisions for navigation. Most State Pilots and deep draft Tug/Barges do not transit loaded at night from Hyde Park to Albany and will anchor to wait for daylight and/or good visibility prior to continuing the voyage. A participant noted that if significant vessel traffic is added to the river, there may be a

need to simulate vessel movements to coordinate commercial traffic between Albany and Kingston. Another participant expressed concerns with the expense and level of coordination that may result from such simulations.

2.3.2 Accessibility to Tugs

Survey participants were asked to provide their observations of the availability and accessibility to tugboats.

Tugboats are an integral part of many maritime operations. They are used to escort large vessels into and out of the harbor, especially through narrow channels (e.g. Kill Van Kull, see above in section 2.3.1); they are used to help vessels berth and depart at marine terminals, participate in coastwise trade propelling barges, provide lightering and bunkering services, firefighting/emergency services, and more. One respondent stated that New York Harbor is the largest tug and barge port on the East Coast. As OREI construction begins, tugboats will likely be called upon to provide additional services, such as transporting components to/from manufacturing and staging facilities, berthing additional vessels, and providing offshore construction support. Participants anticipate a need for early commitments from wind farm developers to ensure that sufficient units are in the port to meet the needs of both the existing maritime industry and the nascent offshore wind industry.

Within New York Harbor, there are a limited number of high horsepower tugboats that are powerful enough to escort larger ships. When a number of larger ships plan simultaneous movements within the four 2-hour windows around slack water per day, it can be difficult at times to locate enough tugs with sufficient horsepower. In some cases, a tug boat "handoff" is coordinated in order to "share" tugs between two vessels; an outbound ship that requires four tugs will leave its berth and steam ocean-bound to a certain point with the four tugs, then two tugs will break off in order to assist an inbound vessel at the handoff location. The timing of the handoff must be coordinated so that both large vessels have sufficient tug escort at all critical times.

Many tug companies have operations in multiple ports, so if work suddenly increases in one port, the companies are able to shift resources (i.e. tugboats) where they are needed. However, local knowledge of tides and currents can be critical to providing safe harbor assist, escort services and towage services. With the three TSSs and one SMA, entering New York Harbor is a very tricky harbor for professional mariners to navigate.

The U.S. Army Corps of Engineers (USACE) worked collaboratively with PANYNJ, Docking Pilots Associations, and the Sandy Hook Pilots Association (SHPA) on a Vessel Simulation Study that allowed local vessel pilots to train on a simulator to handle larger vessels in the harbor. The simulator models actual vessels calling at the port, along with the available tug fleet. The purpose of the simulation study was to evaluate different operational scenarios to determine the conditions under which the new generation of 18,000 TEU container ships can safely transit New York Harbor and the Kill Van Kull to make berth at the Port Newark and Port Elizabeth PAMT. Within the simulator, different scenarios and operational conditions (i.e. visibility, current speed, direction, high winds, etc.) are tested by several different pilots. Once proven within the simulations, certain situations are being evaluated with real world experience. Once proven in repeated real-world trials, the experience and lessons learned will ultimately become part of the VTS guidelines for those large vessels operating within the harbor.

2.3.3 Vessel Supplies

Survey participants were asked to provide their observations on the availability to and accessibility of supplies.

Fuel

In general survey participants observed that access to and availability of fuel was not a concern; however, the price of fuel was a significant cost to operations and the profitability of a business. The increase in the size of vessels has also increased the typical volume of fuel carried by vessels. Multiple participants noted that IMO 2020 regulations will ban ships from using fuels with a sulfur content above 0.5%, compared with 3.5% allowed prior to January 2020, unless a vessel is equipped with sulfur-cleaning devices known as scrubbers. The Very Low Sulfur Fuel Oil (VLSFO) was typically observed to be available, but not common, in New York Harbor prior to January 2020. This was not anticipated to be an issue.

LNG Bunkering

Most survey participants acknowledged that LNG bunkering (i.e. fueling of vessels) is anticipated to be utilized in New York Harbor as early as fall 2020 as a source of cleaner fuel compared with traditional options such as marine diesel fuel; however, they did not have first-hand experience with LNG.

Fuel Taxes

One participant noted that New York and New Jersey have dissimilar taxing systems for marine fuel. It was noted that both states used to have similar taxing systems until NY increased taxes on fuel through the Petroleum Business Tax (PBT). The participant stated that the PBT is viewed by some as an unfair tax on companies home-based in NY, due to the resulting tax rate being nearly double as compared to NJ-based companies. The maritime industry representatives believe that if NY were to match the existing NJ taxes (by removing PBT), then NY State could reopen shuttered fuel terminals and ultimately generate more tax revenue.

2.4 Anchorage Areas and Anchoring

Anchorage areas are critical areas where vessels can safely wait until the intended terminal is prepared to receive the vessel and environmental conditions are favorable for the vessel to make the transit.

The U.S. Coast Guard is responsible for overseeing daily operations at anchorage areas. Inside the harbor, vessels are not allowed to anchor outside of designated anchorage areas, except in case of emergency (e.g. loss of propulsion or steering). Outside of the pilot light, which designates the entrance to New York Harbor, there are unofficial anchorage areas in place (e.g. there is an unofficial anchorage area off Long Beach, NY, where on any given day there can be 10-12 ships anchored) due to the lack of space inside the harbor. Multiple survey participants stated that the offshore anchorage areas are vital to their operations. The New York Harbor Safety Navigation and Operations Committee is working with the U.S. Coast Guard to designate custom and practice anchorages as Federally Designated Anchorages.

PANYNJ is the local sponsor for a 3-year duration, approximately \$3 million USACE-led study on the suitability of existing anchorage areas for the larger ships calling on their berths. The study includes

evaluation of size and depth of the Gravesend Bay anchorage area and its adequacy for the size and number of vessels using the anchorage area.

One participant noted the need for additional study to serve the needs of other public or private marine terminal users. Almost on a daily basis there are numerous vessels anchored outside of federally designated anchorages: Ships off the south shore of Long Island; Tug and Barge Units anchored east of Throggs Neck Bridge; and both Ships and Tug and Barge Units in the Hudson River during restricted visibility.

With regard to OREIs, it is anticipated that offshore wind vessels would create an additional demand for Federally designated anchorage areas in the Harbor and offshore. Additional anchorages may be needed in the Hudson River. Multiple respondents voiced concern regarding the location of submarine power cabling around navigation fairways and anchorage areas; those comments are detailed further in Section 2.5.2.

2.5 Offshore Wind Zone Draft Best Management Practices

Survey participants were asked to provide their opinions and observations regarding a number of potential offshore wind best management practices (BMPs). Note that the BMPs listed below are **not** the product of any definitive views of the offshore wind industry or maritime stakeholders, rather they are offered here in draft, deliberative form as a point of early observation as the basis for further discussion among stakeholders and industry.

Any eventual recommendations of BMPs for New York State will be determined through a consensus-based process between the offshore wind industry and stakeholders and will be designed to help ensure offshore wind energy is developed in a way that is responsive to maritime and industry considerations. To be adopted as BMPs, a recommendation also must not run contrary to Federal regulations or be infeasible to implement. Furthermore, any recommendations adopted by the State as BMPs must maintain sufficient flexibility to be adjusted or reconciled with Federal guidance in good faith with NYSERDA as the central procurement authority for offshore wind in New York State. Such adjustments may be necessary in response to evolving circumstances and new information, or to maintain project feasibility and practicability.

2.5.1 Set-Back Distance

Set-back distance is the minimum clear distance between a navigation channel and the closest physical structure that presents a potential for vessel allision. Published guidelines for set-back distances are discussed below in Section 3.2.4; this section contains observations and opinions provided by survey participants. Participants generally felt strongly that there should be safe minimum set-back distances.

Most participants cited a need for 2 nm minimum set-back distance primarily based on the two following reasons:

- the reduction of steerage when a vessel is steaming less than 10 knots within the SMA or when decelerating upon approach to the Harbor
- potential loss of control during a loss of propulsion or loss of steerage emergency

Some survey participants had previously read the Navigation Safety Risk Assessment that was created in support of Equinor's Empire Wind Project and offered specific comments, which are found in the specific responses in the appendices. Participants noted that Equinor has proposed a 1 nm set-back and survey participants have alternatively pushed for 2 to 5-mile set-back from the approach channels. Participants offered scenarios in which they may be more comfortable with a 1 nm set-back including:

- developing wind farms only on one side of a navigation channel so that vessels could deviate outside of the channel on the opposite side of the wind farm
- extending compulsory pilotage (area where vessel is required to be guided by a local vessel pilot) further offshore; while this was suggested, some participants noted this may not be feasible as it would require a pilot station at the beginning of each TSS and may not be supported by the maritime industry
- extending TSS laterally and VTS controls further offshore. Any changes to TSS will require international approval. VTS may be restricted to how far offshore they are able to operate.

2.5.2 Submarine Cables

Submarine cables are required to transmit the power generated by OSW turbines to each other and to shore. In a typical commercial scale OREI, a string of five (5) to ten (10) turbines are connected to each other. Multiple strings of turbines are collected at an offshore electrical platform. From the electrical platform, one (1) to two (2) export cables transmit the power to an onshore interconnection point. Survey participants offered a significant number of comments with regard to submarine cables.

Cable Routing

Nearly all survey participants felt strongly that electrical cables should not be placed within, or adjacent to anchorage areas. In locations where cables must be installed in anchorage areas, electrical cables should be buried much deeper than typical to prevent anchor damage to cables.

Multiple survey participants acknowledged that electrical cables for OREIs are likely to run across or parallel to navigation channels, due to the need to bring power into the population center. They identified the parallel cables as a known risk¹, primarily due to the need to drop anchor in the event of an emergency. Participants requested that when it is necessary for cables to cross navigation channels, they should cross as close to perpendicular as possible to minimize the length of cable within the channel.

¹ Trans Bay Cable LLC vs. M/V Ocean Life

Burial Depth

Survey participants provided a wide range of opinions on cable burial. Notable comments are detailed below:

- > Ship anchors are historically thought to penetrate the seafloor by approximately 10 to 15 ft. Other participants cited reports claiming 20 ft depth of anchor penetration. Newer, larger vessels carry larger anchors and require more stopping power, so anchor penetration depth is thought to increase with newer technology. There are two credible technical papers on anchor penetration, which present the upper limit of anchor penetration range at 10 to 15 ft [4] and 12 to 20 ft [5], depending on vessel size, anchor type and soil conditions.
- > Anchor penetration depth depends on location, soil type, and types of vessels that operate in the area (or could), as well as anchor type and size. Various industry standards exist for quantifying cable burial risk. Two participants noted the Carbon Trust Ref. [6] guidance.
- > When a cable or pipeline operator obtains a permit from USACE, the permit contains conditions that if the shipping channel is dredged in the future, the entity owning the cable or pipeline is responsible for moving and/or deepening the cable or pipeline.
- > Participants stated that in many previous instances of anchor strikes upon submarine cables (electrical or telecom), the vessel frequently bears the burden of the financial risk, as opposed to the cable or pipeline owner. Participants were concerned that there may be circumstances in which the risk is not fairly allocated and have requested that all cable burial exceed 15-feet and no concrete mattress (installed as cable protection) be utilized. The allocation of financial risk is outside the scope of this report; however, it may be taken as an opportunity for further investigation by later efforts.

Cable Protection

Survey participants identified cable protection as a large known risk in navigation channels, fairways, TSS, and anchorages. In areas where it is not technically possible to bury cables, cable protection, often in the form of marine mattresses (e.g., wire cages filled with stone, concrete cells linked with polymer ropes), are placed atop an exposed or shallow-buried cable. When placed on the ocean floor, the marine mattress creates an obstruction that vessel anchors could grab onto. For example, when vessels drop anchor in an emergency, they will generally let out a length of line 1.5 to 2 times longer than the water depth. The idea is that the anchor will bounce and slow down without immediately grabbing. However, if an anchor fluke grabs something too quickly, there are potentially high forces transferred through the anchor line to the vessel, potentially breaking the line, damaging the vessel and/or damaging the electrical cable. Additionally, if the flukes of the anchor are fouled, they may not work properly when vessels want to stay anchored.

2.5.3 Traffic Controls

Vessel Traffic Service

As noted in Section 0, the New York VTS Area does not extend beyond the Ambrose and Sandy Hook Channel entrance buoys. Mandatory participation in the VTS is limited to the navigable waters of the United States as defined by the USACE [7]. However, the VTS can provide services to vessels departing from and arriving to the VTS Area in the form of advisories regarding navigation hazards VTS users may encounter, including potential hazards associated with OREIs.

Participants suggested that specific navigational guidelines for offshore wind support/construction vessels could be developed contingent on the predicted impact these vessels would have on navigational safety in the VTS area (for example, guidelines may be based on the size and maneuverability of these vessels). These guidelines would be promulgated by the Maritime Association of Port of New York/New Jersey Harbor Operations Committee (in consultation with the U.S. Coast Guard) and incorporated in Appendix 7 "Port of New York/New Jersey Recommended Safety and Navigation Guidelines" of the VTS Users' Manual.

Multiple survey participants recommended additional navigation safety resources be deployed for all of industry (existing maritime industry and OSW). Most suggested that increases in physical infrastructure resources such as automated identification system (AIS), radar sites, vessel tracking, cameras, etc., as well additional personnel would benefit risk reduction.

Aids to Navigation

USCG has provided comments to BOEM's recent proposed guidance on Aids to Navigation, identifying that the specific marking required on the OREI as a whole and each individual wind turbine will be determined based on the navigation circumstances affecting the particular waterway in which the wind turbine and OREI are located. The USCG will consider factors such as maritime traffic types, density and size, prevailing weather (e.g., fog, rain, snow), tower configuration and spacing, and other factors. Signals will likely include a combination of yellow navigation lights, retroreflective material, sound signals, individual tower designations, Automated Information System (AIS) transponders, or other marking as appropriate. Modifications to markings may be required if maritime traffic changes, signal technology evolves, and/or more wind turbines are constructed nearby, particularly in abutting Wind Energy Areas (WEAs).

2.5.4 Vessel Lanes

Some survey participants noted that they support defined navigation lanes passing through the interior of the OREI to provide access for smaller vessels such as tugs and barges, offshore support vessels, commercial fishermen, etc.

2.6 Miscellaneous

Survey participants provided a number of observations that were not tracked to a specific content area. Notable observations are summarized below:

- > NY mariners have a history of adapting to additional vessels in the water. For example, during the last harbor deepening project, there were up to approximately 80 dredging vessels operating in the shipping channel, which intermittently caused half of the channel width to close to vessel traffic. During this time, all vessels transiting through shipping channels had pilots aboard. Even with the intermittent closures, shipping did not experience major impacts to operations. However, the maritime industries that use the harbor acknowledge that OSW projects will be multi-phase and multi-years-long projects, not just a single construction phase, and the impacts are not well understood.
- > Security risks exist in the harbor. The NY/NJ region is a terrorist target. Dense populations exist on Staten Island and Manhattan, which are islands. If the islands need to be evacuated, a considerable contribution to the evacuation is done by water.
- > Port competitiveness, safety, and competition for the waterway all factor into a company's decision if they will ship to certain ports. If shipping lanes are deemed unsafe or too congested to travel through, then the Port of NY risks losing business.
- > Potential radar interference due to OSW turbines is not well understood by existing maritime stakeholders.

2.7 Opportunities and Open Feedback

In addition to structured questions, the survey contained an open response section seeking input on any specific actions, programs, regulations, incentives, etc. that could be undertaken by government, the offshore wind industry, the maritime industry, or others to help sustain and/or encourage maritime operations as they relate to offshore wind. Survey respondents provided the following feedback:

- > Detailed glidepath for OREI procurement

Multiple participants stated a desire to invest in vessels and/or marine terminal infrastructure which would support the offshore wind industry; however, they cited a lack of detail in the procurement glidepath. Infrastructure investments require a long-term road map to ensure return on investment. Participants also noted that the structural wharf live load capacity requirements for marine terminals servicing the OSW industry may potentially be overbuilt for other uses and therefore very expensive, making it challenging for owners to recoup investments in one or two projects.

- > Port Access Route Study (PARS) Report(s) – next phase

Multiple participants stated that it would be helpful if state delegations could work together to complete another Atlantic Coast Port Access Route Study (ACPARS) style report. In their view, there needs to be balance between offshore wind development goals and practical concerns that need to be addressed before planning advances too far, like establishing safety lanes or set distances from channels prior to establishing WEAs. The federal government, along with state governments, are pursuing additional maritime priorities, such as the "blue highway", as a better

way to haul freight that is cleaner and more effective, with regard to fuel consumption and emissions, than traditional road trucking. A "blue highway" type system may need to be mapped out before the establishment of OREIs. At the time this report was prepared, USCG noted that ACPARS is in process of implementing recommendations and there are additional PARS being undertaken in the region, such as the Fifth District undertaking a PARS off Delaware Bay and the First District undertaking the Northern NY Bight PARS.²

> Maritime workforce training

As noted above, New York Harbor can be a challenging area in which to operate. Multiple participants expressed a need to support training facilities for mariners and Maritime Simulation Modeling/Training in New York. Local training programs based in NY would help to train mariners for the conditions they will face when operating in the local area.

> Support for shipyards

Certain projects anticipate a shortage in shipyard capacity to sustain existing vessel needs (new built, maintenance and rehabilitation) for the existing maritime industry. Development of offshore wind resources will place additional demand on the existing shipyard facilities. Multiple participants expressed that it would be difficult to obtain regulatory approvals to maintain existing or construct new shipyard facilities. In this context, shipyard facilities include facilities that perform shipbuilding and repair, piers for lay berths (idle vessel storage), piers for wet berth repairs, etc.

² For the latest information on the PARS, see <https://www.navcen.uscg.gov/?pageName=PARS>

3 Literature Review Findings: Effective Management Options for Offshore Wind Facility Navigation

COWI researched and reviewed available global literature in order to summarize existing methods and potentially effective management options that have been implemented by a wide range of other industries, nations and U.S. states to identify, analyze, and reduce potential navigation conflicts. Literature related to the siting, development, and operation of offshore wind farms and their related infrastructure was sourced from Europe, BOEM WEAs, and/or states. The scope of topics included identifying, evaluating, and predicting the potential risks and a comparative analysis of the change in vessel traffic before and after the construction of OREIs. Specific content areas investigated by the literature review included:

- > Establishment of navigation safety measures (navigation risk changes, risk acceptance, set-back distance, anchorage areas, radar interference, construction and operational safety, aids to navigation)
- > Adjusting to advances in technology and new information (AIS, floating offshore wind farms, increased turbine size)
- > Electrical transmission system (cable or pipeline risk assessment, cable burial or protection)

3.1 Basis

The resources listed below constitute the primary sources of information for the literature review. They are sourced from guidelines, reference documents and published Navigation Risk Assessments developed within four of the European countries leading the offshore wind market, including the United Kingdom, Germany, Denmark, and the Netherlands, as well as relevant navigation publications from the United States.

- > International Guidelines:
 - > International Maritime Organization (IMO) Guidelines for Formal Safety Assessment for use in IMO rule-making process (FSA guideline) [8]
 - > International Maritime Organization (IMO) Resolution A 572(14) General Provisions on Ships' Routing [9]
 - > United Nations Convention on the Law Of the Sea (UNCLOS) [10],
 - > The World Association for Waterborne Transport Infrastructure (PIANC) Report 161, Interaction between Offshore Windfarms and Maritime Navigation [11],
 - > International Association of Lighthouse Authorities (IALA) Recommendations for the marking of offshore structures [12]

- > U.S.:
 - > USCG Policy and Guideline [13] [14] [15]
 - > BOEM Publications [16] [17]
 - > Massachusetts and Rhode Island Port Access Routes Study [18]
- > UK Guideline and methodology: [19] [20]
- > German guidelines
- > Netherlands Guidelines [21] [22]
- > Swedish Guidelines [23]
- > North Sea Regulation [24]
- > Scientific Papers: [25] [26] (comparison of navigation risk assessments (NRAs))
- > Navigation Risk Assessment studies: [27] [28] [29] [30] [31] [32]
- > Cable burial [4] [17] [20] [33] [34]

3.2 Evaluation, Assessment, and Management of Navigational Safety and Risk

This section includes methods to evaluate navigation risk changes and methods to determine risk acceptance. Specific content includes transit lane set-back distances for commercial vessels operating around OREIs, anchorage areas, radar interference, service vessel impacts, and construction and operational safety zones.

3.2.1 Evaluation of Navigation Risk Changes

Construction, operation, and decommissioning of OREIs may affect navigation safety. The USCG states [13], "[t]he primary concern with the construction and location of OREIs are related to their impacts on marine navigation safety. Installation may physically affect commercial shipping, fishing or recreational boating operations, or other traditional uses of the waterway."

While the USCG does not have authority to approve/disapprove or authorize an OREI, they will provide recommendations to address navigation safety to support the permitting agency [15]. Generally, an Navigational Safety Risk Assessment (NSRA) is not strictly required by law in the US, but it is typically included as part of the broader environmental review [25]. BOEM requires an NSRA from the developer of OREIs [16]. Recommended guidance to perform the NSRA for projects within the U.S. is found in USCG Circulars [13] [14]. These documents include references to the United Kingdom (UK) guidelines

[19] and a request to use known studies or industry practices from experienced countries such as the UK or Denmark.

In 2019, the USCG published a guidance on NSRAs [14], which presents different levels of analysis depending on the project size and anticipated impacts. Construction and operation of an OREI is generally considered as a Major project and therefore warrants the most detailed level of analysis, which is referred to as a Formal Navigation Safety Risk Assessment. This analysis includes a traffic analysis at the impacted area together with evaluation of the risk of collision and grounding associated with the project.

In the European North Sea, coastal countries with OREIs (e.g. the UK, Denmark, and Germany) require developers to submit an NRA as a component of their Environmental Impact Assessment (EIA). An approved EIA is required to obtain regulatory consent for construction [25]. In the Netherlands, both the NRA and EIA are conducted by governmental authorities.

The IMO refers to the FSA as a structured and systematic methodology aimed at enhancing maritime safety and has issued a guideline to perform the analysis [34]. This methodology is generally referenced as a recommended framework for conducting the NRA in Europe [25]. The IMO methodology is also referenced in the USCG guideline [13]. The general FSA process consists of the following steps:

- 1 Hazard identification
- 2 Risk and hazard evaluation and assessment
- 3 Identify risk control measures
- 4 Cost-benefit of risk control measures
- 5 Decision suggestions and recommendations

While this process is not strictly enforced through any national or international code, there is a consensus around using this approach in the North Sea coastal countries with OREIs [25]. With the exception of Germany, there is generally no required method or model to be used when carrying out the NRA. However, all methodologies require a comparison of the base case risk level against the future case. This base vs. future case requirement also extends into the USCG guidelines.

Some countries offer local, more specific, guidelines to ensure consistency of the analysis and approval processes across different projects. For example, the Danish Maritime Authority published a memo to coordinate and align the methodology to be used for the NRA of two wind farms, Kriegers Flak and Horns Rev 3 [35].

Effective Management Options:

There is general consensus between the major European offshore wind countries requiring that an NRA be performed prior to the regulatory consent of an OREI. The FSA procedure laid out by IMO is

generally accepted but not strictly required; in some cases, country-specific guidelines also exist. Within the U.S., BOEM requires a similar NSRA process, which is carried out according to USCG guidelines. The USCG [13] provides a guideline to perform the NSRA and refers to the UK guideline [19], which also provides a comprehensive guideline that broadly represents the principles adopted by other countries such as Denmark and the Netherlands.

3.2.2 Navigation Safety in WEAs and Cumulative Impacts

In recent years, multiple OREIs have been proposed in close proximity to each other. Many OREIs are still located in isolated locations such that the interference with main shipping routes is minimized. However, as the number of OREIs increases, the issue of how to deal with the cumulative impacts of WEAs as opposed to single OREIs becomes increasingly relevant, especially as multiple adjacent OREIs may be located within multiple jurisdictions. Amongst the European guidelines, there is a growing consensus that cumulative impacts should be considered – both positive and negative. In the North Sea, multiple Exclusive Economic Zones (EEZ) border each other, but currently, there is no established cross border coordination. For the Dutch waters in the North Sea, a study has been published outlining the potential areas for OREIs that can be leased. The study focuses on ensuring safe navigation across the Dutch part of the North Sea [21] considering cumulative impacts of multiple OREI and other existing industries.

In the U.S., the USCG-led ACPARS and the Massachusetts and Rhode Island Port Access Routes Study (MARIPARS) [18] are examples of navigation studies that have been performed to evaluate the potential cumulative impacts to navigation safety risk of multiple OREIs within larger wind energy areas. Thus, it is used to coordinate the planning of OREIs to accommodate vessel traffic. In the U.S. northeast, the five New England offshore wind leaseholders - Equinor, Mayflower Wind, Ørsted/Eversource, and Vineyard Wind - announced a uniform turbine layout proposal submitted to the BOEM with 1 nm spacing between wind turbines [36]. The coordination between developers was proposed to accommodate the requests of the region's commercial fishing industry and facilitate more efficient search and rescue operations through establishment of a uniform, standard layout that provides multiple transit corridors among the contiguous OREIs. USCG has identified their intent to conduct similar PARS for other regions of U.S. east coast, including for the NY Bight.

Effective Management Options:

It is generally advisable to consider cumulative impacts from other existing or planned OREIs when carrying out the NSRA for a project. An analysis of wider areas that may cross national borders or jurisdictional boundaries is relevant if a large number of OREIs may be planned and/or it is expected to have a significant influence on navigation safety. For areas such as the NY Bight that have an existing robust maritime industry and expansive plan for OREIs in the coming years, a coordinated effort to plan for safe vessel traffic routing and responsible siting of OREIs is recommended.

3.2.3 Risk Acceptance

Introducing fixed objects (e.g. wind turbines) at sea will, if no mitigation measures are introduced, most likely lead to an increased risk of marine accidents. Government agencies are responsible for determining if and when the increased risks are considered acceptable.

The change in risk is typically evaluated as part of the NSRA as discussed in section 3.2.1 and used to determine if a project is acceptable or if risk reducing measures are considered necessary.

Based on experience from European projects, the acceptability/approval of an NSRA is generally evaluated on a case-by-case basis. This means that there is not a clearly defined objective acceptance criterion. The exception is Germany which requires a minimum of 100-year return period, meaning that the presence of the OREI should, on average, not cause the risk of an accident to increase by more than one (1) accident in every 100 years. In the UK guideline, it is noted that navigation risk must be reduced As Low As Reasonably Practicable (ALARP).

Previous NSRAs have been approved with the change in return periods for collisions or groundings caused by the presence of the OREI in the range of one (1) accident per 30-50 year [29] [28], only considering the operational phase and not the construction phase. In some cases, it may also be required to evaluate the consequences of accidents.

Further, both Germany and Denmark require the turbines be designed to be "collision friendly" [25] which typically means that the foundations should be round at the zone of potential impact.

Effective Management Option:

The approval of an NSRA is generally evaluated case-by-case and informed by the results of the risk assessment considering the base-case and future-case risk levels. Generally, a certain increase in risk is acknowledged and accepted as long as the increase in risk associated with the OREI would not be significant. Historically, corresponding risk return periods between 30 and 100 years have been accepted.

3.2.4 Set-Back Distance between Transit Lane and OREI

The minimum safe set-back distance between a navigation fairway and fixed OREI infrastructure is a major topic of debate. The intent of the set-back distance is to minimize detrimental impacts to safe navigation while at the same time allowing development of an OREI within a given area.

There are no established international standards that quantitatively specify uniform minimum distances between shipping routes and fixed structures [13]. However, vessels should always be able to fully comply with and act according to International Regulations for Preventing Collisions at Sea, 1972 (COLREGs).

Country-specific guidelines try to provide guidance to address and determine a safe distance. The USCG also provides a guideline on this [15], which is largely influenced by the UK guideline [20]. Generally, it is noted that the set-back to a route should be evaluated on a case-by-case basis [20] [13] [17] [21].

Based on the literature review, different approaches are presented to determine the appropriate distance between OREI and vessel traffic routes:

- > PIANC has published a guideline on the process for determining the safe recommended distance [11]. PIANC's starting point is the COLREGs. They suggest a process to determine the distance both for the early concept design stage as well as the detailed design. They recommend that risk assessments are used as a tool in this process. Elements to be considered within the risk assessment are: ships, marine traffic, hydrographic data, aids to navigation, hydrodynamic characterizations of the areas (e.g. typical currents and wind speeds), pilotage, and escorting or tug requirements.

For the concept phase of a project, PIANC recommends that the following consideration may be used to determine the minimum distance:

- > Based on COLREG 8 (Action to avoid collision) a distance of 6 times the ship length plus 500m safety zone is considered appropriate since this includes the ability of a vessel to make a round turn. In addition, 0.3 nm is added to accommodate deviation in routing before starting the round turn.
 - > In summary, the minimum distance presented by PIANC is considered to be: 0.3 nm + 6 ship lengths + 500m to the starboard side of any route; therefore, the minimum distance for an 18,000 TEU SULCV (likely to be largest ship in NY harbor in 2020-2021 timeframe) would be as follows:
 - > $0.3\text{nm} + 6 * \sim 400\text{m LOA} + 500\text{m} = \sim 3460\text{m}$ or 1.87 nm.
- > The Netherlands North Sea Policy §6.2 [22] defines a safety distance of 2 nm from IMO defined shipping lanes, anchoring areas, and nationally defined clearways. This is noted in [21] to "reflect practical experience and the policy principle of using safe shipping risk analysis". It is further noted that the application of this requirement may be modified higher or lower under specific circumstances at the detailed planning stage. In addition, pre-designated areas have, through analysis, been identified by the Dutch authorities with separation/safety distances between 500m and 2 nm [21]. The minimum 500m safety distance is based on UNCLOS recommending a 500m safety zone for marine operations from an oil/gas installation.
- > A so-called Assessment Framework/Design Criterion has been developed to determine the separation distances in the Netherlands [21] [22]. This framework takes into account the characteristic of the location and the safety requirements of the shipping lane. Simplified, it assumes that a vessel should be able to make a collision avoidance maneuver or a 'round turn', whichever is considered the most expansive and space-requiring maneuver. In addition, a 500m safety zone should be added. For vessels with a length of 400m this results in 1.87 nm starboard and 1.24 portside. Generally, the framework used in the Netherlands provides more flexibility as it will depend on the affected vessel traffic and the specific location.
- > The UK guidelines on the clear distance from shipping routes are described as an "Initial MCA Guidance" and introduces the "as low as reasonably practicable" (ALARP) principle to determine whether or not the distance is acceptable [19]. Generally, 500m is considered the lower bound for acceptable clear distance. If the clear distance is above 2 nm it is generally considered acceptable unless it is close to the entry/exit of a TSS or if there are adjacent OREIs introducing cumulative

effect. However, the guideline emphasizes that the appropriate clear distance is project and area specific. For the specific area of the Thames Estuary, a 1 nm clear distance is imposed through local traffic management control.

- > The USCG guideline [15] refers to the UK guideline and generally suggest a 2 nm set-back and 5 nm if around an entry/exit of a TSS. BOEM recently published a study [17] which suggests that the distance be evaluated on a case by case basis based on input from USCG and offshore wind industry representatives.
- > The five New England offshore wind lease holders propose a 1 nm x 1 nm turbine layout based on a location specific analysis [37]. Transit corridors for large commercial vessels are not provided; however, the spacing was intended to "provide for robust navigational safety and search and rescue capability by providing hundreds of transit corridors to accommodate the region's [commercial fishing and Search and Rescue] vessel traffic" [36]. This means that the minimum navigation corridor width between two turbines would be 0.7 nm. Figure 3-1 illustrates the proposed layout and the potential transit corridors.

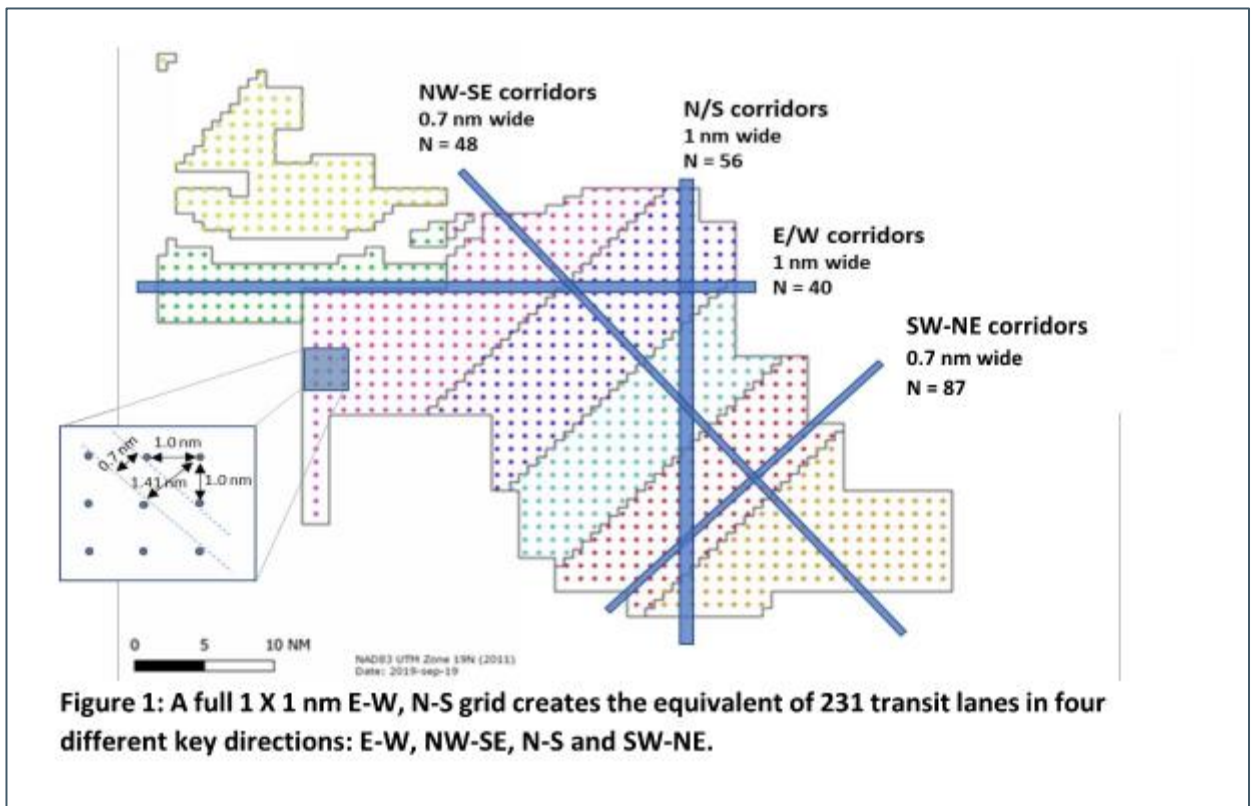


Figure 3-1: MA/RI WEA with 1 nm x 1 nm turbine spacing

However, this area does not include formal shipping routes or TSS and it is specified that it only is appropriate for vessels up to 400 ft (120 m) length. Larger vessels would be required to travel around the OREI. While this layout is supported by a vessel traffic study, this literature review did not identify an accepted NSRA that quantifies the risk level associated with vessel traffic through the OREI, as well as other risks related to the layout.

- > The specific situation of designing corridors through OREIs is also addressed in the UK guideline where a deviation from the expected vessel travel path of 20 degrees should be considered in determining the minimum corridor width.
- > Design of bridge spans crossing navigable waterways has been carried out for decades. A well-known method [38] to analyze the horizontal clearance is based on ship domain theory, which assumes a vessel occupies an area larger than its actual size referred to as a "bumper area". The bumper area was determined to have a width of 3.2*LOA in open waters and 1.6*LOA for restricted waters. Observations had shown that vessel encounters with overlapping bumper areas often resulted in unwanted evasive maneuvers and increased risk to surrounding structures. It is also emphasized that local conditions and vessel traffic affect the necessary clearance for safe passage.

Effective Management Option:

It appears there is a consensus around a minimum of 500m (0.27 nm) distance between OREI and shipping routes, likely rooted in the UNCLOS recommendation for construction safety zones. However, it should be noted that the 500m zone is for protection of the structure and is not meant as a safe distance for safe maneuvering according the COLREGs. Thus, maneuvering should take place outside the 500m safety zone.

A distance of 2 nm is observed to be a common starting point that seems to take into account various evasive maneuvers of very large vessels and is generally considered acceptable. While not yet applied to proposed U.S. OREI projects, both the Dutch framework and the UK ALARP method propose methods for lowering the distance to less than 2 nm. A site-specific analysis for the relevant area could potentially be used to inform such a decision. Generally, it appears recommendable that the set-back distance be evaluated on a case-by-case basis considering the specific area, vessel traffic characteristics, and OREI layout.

3.2.5 Anchorage Areas

This section focuses on anchorage areas and the possibility of vessels dropping anchor in the vicinity of an OREI. The risk of dropped anchors and the impact it may have on the cable burial depth is reviewed in section 3.4.

All OREIs and potential nearby anchorage areas are different and generally it is suggested that they be analyzed and discussed on a case-by-case basis. The following guidelines provide further information on this assessment or the minimum distance between anchorage areas and OREIs.

- > PIANC's publication [11] refers to the results of a safety study for an offshore platform. It was seen that the required space for a vessel to use its engines and maneuver when the anchor is dragging was 1.7 nm from the safety zone around the structure. A similar distance was found sufficient for the approach to the anchorage areas. However, this was a location-specific study with specific vessels included. Thus, PIANC suggested it be used as indicative information and that a separate study might be required for other areas.

- > The USCG guideline [13] requests that any impact to an anchorage area be analyzed and discussed. This is also seen in the South Fork NSRA and Block Island NSRA where the impact is discussed qualitatively but without going into details regarding minimum distance requirements.
- > In the Netherlands [21] [22], it is suggested that the same safe distance be maintained for anchorage areas and clearways as for the traffic separation scheme. This would imply that 2 nm be used as a guideline with the potential to be adjusted based on analysis using their framework, as introduced in section 3.2.4.
- > According to the UK guideline [20], it should be determined if the OREI could pose any type of difficulty or danger to vessels underway performing normal operations, including anchoring. Thus, any impact to anchorage in general or anchorage areas should be considered. No additional guidance on minimum distance was found.

Effective Management Option:

The information and guidance on anchorage areas and the suggested distance to OREIs is sparse. Generally, there seems to be a best practice to include a discussion of the potential impact on anchorage areas in the NSRA. The evaluation may consider minimum distances or processes to define these as suggested by PIANC [11] and the Netherlands [21].

3.2.6 Radar Interference

The PIANC publication [11] states that "it is considered best practice to identify the possible implications for radio-communication systems and AIS operating in the area around a wind farm, and to carry out a study of the potential impact on radio-communication to the extent possible. Field measurements should be conducted when the OWF is completed in order to confirm the need for and location of any additional very high frequency (VHF) coastal radio station or AIS base station in the OWF or simply to check the sea area coverage".

Generally, it is accepted that OREIs cause some level of radar interference. Examples of acknowledgement of interference are found in the USCG guideline [13], the UK guideline [19], and the Dutch White Paper [21]. The suggested impact range and recommended minimum distance vary and are presented below:

- > PIANC [11] refers to surveys determining that a 1.5 nm distance between the OREI and the vessel is necessary to minimize interference on vessels, as well as studies with deep sea pilots resulting in a 0.8 nm minimum distance. It was also noted that while AIS is used for collision avoidance, it is not mandatory for all vessels. Additionally, the AIS transceiver operates on the VHF band and is thus, also subject to radar interference.
- > The UK guideline [19] suggests that distances less than 0.5 nm will cause X-band radar interference and distances less than 2 nm will cause S-band radar interference.

- > In the Dutch White Paper [21], the opinion is that there is no objective, evidence-based standard for minimum distance. The provisional safe distance based on the experience of the shipping sector is 0.8 nm from a wind farm.

As part of the navigation risk assessment for South Fork OREI [27] the effects of radar were considered. Generally, three different concerns were presented; namely radar cluttering, saturation, and shadowing effects. The conclusions are summarized as follows:

- > Radar clutter, which is unwanted radar echoes/reflections, was found to be most prominent at larger distances from the OREI. The effects could generally be reduced by manipulating the radar operator's gain control, i.e., the operator's ability to control the strength of the signals.
- > Within 0.5 nm saturation, i.e., a signal too strong to provide spatial information, was found possible. The gain control could reduce the saturation.
- > Shadowing effect was found for objects up to 328 ft (100m) behind the OREI (i.e. smaller vessels behind the turbine may not be visible). Shadowing effects increase with greater distance. However, hidden objects may become visible as the vessel moves and the shadowing effect changes.

In addition, the study mentions that a 0.6 nm distance between individual turbines was adopted partly to reduce any impact on radar.

The South Fork NSRA referenced several studies of potential impacts to radar and concluded that the OREI does not create a radar or communications interference risk to navigation due to its distance from commercial navigation channels. Similarly, in the Block Island NSRA [31] it was concluded that interference with maritime electronics systems such as radar or aids to navigation is not anticipated to be an issue.

The UK guidelines [19] refer to a study carried out for the North Hoyle Offshore Wind Farm, located offshore of Wales. The study looked at VHF communications and concluded that, due to the wavelength of the VHF systems, any interference caused by wind turbines would be negligible. It was found that within 1.5 nm, the turbines may develop radar clutter.

Effective Management Option:

Published guidelines and codes typically request that radar impact be considered in conjunction with the specific project, location, and vessel traffic. Impacts should be considered on a case-by-case basis and may be of notable importance for certain projects whether the navigation channel is running adjacent/parallel to the OREI or if it is heading towards the OREI with a bend to go around.

While some level of radar impact is acknowledged and expected, there seems to be a consensus that the operation of the gain control is able to adapt the output to mitigate some interference effects related to OREIs. However, it is possible for an operator to control the gain such that it can be adjusted to the extent where target vessels become invisible. Thus, close attention should be paid to radar gain and sensitivity settings while transiting near an OREI.

3.2.7 Service/project vessels

An evaluation of offshore wind service vessels is not required as a part of the NSRA for all countries [25]. Service vessels are not specifically highlighted in most of the reviewed literature. However, considering the general request to evaluate navigation risk changes presented in section 3.2.1, it would be expected that the anticipated increase in service vessels be considered.

In Denmark, the impact of the new service vessel traffic must be considered under the NSRA and the increase in potential ship-ship collisions is addressed either qualitatively or quantitatively. It is evaluated whether special measures are needed such as dedicated sailing routes, information to mariners, aids to navigation, etc. Examples of service vessel impacts are seen at Kriegers Flak and Horns Rev 3 [28] [29]. The impact is considered on a case-by-case basis and dependent on where the service vessels will operate and how they will have to interact with the existing vessel traffic.

Examples from NSRAs in the U.S. suggest that the number of vessels be quantified, and the probability of impact (risks) from service vessels be evaluated qualitatively. Within the Block Island NSRA [31], the only mention of service vessels impacts was "The routine maintenance and operation of BIWF will not cause any significant increase in vessel traffic or traffic disruption around the Project Site." In the NSRA for Vineyard Wind [32] the impact from operation and maintenance vessels was addressed qualitatively. Finally, the NSRA for South Fork Wind Farm [27] provided quantitative collision estimates but did not explicitly address the impact from operation and maintenance vessels.

Effective Management Option:

Evaluation of the navigation impact of service vessels is found in some, but not all of the evaluated NSRA studies. The risk is not specifically highlighted in any of the national guidelines, but based on the general guidelines for the NSRA (see section 3.2.1), the increased presence of service vessels should be addressed if identified as a hazard.

3.2.8 Construction and operational safety zones

The UNCLOS specifies a safety zone of 500m may be defined around 'single objects', such as drilling platforms. An IMO circular also advises a zone of 500m around multiple objects. However, it should be noted that such safety zones are considered to be based on the safety of the structure and not the vessel.

Generally, a 500m safety zone is adopted during construction for OREI in the UK, Germany, Denmark, and the Netherlands according to a comparative study in Ref. [25].

BOEM guidance [17] states that a safety zone during construction is recommended by developers. This was also implemented for the Block Island OREI and is expected for the South Fork OREI [27]. It is noted that USCG does not have the authority to issue safety zones beyond 12 nm for offshore wind farm.

During the operational phase, experience from Europe does not show a uniform picture [24]. The construction safety zone of 500m is maintained during the operational phase for Germany and the

Netherlands, whereas both Denmark and the UK typically do not maintain a safety zone during operation. In the UK, the OREI can apply for a 50m safety zone around individual turbines.

Effective Management Option:

Adopting a 500m safety zone during the installation phase of an OREI is generally considered best practice in the North Sea countries. There is generally no consensus around using safety zones during the operational phase.

3.2.9 Aids to Navigation

Navigational marking during all phases of the project should be considered by the applicant. IALA provides an international guideline for aids to navigation for marine structures including OREIs [12]. The UK guideline [20] specifies that aids to navigation must comply with marking for OREIs as required by the General Light Authority (GLA) in consideration of IALA guidelines and recommendations. The USCG guideline [14] requires the applicant to comply with the requirements by the USCG and recommended by IALA. BOEM also recommends following the IALA navigational marking guidelines [16].

Effective Management Option:

Within the U.S., BOEM has issued preliminary guidelines. The USCG provides input to the BOEM process of developing and issuing uniform guidelines for aids to navigation on U.S. OREI.

3.3 Adjusting to Advances in Technology and New Information

The offshore wind industry, like many other industries, is witnessing exponential growth in the available technology. Turbines are becoming larger, in terms of nameplate capacity, blade length, hub height, weight, and size. New, higher voltage electrical collection systems are being developed to conduct greater amounts of power. Many stakeholders seek to understand how advances in offshore wind technology will affect the industry, and for the purposes of this literature review, how technology will affect existing maritime interests. Unfortunately, there are few publications that present definitive forecasts for future development. Therefore, this section seeks to summarize a range of predictions collected from a variety of resources.

3.3.1 Accident Prevention Using AIS

AIS is a GPS-based data tracking system that allows for tracking of vessel movements. Through the International Convention for the Safety of Life At Sea (SOLAS), AIS has been mandatory since 2004 for ships of 300 gross tonnage and upwards engaged on international voyages, cargo ships of 500 gross tonnage and upwards not engaged on international voyages, and all passenger ships irrespective of size. It transmits and records vessel identification, position, course, and speed. It is widely used as a basis for identifying vessel routes, density, type, speed, etc. AIS data also allows for nearly real-time tracking of vessels. This can potentially be used as a risk reducing measure even though AIS is not always 100% reliable. The applicability of AIS has also been identified in the UK guideline [19] even

though it is not mandatory. There are some reports that suggest OREIs could broadcast their own AIS signal as an aid to navigation. AIS may also be used as a measure to mitigate the risk related to radar interference for vessels within the OREI.

3.3.2 Deep Water and Floating OREIs

Technological limitations have until recently prevented OREIs in deep water, which is traditionally defined as greater than 30m (100 ft.). This has generally meant that OREIs are located close to shore. New manufacturing and installation technologies are allowing for deployment of traditional bottom-fixed offshore wind foundations to be installed in water up to 60m (200 ft.) deep, with even deeper projects being planned. In newer technology development, floating turbines open up the development possibilities to install OREIs very far from shore in considerably deeper water. While the OREI itself may not appear visibly different from the perspective of a vessel, the presence of turbines far from shore may introduce both benefits and drawbacks compared to traditional bottom-fixed OREIs closer to shore. Pilot projects have been deployed by Equinor, Hywind, and others. At the time this report is published, Equinor is developing the Hywind Tampen project, which will be the first multi-turbine floating foundation project. Due to the emerging nature of this technology, little definitive information has been published; however, some logical assumptions regarding the impact of floating OREIs may include the following:

- > Dynamic cables will be used to connect the turbines. Dynamic cables are suspended in the water using systems of floats, weights, and anchors to hold their position, as seen in Figure 3-2. Due to the OREI being located further offshore, the export cable may pass more or larger navigation routes. Similarly, the vessel traffic of service boats may also encounter more navigation routes to cross and thus an increased risk of collision.

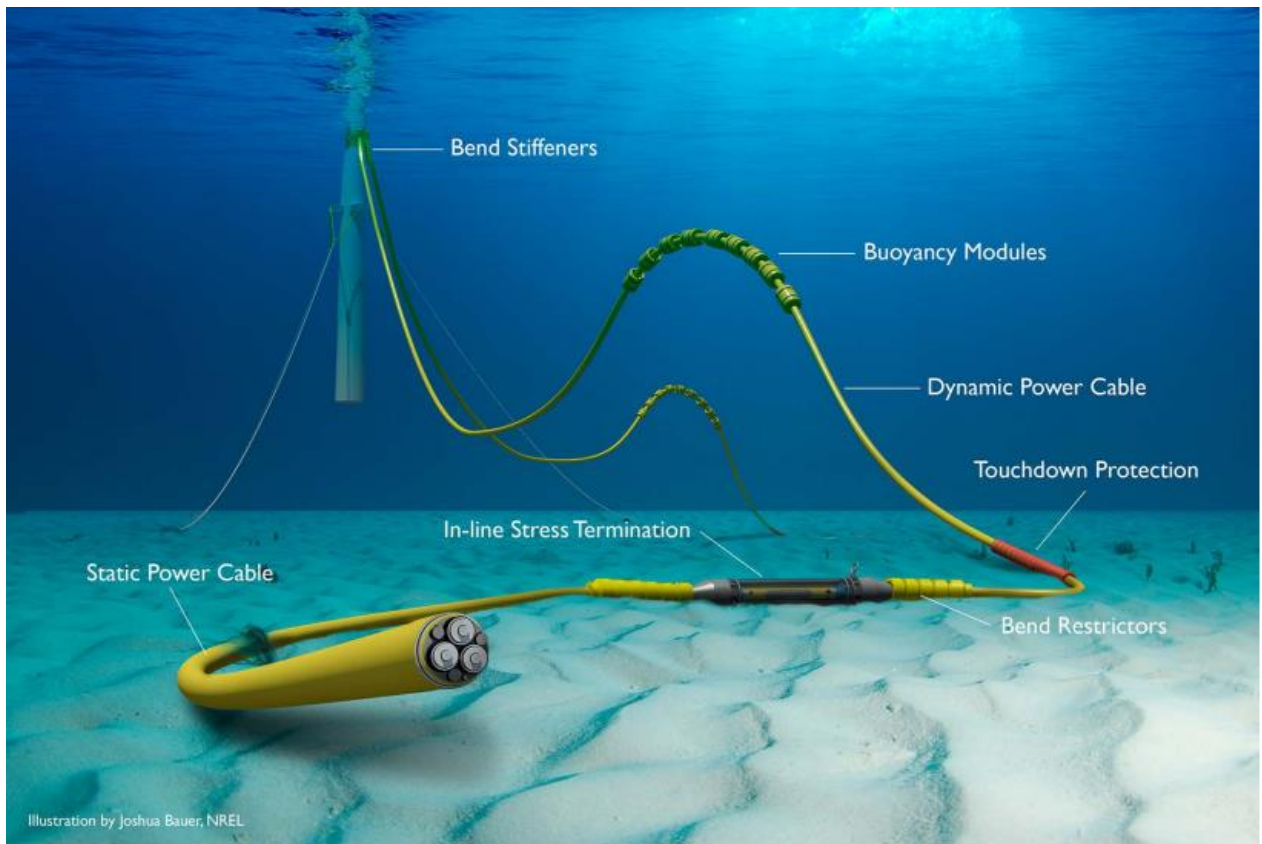


Figure 3-2: Typical dynamic electrical cable (photo credit NREL, obtained from BOEM [39])

- > On the other hand, the possibility of siting OREIs in deeper water increases the siting options and can reduce "congestion" of OREIs in areas that may also have significant vessel traffic.

3.3.3 Increased Turbine Size

The development of the offshore wind industry points towards increasing turbine sizes. Sizes are generally measured by the energy capacity (in MW) but a size increase will also increase the physical dimensions of a turbine, such as height and diameter. Literature addressing the impact of increased turbine size on navigation safety was not found. Larger turbines with sizes of 10-20 MW may have a diameter of 250-300m. In order to maximize energy production, turbines are typically spaced in regular arrays at a set number of "turbine rotor diameters"; typical arrays are 6 to 10 rotor diameters. As rotor sizes increase, one may expect spacing between turbines to increase, ultimately resulting in fewer turbines per area.

Potential impacts to radar due to larger turbines was not examined by this literature review.

3.4 Electrical Transmission System

This literature review seeks to identify and discuss issues with regard to the electrical transmission system (i.e. submarine cables), especially with regard to cable routing, burial depth, and cable protection.

3.4.1 Risk Assessment for Cable or Pipeline Protection

Due to the necessity of connecting the offshore infrastructure with onshore electrical demand, cables to/from an OREI will often pass under a navigation channel, traffic lane etc., and thus, there is a risk that a dropped anchor may impact or damage the cable. There is a corresponding risk that an electrical cable can foul a vessel's anchor. The risk will depend on the design, burial, and protection of the cable. Most of the references reviewed for this literature review consider the impact to the cable as a hazard to be considered within the NSRA, which is discussed in section 3.2.1. The risk of vessel impact with transmission cables is also listed in the UK guideline [19] as a major hazard. Even though the consequence of such an incident is not anticipated to pose substantial risk to human life, an incident may cause severe economic loss if a cable was damaged.

Experience from offshore wind projects in Denmark suggests that the risk of cable impact and the risk associated with the wind turbines be considered separately due to the different ownership and thus liability of the transmission cable and the wind turbines [29] [28].

It is noted that for South Fork OREI [27] the risk of cable impact is not considered in the NSRA specifically. The risk of impacts to the South Fork Export Cable is evaluated elsewhere in the Construction and Operations Plan and in the New York State Article VII filings. For the Block Island NSRA the risk to cable impact is discussed. Based on a study of anchor penetration depth, it was evaluated that likelihood of exceeding target burial depth was remote.

While there is no one way to evaluate the risk of impact from a dropped or dragged anchor several analyses have been performed on this subject. Det Norske Veritas Germanischer Lloyd (DNVGL), an international classification society, has issued a best practice on risk assessment for pipeline protection [33], which may to some extent be applicable to transmission cables as well. However, it is worth noting that the consequence of a disruption of a pipeline can be significantly different from a disruption in a transmission cable. DNVGL introduces safety classes based on the expected consequence and associates an annual failure probability either for the pipeline aggregated or per any km if risk is local.

The risk related to offshore pipelines has been investigated by DNVGL [33] and by Vinnem (2007) [26], which provide empirical values for relevant parameters such as: probability of dropped anchor per nautical mile (may be location specific), empirical relationship between ship size and anchor weight and fluke length, chain breaking load, and ship accident frequencies leading to sinking ships.

Effective Management Option:

> From the literature review, it appears to be advisable to consider the risk of cable impact even though elaborate quantitative analysis was not found to be common. However, assessment of impact is not always considered as part of the NSRA for the OREI itself.

3.4.2 Cable Burial or Protection

Impact from an intentional or unintentional dropped anchor is a major hazard for transmission cables. This risk is mentioned several places in the literature. Where the section above considered the best practice in regard to an analysis framework, this section considers specific recommendations and best practices for the cable burial depths or other protective measures. Generally, the navigation risk associated with cable impact is considered as part of the NSRA and is, as such, one of several hazards to be analyzed, evaluated, and potentially mitigated in the NSRA.

There are various ways of protecting transmission cables and significant experience to leverage from the offshore pipeline industry. In addition to burying the cable, a cover or coating are alternative methods. It is also noted that other factors influence the burial depth, most dominantly the required heat dissipation.

Various methods for determining cable burial depth or protection were reviewed and are listed below.

- > Guidelines for offshore electrical cable burial for OREIs were prepared for BOEM [4]. A burial depth of 1-2m is considered necessary from a design perspective due to the heat dissipation. Burial depth beyond this is unfavorable when considering cable performance and installation cost. The study concludes that the norm for acceptable cable burial depth is 3-6 ft (1-2m) unless it is inside an anchorage area or navigation channel where 15 ft should be adopted (4.5m). Furthermore, location or project specific circumstances and soil conditions could affect the burial depth.
- > Another BOEM study [17] infers that the USACE guidance on burial depth is 3-6 ft unless in an anchorage area where it should be 15 ft below seabed and thus, consistent with Ref. [4]. The study also mentions that cable burial depth should be considered as part of the NSRA. For the specific case of the South Fork OREI NSRA [27], the recommended burial depth was 3 ft plus an armor layer with reference to the BOEM study. For the Block Island OREI NSRA [31], a target depth of 6 ft was determined appropriate based on a study of fishing gear or anchor penetration of vessels typically passing the area, noting that if a larger vessel accidentally anchors, it may reach and damage the cables.
- > According to the UK guideline [20], cables are generally to be buried if possible. If this is not possible, (e.g. due to underwater features and/or seabed ground conditions) they should be protected to mitigate the risk to vessels. The UK guideline refers to a 5% reduction in the surrounding charted depths unless developers are able to demonstrate evidence that any identified risks to any vessel type are satisfactorily mitigated.
- > The DNVGL best practice for pipelines [33] uses risk assessment to determine the appropriate burial depth associated with a certain failure probability. The acceptable failure probability is dependent on the safety class of the structure and may be considered in aggregate for the entire pipeline or as criteria per km (reducing the criteria by a factor 10) if risks are considered local.
- > In the Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR) Commission Best Environmental Practice for Cable Laying [40], they evaluated the typical burial depths across several countries and found that Germany adopted a minimum of 1m within the

EEZ in general with a minimum of 3m burial depth in areas of heavy ship traffic (such as shipping channels). In the Wadden Sea, a minimum of 2m below the seabed was adopted. Experience from cable installation in recent Danish and Swedish offshore wind projects in the Wadden Sea and Baltic Sea suggest a burial depth of 1-2m.

Effective Management Option:

The review of various practices for burial depths suggest a case-by-case approach where the crossing vessel traffic be considered in relation to the potential impact from intentionally or accidentally dropped anchors. Both American and European resources typically indicate that a 1m (3 ft) minimum burial depth be appropriate with a larger burial depth of 2-3m in areas with significant vessel traffic and 4-5m in anchorage areas.

4 Developer Roundtable

NYS DOS and NYSERDA hosted a two-part Developer Roundtable on August 11 and August 14, 2020 for the key purposes of introducing OSW developers to the M-TWG, providing OSW developers an opportunity to share initial views on the draft report, receive updates from the U.S. Coast Guard on recent Port Access Route Studies (PARS) and to initiate a discussion on key topics of special interest to the maritime community related to current and upcoming OSW projects. OSW developers were invited to share their feedback to this report and highlights of that feedback are captured in this section and the detailed notes from the Developer Roundtable provided in Appendix C. In addition, the literature review was updated to reflect the latest editions of references.

Following DOS and COWI's summary of the technical report, developers were invited to share their feedback on the report. Developers expressed a desire to have been invited to formally join the M-TWG at its creation and to have been included in the development of the report prior to the roundtable. DOS discussed the intent of the M-TWG and the rationale for its creation. In particular, that the M-TWG membership was originally constructed to bring together the diverse navigation-related interests of the maritime community to advance the State's offshore wind goals through focused, constructive dialogue and information sharing. The intent of the survey campaign was to provide an outlet for existing maritime operators to share an unfiltered but organized set of perspectives that would provide a structure for expanding the coordination and dialogue to include broader offshore wind stakeholders. Throughout the discussion of the report and the roundtable, agency officials, M-TWG members and OSW developers expressed their commitment to working together.

There was general agreement among the participants that marine coordination prior to and during construction and operation of OSW facilities will be critical to success of all affected industries. Developers described their various methods to date for engaging the maritime community, which has generally focused on seizing the opportunities available for group dialogue (e.g., presentations to the New York Harbor Safety and Operations Committee) as well as putting significant effort into local outreach. They indicated that a forum like the M-TWG would be useful for them, particularly if the membership were more inclusive of the vessel operators and port facilities in the Harbor, as they have experienced difficulty finding a single forum where they can engage all of the relevant maritime stakeholders.

The U.S. Coast Guard then provided an update to recently completed, ongoing and upcoming Port Access Route Studies (PARS). The PARS are intended to be a tool to help facilitate safe navigation, including safe routing around existing and future offshore wind lease areas. The initial Atlantic Coast PARS (ACPARS) was conducted from 2011 to 2017 and recommended developing navigation safety corridors into shipping safety fairways. U.S. Coast Guard is currently conducting supplemental studies, including the North NY Bight PARS and Seacoast of New Jersey PARS. The Massachusetts and Rhode Island PARS (MARIPARS) was recently completed in May, 2020.

During day two of the roundtable, DOS initiated a guided dialogue on certain key topics of special interest including wind farm setbacks between turbines and vessel travel lanes, radar interference, transmission cable depths and routing, vessel traffic in New York Harbor and up the Hudson River, and suggestions and recommendations for additional studies.

OSW turbines are installed a certain distance outside of navigation fairways; that distance is known as a “setback”, or “setback distance”. There was a robust discussion between parties on the appropriate setback distance for OSW projects. Participants agreed the first step to determining appropriate setback distances is to decide upon how risk should be measured and defining the acceptable level of risk. For the role of the M-TWG, the discussion focused on distance between navigation fairways and the closest turbines, rather than navigation between turbines, as large commercial vessels are not likely to navigate within a wind farm. The discussions regarding potentially desired or preferred setback distances related primarily to needs for vessels within a traffic fairway to execute 180 degree turns and potential loss of propulsion/steerage incidents.

During the discussion of radar, some participants noted that radar interference can be mitigated through strategies such as larger setback distances or adjusting radar settings, while others cautioned that adjusting some settings could limit the ability to detect smaller targets. The group also discussed a new study in progress on potential radar interference involving sea trials off the coast of Block Island.

Another robust discussion was facilitated regarding the location and burial depth of submarine transmission cables. The group acknowledged that cable routing and burial encompasses a wide range of additional considerations and stakeholders, including where power can be injected into the grid, cost effectiveness, environmental issues and more. OSW developers stated that they were searching many different alternatives for cable interconnections and routes and would comply with all permitting requirements. M-TWG members requested that submarine cables be as short as possible, and located outside of official and unofficial anchorage areas, cross traffic lines perpendicularly, and be buried as deeply as possible. All participants agreed that despite challenges, they share the same goal of protecting cables and avoiding accidents.

Vessel traffic and size on the Hudson River were identified as another set of key issues for coordination. Participants agreed that some navigation challenges on the Hudson River pre-date the OSW industry, but are increasingly relevant as a number of facilities have been proposed for OSW use in the NY Capital Region. There was strong support among participants for developer-run vessel coordination and undertaking traffic simulations.

In closing, roundtable participants agreed that developer input in the M-TWG is important to advancing discussion of these topics. DOS also encouraged all meeting participants to recommend specific issues which may benefit from additional New York State studies, involvement or coordination.

5 References

- [1] Port Authority of New York and New Jersey, "Port Master Plan, 2050," PANYNJ, New York, NY, July, 2019.
- [2] U.S. Coast Guard, Vessel Traffic Service New York, User's Manual, U.S. Coast Guard, November, 2019.
- [3] U.S. Coast Guard, Advisory Notice (CGAN 2017-016) Re: Ultra Large Container Vessel Guidelines, Staten Island, NY, USA: U.S. Dept of Homeland Security - U.S. Coast Guard, September 1, 2017.
- [4] M. Sharples, "Offshore Electrical Cable Burial for Wind Farm: State of the Art, Standards and Guidance & Acceptable Burial Depths, Separation Distances and Sand Wave Effect," BOEM, 2011.
- [5] *Aubeny, Charles Testimony*, 2015.
- [6] The Carbon Trust, "Cable Burial Risk Assessment Methodology: Guidance for the Preparation of Cable Burial Depth of Lowering Specification," February 2015.
- [7] United States Army Corps of Engineers, "33 CFR Part 329 Definition of Navigable Waters of the U.S."
- [8] IMO, "Guidelines for Formal Safety Assessment for use in IMO rule-making process," International Maritime Organization, 2002.
- [9] IMO, "Resolution A. 572(14) General Provisions on Ships' Routing," IMO, 1985.
- [10] UNCLOS, "United Nations Convention on the Law Of the Sea," UNCLOS.
- [11] PIANC, "Report 161, Interaction between Offshore Windfarms and Maritime Navigation," The World Association for Waterborne Transport Infrastructure, 2018.
- [12] IALA, "Recommendations for the marking of offshore structures,," International Association of Lighthouse Authorities, 1984.
- [13] USCG, *Requirements WWM Navigation Safety Risk Assessment*, United States Coast Guard, 2015.
- [14] USCG, "Guidance on the coast guards role and responsibilities for offshore renewable energy installations (OERI), NVIC 01-19," U.S. Department of Homeland Security, 2019.
- [15] USCG, "Marine Planning To Operate And Maintain The Maine Transportation System and Implement National Policy," U.S. Department of Homeland Security, 2019.
- [16] BOEM, "Bureau of Ocean Energy Managements Offshore Wind and Maritime Industry Knowledge Exchange," BOEM, Baltimore, MD, 2018.
- [17] BOEM, "Supporting National Environmental Policy Act Documentation For Offshore Wind Energy Development Related To Navigation," BOEM Bureau Of Ocean Energy Management, 2019.
- [18] USCG, "Massachusetts and Rhode Island Port Access Routes Study (MARIPARS)," United States Coast Guard, 2020.
- [19] MCA, "Methodology for Assessing Marine Navigational Safety & Emergency Response Risks of Offshore Renewable Energy Installations (OREI)," Maritime And Coastguard Agency, 2020, Draft.
- [20] MCA, "Offshore Renewable Energy Installations (OREIs) - Guidance on UK Navigational Practice, Safety and Emergency Reponse," MGN, Maritime and Coastguard Agency, 2020, Draft.

- [21] T. M. o. E. Affairs, "White Paper on Offshore Wind Energy - Partial Review of the National Water Plan - Holland Coast and area north of the Wadden Islands," The Ministry of Infrastructure and the Environment, 2014.
- [22] NL, "Policy Document on the North Sea 2016-2021," The Dutch Ministry of Infrastructure and the Environment, 2015.
- [23] SSPA, "Methodology for Assessing Risk to Ship Traffic from Offshore Wind Farms," Vattenfall and Swedish Energy Agency, 2008.
- [24] D. GL, "Summary Report on North Sea Regulation and Standards," Danish Maritime Association, 2015.
- [25] R. A. Mehdi, "Improving the coexistence of Offshore Wind farms and shipping: an international comparison of navigational risk assessment processes," *World Maritime University*, 2018.
- [26] J. Vinnem, "Offshore Risk Assessment - Principles, Modelling and Applications of QRA studies," *Springer*, vol. 2nd edition, 2007.
- [27] D. GL, "South Fork Wind Farm - Navigational Safety Risk Assessment," DNV GL, 2018.
- [28] COWI, "Horns Rev 3 Offshore WindFarm Navigational Risk Analysis," Orbicon, 2014.
- [29] DNV-GL, "Kriegers Flak Havmøllepark - Sejladsforhold, VVM-redegørelse. Teknisk baggrundsrapport," Energinet.dk, 2015.
- [30] C. H. Consulting, "Revised Navigational Risk Assessment," Vineyard Wind, 2018.
- [31] D. Wind, "Navigation Risk Assessment - Block Island Wind Farm & Block Island Transmission System," Tetra Tech, 2012.
- [32] V. W. LLC, "Drat Construction and Operations Plan, Volume III, Appendix I, Navigation Risk Assessment," 2019.
- [33] DNVGL, "DNVGL-RP-F107 Risk Assessment of Pipeline Protection," DNVGL, 2017.
- [34] IMO, "Guidelines for Formal Safety Assessment for use in IMO rule-making process," International Maritime Organization, MSC&Circ1023, MEPC/Circ. 392, London, 2002.
- [35] DNV, "Memo omkring sejladsforhold: Koordinering af metoden for Horns Rev 3 og Kriegers Flak," Danish Maritime Authority, 2013.
- [36] Vineyard Wind, "New England Offshore Wind Leaseholders Submit Uniform Layout Proposal to the U.S. Coast Guard," November 19, 2019. [Online]. Available: <https://www.vineyardwind.com/press-releases/2019/11/19/new-england-offshore-wind-leaseholders-submit-uniform-layout-proposal-to-the-us-coast-guard>.
- [37] Orsted, *Proposal for a uniform 1x1 nm wind turbine layout for New England Offshore Wind*, USCG , 2019.
- [38] "O.D. Larsen, Ship collision with bridges,," IABSE , 1993.
- [39] National Renewable Energy Laboratory, "Offshore Wind Plant Electrical Systems," in *BOEM Offshore Renewable Energy Working Group*, July 29-30, 2014.
- [40] OSPAR, "Guidelines on Best Environmental Practice (BEP) in Cable Laying Operation," OSPAR Commission, 2012.
- [41] P. Friis-Hansen, "Basic Modelling Principles for Prediction of Collision and Grounding Frequencies, Working Documents," 9 March 2008.
- [42] G. Lloyd, "Offshore Windparks - Parameter für Risikoanalysen im Genehmigungsverfahren und Wirksamkeit kollisionsverhindernder Massnahmen," 2010.
- [43] ISO, "ISO 31000, Risk Management," 2018.

- [44] A. Rawson, "Assessing the impacts to vessel traffic from offshore wind farms in the Thames Estuary," *Scientific Journals of the Maritime University of Szczecin*, 2015.

Appendix A Survey Questionnaire and Survey Responses

TELEPHONE RECORD

TITLE Telephone Interview – Sandy Hook Pilots Association
DATE November 11, 2019
PLACE Via Telephone
INVITED Andrew McGovern – Sandy Hook Pilots Association
 BRCO - COWI
 MWSI - COWI
PREPARED BY BRCO, November 22, 2019
DISTRIBUTION All present, Project File
PROJECT NO A128239-001

ADDRESS COWI North America, Inc.
 276 5th Avenue
 Suite 1006
 New York, NY 10001
 USA

TEL +1 646 545 2125
WWW cowi.com

PAGE 1/8

1 Introduction & Background

Hello, my name is Brent from COWI, and I'm working with NYSDOS & NYSERDA to identify maritime and navigation concerns that could influence how offshore wind and renewable energy transmission to NYS gets developed.

Thank you agreeing to this meeting. You were identified as a member of the Maritime Technical Working Group (M-TWG). COWI requested this meeting with the Sandy Hook Pilots Association (SHPA) in order to discuss marine commerce trends (e.g. volume, vessel types and sizes), describe navigation needs and challenges of commercial vessels, *especially as these key issues may be affected by the offshore wind industry.*

As you're probably aware, NYS has recently awarded contracts to two (2) offshore wind projects. New York State has adopted the most aggressive climate change legislation in the nation, where the Climate Leadership and Climate Protection Act (CLCPA) mandates that at least 70% of New York's electricity come from renewable energy sources such as wind and solar by 2030, and that the state's power system is 100% carbon neutral by 2040. Recognizing that New York State has a substantial potential for offshore wind production, the CLCPA specifically confirms a 9,000 MW by 2035 mandate for the State's offshore wind program. Your experience and industry knowledge are valuable to NYSDOS and NYSERDA and your responses to this survey will help inform NYS as it seeks to help guide the offshore wind industry toward responsible offshore development.

We will be using information from this discussion in a report to NYS that identifies the future trends in the maritime industry and potential concerns related to offshore wind development.

2 Confidentiality

- > Please identify your preferred level of confidentiality:
 - > My responses and the name of my organization may be made public.

3 Structured Interview

3.1 Traffic

- > New York is one of the busiest harbors in the world. Describe your experience with the volume of vessel traffic when **in** the harbor. Do you experience difficulty navigating safely and freely, and if so where are the navigation bottlenecks? What changes do you see now in navigation within the harbor and what other changes do you see in the next 10-20 years?

Discussion:

NY mariners have a history of adapting to additional vessels in the water. For example, during the last harbor deepening project, there were up to approximately 80 dredging vessels operating in the shipping channel, which intermittently caused half of the channel width to close to vessel traffic. Even with the intermittent closures, shipping did not experience major impacts to our operations. However, the maritime industries that utilize the harbor acknowledge that OSW projects will be multi-phase and multi-years long projects, not just a single construction phase and the impacts not well understood.

- > Describe your experience with the volume of vessel traffic when **approaching** the harbor. Do you experience difficulty navigating safely and freely, and if so where are the navigation bottlenecks? Are you forced to add time/distance to your trip to negotiate vessel traffic? What changes do you see now in navigation approaching the harbor and what other changes do you see in the next 10-20 years?
- > Are existing navigation fairways and/or traffic separation lanes reflective of your preferred transit routes to/from other ports? Are you forced to add time/distance to your trip to use the existing navigation fairways or lanes?

Discussion:

Outside of offshore wind, Federal Agencies (e.g. U.S. DOT) are pushing to create "Americas Blue Highway¹," which would create more coastal shipping traffic. SHPA is pushing to see safe navigation fairways established before offshore wind facilities are installed in the water. The fairways should be straight and then build wind farms around the fairways.

The previously completed Atlantic Coast Port Access Route Study (ACPARS) was primarily focused on north and south routes for coastwise shipping. The in-process New York Port Access Route Study (NYPARS) is more focused on east and west routes (e.g. ships entering and exiting the harbor). It would be valuable for the U.S. Coast Guard to commission more studies like this to assess impacts that wind farms could have for shipping."

- > What is the typical minimum vessel separation distance that your vessels try to observe when following or passing other vessels and when not regulated by VTS/TSS?
- > Do you see changes/trends in the type of shipping (e.g. new/different routes, short sea shipping? barge vs ship transport? types of cargo?)
- > Do you routinely drop anchor in the same place? Can we send you a map where you can identify these locations for us (email/mail)?
- > Would you be interested in having areas open to being designated as anchorage and non-anchorage areas?

Discussion:

There are unofficial anchorages in place (generally 48 hour maximum), but The harbor safety committee is working with the U.S. Coast Guard to designate additional anchorage areas and SHPA recommends that power cables are not routed through those locations.

A traffic issue has been identified on the Hudson River. A developer has proposed building concrete gravity based foundations (GBF) at the Port of Coeymans. The GBF proposed by the developer are significantly wider than the beam of vessels traversing the river. It is not anticipated that the movements of the GBF would have a problem but they may cause problems with other traffic. Moving a vessel of that size down the river would likely mean closing off

¹ <https://www.maritime.dot.gov/newsroom/speeches/marine-highway-conference-%E2%80%9Camerica%E2%80%99s-blue-highway%E2%80%9D>

the river to other traffic during transit. It is likely that NY mariners will be able to adapt, but this operation will require additional coordination.

3.2 Vessel Size

- > In general, the overall trend is that some vessel types (e.g. container ships) are getting larger. What kind of vessels do you operate/service? How do you anticipate those vessels to change (LOA/Beam/Draft/DWT/etc..) over the next 20 years?

Discussion:

The general trend is that vessels continue to become larger. New York is anticipating that 18000 TEU vessels will likely begin service in the harbor in 2020.

3.3 Operations

- > **Liquids regulation** – regulation of transporting liquids (i.e. oils and petrochemicals). Who does it and how, especially within navigation fairways? How long does it take for the liquids inspections to occur from when you enter the Harbor (avg & max)? Are you anchored in one place for this duration?
- > Vessel stores: how is your access to vessel stores (food, equipment, supplies, etc..).
- > Please describe your access to fuel. How critical is the availability/cost of fuel to your business? How/where are your vessels fueled? Do you anticipate any changes to the fuel type used by the vessels you operate/service (e.g. Low sulfur, LNG, battery)?
- > How do you anticipate the general volume/ frequency of vessels to change your operations/service?
- > On accessibility to tugs, will there be enough operating space to meet our navigation needs with increased traffic around the NY Bight? What could be done to improve accessibility to tugs?

3.4 Offshore Wind

- > Is your business familiar with navigating in, around or through individual or multiple offshore wind farms?
- > OSW obviously introduces fixed objects in the ocean with the potential for vessel allision. Can you provide any input on your view of minimum separation distances between vessel traffic and fixed objects (e.g. wind turbines,

substation, etc.)? How does this minimum separation distance change with respect to vessel speed – is there a standard rule you follow to determine how long it will take you to alter course or stop your vessel?

Discussion:

SHPA is concerned that neither federal nor state governments will have much oversight of vessel traffic outside of national boundaries, as no agency has true oversight in international waters. SHPA representatives have worked with the International Maritime Organization (IMO) on creating the latest International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW). Based on experience, not all vessels comply with those standards. SHPA is concerned that installing fixed structures (e.g. OSW turbines) too close to shipping lanes will result in increased collisions.

The draft Navigation Safety Risk Assessment (draft NSRA) prepared by a domestic developer provides a setback of 1 mile between the navigation channel and the wind turbines; this proposal does not use the IMOs' updated recommendations of 2 miles between channels and wind farm turbines². The shipping industry may accept a 1-mile setback if the pilots' station could be moved further offshore, but the state-licensed pilots do not have jurisdiction in international waters.

- > OSW also introduces new submarine cables in the ocean and within the harbor with the potential for cable strikes. What is your view of minimum cable burial depth beneath navigational assets (e.g., channels, fairways, anchorages) vs. burial depth in other areas?

Discussion:

To prevent anchor damage to cables, the industry should be considering ten (10) to 15 feet deep cable burial in areas of anchorages. Studies of older vessels showed around 15 ft of anchor penetration, but newer, larger ships will have larger anchors that will penetrate deeper. At this time, SHPA is not aware of new studies on anchor depths for larger vessels, but the Harbor Safety Committee is pushing for more research on bigger ships.

When a cable or pipeline operator obtains a permit from USACE, the permit contains conditions that if the shipping channel is dredged in the

² White Paper on Offshore Wind Energy: Partial review of the National Water Plan Holland Coast and area north of the Wadden Islands

future, the entity owning the cable or pipeline is responsible for moving and/or deepening the cable.

Eric Johannsson (M-TWG) will have a lot of information on anchor burial. The Harbor safety has a sub-committee that regularly works with utility companies for routing plans for power cables.

- > When submarine cables cross other infrastructure (pipelines and other cables), they are often buried shallower and cable protection is placed on top. Do existing cable crossings pose a concern to navigation or your business? Do you have specific concerns with future submarine cables; if so, what are they?
- > Aside from the issues you just raised, how do you anticipate offshore wind to affect your business?

3.5 OSW Zones BMPs

- > Provide input on offshore wind development best management practices to address maritime issues and on strategies for offshore wind developers and maritime industry representatives to engage each other effectively. This input, guidance, guidelines etc. might take the form of:
 - > Protocols that could be added to the Vessel Traffic Service (VTS) Manual, including how offshore wind vessels will operate within the VTS zone.
 - > Changes that could be made to ensure a smooth handoff between the VTS zone and national waters. What changes need to be made to the navigational paths managed by NOAA? What other elements need to be coordinated to make that transition smooth?
 - > Potential best practices for how offshore wind developers should coordinate placement of export cables to shore and inter-array cabling within the project footprint.
 - > Recommendations on navigational aids within a wind farm (e.g., PATONS, AIS, individual markings).
 - > Issues with navigation safety in, around, and through individual and adjacent offshore wind installations.

Discussion:

Harbor safety committee has been pushing for 2-mile setback of turbines from shipping channels. The UN Law of the Seas dictates that

no vessels may approach within 500m (~1640 ft.) of an offshore object. Equinor has proposed a 1-mile setback from navigation fairways to the closest turbines, which is not enough room for ships to turn around in channels, if needed. The shipping industry would be content with 2-5 miles spacing between shipping lanes and turbines but is concerned with safety risks associated with a 1-mile setback. A Dutch study on windfarm impacts on shipping highlighted that 2 miles is the closest distance that can be safe for vessels.

3.6 Miscellaneous

- > What do you see as the largest hazard/risk at the moment (e.g. collisions, allisions, near miss, anchor strike)?

Discussion:

Permanent fixed structures create additional risk of allisions, which in turn potentially increases the risk of adverse environmental impacts if the alluding vessel is compromised and fuel or other vessel cargo is spilled on to NJ and NY beaches and surrounding ecosystems.

- > Where do you see these risks? Why do you think the risks are associated with these locations?
- > What are the best preventive tools to avoid these risks (e.g. TSS, pilot, VTS etc?)
- > **Autonomous shipping vessels (MATS)**— Finland, Norway and Sweden are already using autonomous shipping vessels for ferrying and cargo hauling. How will human-driven shipping vessels interact with autonomous ships, and how will they be regulated upon arrival?

Discussion:

IMO has addressed the idea of more countries using MATS, the coast guard is also working on a study of this right now. I do not see this technology being used in the future for international travel, as it too much of a liability issue for companies. International ship operators are saying that it is cheaper for them for the foreseeable future to used manned ships compared to autonomous ones. Smaller ships may begin to use this technology but not larger cargo ships. We may begin to see more ROVs than autonomous vessels.

- > Are there specific actions / programs / regulations / incentives / etc... that could be undertaken by government, OSW industry, maritime industry or others that could help to sustain/encourage maritime operations.

Discussion:

It would be helpful if state delegations could work together to do another ACPARS style report. There needs to be balance between what states want to accomplish vs. current issues that need to be addressed, like establishing safety lanes or set distances from channels before putting in wind farms. The blue highway is a better way to haul freight, cleaner and more effective than traditional trucking, but this system needs to be established before the addition of wind farms.

4 Open Discussion

This section is open for any additional discussion raised by interviewee.

Discussion:

Port competitiveness and safety goes into companies' decisions if they will ship to certain ports, if lanes are deemed to be not safe to travel through then NY port will lose business. it is also worth noting that the static electricity created by turbines causes navigational radar interference."

- > What concerns do you have with regard to offshore wind upon which you would like more information?

TELEPHONE RECORD

TITLE Telephone Interview – The Port Authority of New York and
New Jersey (PANYNJ)
DATE November 5, 2019
PLACE Via Telephone
INVITED Bethann Rooney – PANYNJ
BRCO - COWI
MWSI - COWI
PREPARED BY BRCO, November 21, 2019
DISTRIBUTION All present, Project File
PROJECT NO A128239-001

ADDRESS COWI North America, Inc.
276 5th Avenue
Suite 1006
New York, NY 10001
USA

TEL +1 646 545 2125
WWW cowi.com

PAGE 1/10

1 Introduction & Background

Hello, my name is Brent from COWI, and I'm working with NYSDOS & NYSERDA to identify maritime and navigation concerns that could influence how offshore wind and renewable energy transmission to NYS gets developed.

Thank you agreeing to this meeting. You were identified as a member of the Maritime Technical Working Group (M-TWG). COWI requested this meeting with PANYNJ in order to discuss marine commerce trends (e.g. volume, vessel types and sizes), describe navigation needs and challenges of commercial vessels, *especially as these key issues may be affected by the offshore wind industry.*

As you're probably aware, NYS has recently awarded contracts to two (2) offshore wind projects. New York State has adopted the most aggressive climate change legislation in the nation, where the Climate Leadership and Climate Protection Act (CLCPA) mandates that at least 70% of New York's electricity come from renewable energy sources such as wind and solar by 2030, and that the state's power system is 100% carbon neutral by 2040. Recognizing that New York State has a substantial potential for offshore wind production, the CLCPA specifically confirms a 9,000 MW by 2035 mandate for the State's offshore wind program. Your experience and industry knowledge are valuable to NYSDOS and NYSERDA and your responses to this survey will help inform NYS as it seeks to help guide the offshore wind industry toward responsible offshore development.

We will be using information from this discussion in a report to NYS that identifies the future trends in the maritime industry and potential concerns related to offshore wind development.

2 Confidentiality

- > Please identify your preferred level of confidentiality:
 - > My responses and the name of my organization may be made public.

3 Structured Interview

3.1 Traffic

- > New York is one of the busiest harbors in the world. Describe your experience with the volume of vessel traffic when **in** the harbor. Do you experience difficulty navigating safely and freely, and if so where are the navigation bottlenecks? What changes do you see now in navigation within the harbor and what other changes do you see in the next 10-20 years?

Discussion:

New York is fully immersed in the "big ship era". Currently, the USCG and the Harbor Safety, Navigation and Operations Committee ("Harbor Ops") of the Maritime Association of the Port of New York/New Jersey (MAPONY/NJ) have published guidelines for the passage of large ships in certain areas of the harbor. One specific example is the guidelines for the Kill van Kull. Those guidelines specify the times that large tanker and large container vessels (over 8,000 to 9,000 TEUs) may transit the Kill van Kull (+/- 2 hours of slack water, i.e. maximum of 8 hours per day allowed for transit); the speed of the vessels, and the minimum number of tugs required to assist.

The addition of OSW-related traffic will impact current waterway users. If operations of OSW-related vessels create additional restrictions on ability of large container and tanker vessels to navigate the critical waterways during limited transit windows, then existing vessel owners and operators are likely to experience commercial and financial impacts.

PANYNJ and USACE are currently involved in a 3 year long, \$3M, Navigational Improvements Study¹ for the purpose of reducing navigational restrictions, straightening / softening bends in navigation

¹ <https://www.panynj.gov/port/pdf/PA-VesselSimulation-D-no-crop.pdf>

channels, and determining critical locations for localized channel deepening for the ultimate purpose of increasing vessel safety. Following the study, it will likely be necessary to obtain congressional authorization and funding to enact recommendations from the study. The study is focused on restrictions in the Kill van Kull, as well as other area of NY Harbor.

- > Describe your experience with the volume of vessel traffic when **approaching** the harbor. Do you experience difficulty navigating safely and freely, and if so where are the navigation bottlenecks? Are you forced to add time/distance to your trip to negotiate vessel traffic? What changes do you see now in navigation approaching the harbor and what other changes do you see in the next 10-20 years?

Discussion:

In 2011, the Atlantic Coast Access Route Study (ACPARS) "was chartered to address the potential navigational safety risks associated with the development of offshore renewable energy installations (primarily wind farms) and to support future marine spatial planning efforts²". ACPARS is a study of Automated Identification System (AIS) data indicating the specific vessel, vessel type, location, speed, heading, and destination. PANYNJ has not been notified of regular challenges in approaching the harbor.

Are existing navigation fairways and/or traffic separation lanes reflective of your preferred transit routes to/from other ports? Are you forced to add time/distance to your trip to use the existing navigation fairways or lanes?

- > What is the typical minimum vessel separation distance that your vessels try to observe when following or passing other vessels and when not regulated by VTS/TSS?

No comment.

- > Do you see changes/trends in the type of shipping (e.g. new/different routes, short sea shipping? barge vs ship transport? types of cargo?)

Discussion:

"The Port Master Plan 2050 is a comprehensive and flexible roadmap that charts the course for future growth and development at the Port of New York and New Jersey.

The 30-year plan takes a holistic look at the Port, including cargo container facilities, automobile terminals, dry and liquid (non-petroleum) bulk cargo operations, cruise terminal and ferry landings, mapping out the generation of land-use and infrastructure development projects, allowing the port to remain among the nation's leading maritime gateways.³"

The Master Plan covers only PANYNJ facilities; it does not cover the roughly 50 privately owned (primarily petrochemical) facilities. PANYNJ anticipates that the amount of cargo for all facilities (container, bulk, auto, passenger, etc..) will double to triple in 30 years; the number of container vessel calls will decrease; the number of other vessel calls will increase.

- > Do you routinely drop anchor in the same place? Can we send you a map where you can identify these locations for us (email/mail)?

Discussion:

PANYNJ is not involved in daily operation of anchorages. The U.S. Coast Guard is responsible for overseeing daily operations at anchorages.

PANYNJ is the local sponsor for a 3-year duration, approx. \$3M, USACE led study with regard to suitability of existing anchorages. The study includes evaluation of size and depth of the Gravesend anchorage and its sufficiency for the size and # of vessels using the anchorage.

- > Would you be interested in having areas open to being designated as anchorage and non-anchorage areas?

Discussion:

Inside the harbor, vessels are not allowed to anchor outside of designated anchorages. Outside of the pilot light, the water is too deep for commercial vessels to anchor.

3.2 Vessel Size

- > In general, the overall trend is that some vessel types (e.g. container ships) are getting larger. What kind of vessels do you operate/service? How do you

³ <https://www.panynj.gov/port/port-master-plan.html>

anticipate those vessels to change (LOA/Beam/Draft/DWT/etc..) over the next 20 years?

Discussion:

This information is covered in the Port Master Plan. In general, container vessel size is anticipated to increase. Other vessels are anticipated to remain similar in size.

3.3 Operations

- > **Liquids regulation** – regulation of transporting liquids (i.e. oils and petrochemicals). Who does it and how, especially within navigation fairways? How long does it take for the liquids inspections to occur from when you enter the Harbor (avg & max)? Are you anchored in one place for this duration?

Discussion:

Liquids inspection is primarily aligned with petrochemical vessels, which do not call at PANYNJ facilities; however every vessel is subject to inspection by USCG, CBP, etc.

Most cargo inspections are typically conducted by 3rd party agencies by the buyer of the cargo. Inspections typically only occur at anchorages for purposes of lightening vessels. Lightening is the purpose for approximately 60% of use of the anchorages. Bunkering may also take place at same time as lightening; bunkering may take place at fixed berths but depends on size of vessel(s) and if the bunkering operation blocks the channel(s).

- > Vessel stores: how is your access to vessel stores (food, equipment, supplies, etc..).

Discussion:

PANYNJ is generally not involved in vessel stores. Stores generally can be delivered straight to docks. Some providers (e.g. ship chandlers and lube oil) may not be allowed at docks due to TWIC requirements, but this is more of a regulatory issue than an availability issue.

- > Please describe your access to fuel. How critical is the availability/cost of fuel to your business? How/where are your vessels fueled? Do you anticipate any changes to the fuel type used by the vessels you operate/service (e.g. Low sulfur, LNG, battery)?

Discussion:

PANYNJ completed a study 2 to 2.5 years ago regarding the availability of bunker fuel and found more than enough availability. The study was completed before IMO low sulfur fuel requirements (effective 2020). There has been some discussion that there is not enough IMO 2020 compliant low sulfur fuel, though that is anticipated to be due to low existing demand and anticipated to change when 2020 requirements go into effect)

- > How do you anticipate the general volume/ frequency of vessels to change your operations/service?

Discussion:

This information is covered in the Port Master Plan.

- > On accessibility to tugs, will there be enough operating space to meet our navigation needs with increased traffic around the NY Bight? What could be done to improve accessibility to tugs?

Discussion:

There are a limited number of large tug boats that have horsepower required to handle larger ships. When all of the larger ships are required move within the (4) 2-hour windows around slack water per day, it can be difficult at times to locate enough tugs with sufficient horsepower. In some cases, tug boat "handoff" is highly coordinated; an outbound ship that requires 4 tugs will go to a certain point with 4 tugs, then 2 tugs will breakoff to assist an inbound vessel at the handoff location. The timing of the handoff must be coordinated so that the vessels have sufficient tug support at all critical times.

Part of the Vessel Simulation Study includes local vessel pilots training on a simulator to handle larger vessels in the harbor. The simulator allows design vessels actually calling at the port and the available tug fleet. Different scenarios and operational conditions (i.e. visibility, current speed and direct, high winds etc) are tested by several different pilots in order to generate what became the VTS guidelines. Certain situations are now being evaluated with some recent real world experience.

The lesser HP tugs are still busy with other operations, including lightering, moving rail barges, bunker barges, assisting smaller ships, etc..

3.4 Offshore Wind

- > Is your business familiar with navigating in, around or through individual or multiple offshore wind farms?

Not Applicable

- > OSW obviously introduces fixed objects in the ocean with the potential for vessel allision. Can you provide any input on your view of minimum separation distances between vessel traffic and fixed objects (e.g. wind turbines, substation, etc.)? How does this minimum separation distance change with respect to vessel speed – is there a standard rule you follow to determine how long it will take you to alter course or stop your vessel?

Not Applicable

- > OSW also introduces new submarine cables in the ocean and within the harbor with the potential for cable strikes. What is your view of minimum cable burial depth beneath navigational assets (e.g., channels, fairways, anchorages) vs. burial depth in other areas?

Discussion:

PANYNJ is not in the position of recommending burial depths. Cables should be kept below risk of anchor drag strikes.

The existing channel and anchorage depths will not likely remain the same throughout the future. Channels will likely be deepened 57 to 58 ft. with 2 ft. overdredge limit. Cable burial depths should consider future depth, with a margin of error.

- > When submarine cables cross other infrastructure (pipelines and other cables), they are often buried shallower and cable protection is placed on top. Do existing cable crossings pose a concern to navigation or your business? Do you have specific concerns with future submarine cables; if so, what are they?

Discussion:

See Above

- > Aside from the issues you just raised, how do you anticipate offshore wind to affect your business?

3.5 OSW Zones BMPs

- > Provide input on offshore wind development best management practices to address maritime issues and on strategies for offshore wind developers and maritime industry representatives to engage each other effectively. This input, guidance, guidelines etc. might take the form of:
 - > Protocols that could be added to the Vessel Traffic Service (VTS) Manual, including how offshore wind vessels will operate within the VTS zone.

Discussion:

VTS is a valuable system, but it is limited in its ability to coordinate vessel activity offshore. VTS protocols need to consider one-way traffic over limited traffic windows. VTS should consider potentially limited maneuverability of towing large OSW components (e.g. foundations).

VTS will need to bring additional resources to bear for all of industry. USCG will need additional resources, such as AIS, radar sites, tracking, cameras, etc.. resulting in additional infrastructure + personnel.

- > Changes that could be made to ensure a smooth handoff between the VTS zone and national waters. What changes need to be made to the navigational paths managed by NOAA? What other elements need to be coordinated to make that transition smooth?
- > Potential best practices for how offshore wind developers should coordinate placement of export cables to shore and inter-array cabling within the project footprint.
- > Recommendations on navigational aids within a wind farm (e.g., PATONS, AIS, individual markings).
- > Issues with navigation safety in, around, and through individual and adjacent offshore wind installations.

3.6 Miscellaneous

- > What do you see as the largest hazard/risk at the moment (e.g. collisions, allisions, near miss, anchor strike)?

Discussion:

Additional vessel traffic, compressed hours of operation, larger ships with longer stopping distances, and a general lack of resources contribute to risk. Commercial vessels are vying to be first in and first out; the financial/commercial cost of missing a sailing order can be significant.

Sailing order is generally on a first-come first-serve basis, presuming berth space and tugs are available. Since large vessels meetings and passing is prohibited, vessel order is determined by pilots (in coordination with vessels, tug operator, berth, etc..) so that pilots are certain that vessels can proceed to dock. Vessels may not begin their approach to berth until sufficient tugs are available, in the vicinity of St. George (Staten island) where tug escorts are necessary.

Security risks exist in the harbor. The NY/NJ region is a terrorist target. Dense populations exist on Staten Island and Manhattan, which are islands. If the islands need to be evacuated, a considerable contribution to the evacuation is done by water.

- > Where do you see these risks? Why do you think the risks are associated with these locations?
- > What are the best preventive tools to avoid these risks (e.g. TSS, pilot, VTS etc?)
- > **Autonomous shipping vessels (MATS)**— Finland, Norway and Sweden are already using autonomous shipping vessels for ferrying and cargo hauling. How will human-driven shipping vessels interact with autonomous ships, and how will they be regulated upon arrival?
- > Are there specific actions / programs / regulations / incentives / etc... that could be undertaken by government, osw industry, maritime industry or others that could help to sustain/encourage maritime operations.

Discussion:

There are many unknowns about the OSW industry. It is commonly understood that components will probably come from Europe initially, but investments need to be made locally. Marine terminals will not be developed based on "build it and they will come", or based upon singular contracts. State should be more transparent about interim steps in the broader goal. Terminals need a longer term road map for the industry because there's not enough information yet for someone to invest in OSW

business. An offshore wind facility is way too overbuilt for other uses and it is owners are not able to recoup investment in one or two contracts.

4 Open Discussion

This section is open for any additional discussion raised by interviewee.

- > What concerns do you have with regard to offshore wind upon which you would like more information?

Appendix B Confidential Survey Responses

NOT INCLUDED IN PUBLISHED REPORT

Appendix C Maritime Technical Working Group – Wind Developer Roundtable Summary

New York State Offshore Wind Maritime Technical Working Group (M-TWG)
Meeting #8 - Two Part Wind Developer Roundtables - Summary
August 11th and 14th, 2020 | Online Webinar

Next Steps

M-TWG Members:

- Suggest ideas for future research
- Review draft roundtable summary prior to it being considered final
- Coast Guard to check question about ACPARS buffers and get back to the M-TWG
- Coast Guard to provide data on losses of propulsion in the Harbor to M-TWG members and developers

Additional Participants:

- Offshore Wind Developers to share studies on radar and other relevant topics
- Offshore Wind Developers to suggest ideas for future research

Cadmus & CBI:

- Draft meeting summary
- Circulate the draft summary to participants for review

Planning Team (DOS, NYSERDA, and C&C):

- Start planning for the next phase of M-TWG, including conferring with M-TWG members
- Share COWI report with the Fisheries Technical Working Group (F-TWG)
- Share F-TWG cable study with M-TWG members

Research Team (COWI):

- Revise and finalize report
- Discuss with the planning team how to best share the final report

Welcome, introductions, webinar overview

Michael Snyder (DOS), Project Team lead, welcomed participants and provided an overview of the six-hour meeting, held virtually over two days. Participants included M-TWG members and representatives from the five current offshore wind developer teams with lease holdings in the Northeast. They were invited to work together in three sessions to: (1) discuss a draft stakeholder and literature review developed in response to M-TWG research questions, (2) hear updates from the Coast Guard on three Port Access Route Study (PARS) efforts, and (3) explore areas of agreement and divergence on key topics of M-TWG concern. Participants from both days of the roundtable are listed on the final page of this summary, and presentation slides are attached.

I. COWI Report & Responses from Developer Teams

COWI North America researched and summarized in a draft report a set of navigational safety measures and effective management options for consideration based on a maritime stakeholder survey campaign and literature review. In advance of this meeting, the Planning Team circulated the draft report to the developers to give them the opportunity to prepare their feedback. Brent Cooper and Maria Grønnegaard of COWI then provided their key findings. See slides for detail.

Brent briefly presented the results of COWI's stakeholder interviews and the survey results. Issues and trends identified by survey participants include:

- Vessel traffic volume, types, and trends in and around New York Harbor
- Vessel traffic and operations
- Anchor areas and anchoring
- Offshore Wind Zone effective management options

Maria then presented the results of COWI's literature review of Navigation Effective Management Options. The literature review covered a variety of resources including international guidelines, U.S. publications, and previous Navigational Risk Assessments of offshore renewable energy infrastructure (OREI) in the North Sea and Europe that address strategies for reducing navigational risk. COWI briefly presented high-level findings for the three primary areas of focus in the M-TWG literature review, including:

- Evaluation, Assessment, and Management of Navigational Safety and Risk
- Adjusting to Advances in Technology and New Information
- Electrical Transmissions System

The five offshore wind developer teams participating each had one representative share feedback on the report in a panel discussion with the facilitator.

Developer feedback on the report and discussion, with M-TWG member responses in italics:

- Developers noted that the report was informative but shared some concerns with the current draft report, which are summarized below.
- Developers and M-TWG members expressed their commitment to working together and agreed that marine coordination prior to and during construction and operation of offshore wind (OSW) facilities will be critical to success. The maritime and offshore wind industries are aligned in many ways, like having shared goals of preventing spills, accidents, and incidents on the water.
- The developers expressed a desire to have been invited to formally join the M-TWG at its creation and to have been included in the development of the report prior to the roundtable. Several developers felt that certain concerns raised and statements made in the report would not have been included if the developers had been involved earlier in the broader process.
 - *DOS provided contextual background on the intent of the M-TWG and the rationale for its creation, noting that the M-TWG membership was originally constructed to bring together the diverse navigation-related interests of the maritime community to advance the State's offshore wind goals through focused, constructive dialogue and information sharing. Now that these issues have been identified, they are opening the conversation to broader participation. They said the report can be adjusted to indicate that this process has been representative, not comprehensive.*

- Developers expressed concern over the strength of some findings in the report, noting that in some circumstances, stakeholder opinions were insufficiently differentiated from facts, there was limited data or quantitative evidence to back up certain statements, and that some of the rules and practices outlined in the literature review were outdated by several years. Developers provided several suggestions for strengthening further iterations of the report, including leveraging developer data to fill gaps, sharing lessons learned from their experiences in Europe and the U.S.
 - *COWI clarified the intent of the survey campaign was to provide an outlet for existing maritime operators to share an unfiltered but organized set of perspectives; whereas the second section of the report was a review and summary of published literature. DOS and COWI committed to reviewing the document to ensure that opinions were clearly identified as such, and that the report did not imply that it represented a consensus view. DOS and COWI also suggested that the developers provide additional references and to identify any inaccuracies in the report. M-TWG members agreed with the importance of making factual, data-supported statements and citing specific analyses and projects.*
- Several developers expressed concern that there are some issues that have long concerned the maritime industry, such as the need for additional anchorages on the Hudson River, that are now being transferred to OSW as something developers need to solve, despite these problems not being specific to OSW, and in many cases, not within the developers' jurisdiction to address.
 - *M-TWG members acknowledged that anchorage and cable strike concerns predated the OSW industry. M-TWG members also believe that – notwithstanding their history – these issues are still germane to the conversation and it is in everyone's collective interest to resolve them. Members noted that certain protections and guidelines need to be planned for so that both the maritime and OSW industries can thrive.*
- Some suggested the report would be strengthened if it explained the process for decision making, permitting, etc. in the NY Bight including Navigation Safety Risk Assessments (NSRAs) and Construction and Operations Plans (COPs) to clarify those decisions that are up to the developers and the many which are not.
- Developers talked about the need for decisions to be made on a site-specific basis within larger guidance, as each site and waterway is different.
 - *Some M-TWG members noted that there will be more developers coming, so there needs to be standard guidance that can be applied as a baseline across future projects rather than relying solely on tailored, labor-intensive solutions in all cases.*
- Some noted that they disagreed with the report's contention that there is agreement about using safety zones. A 500-meter safety zone is employed around turbines during construction, but there is no standard zone around turbines during operation as it varies by country.
 - *The report states: "Adopting a 500m safety zone during the installation phase of an OREI is generally considered best practice in the North Sea countries. There is generally no consensus around using safety zones during the operational phase."*

- One developer specifically noted that in the U.S., the Block Island Wind Farm does not have a safety zone around turbines during operations and assumes Coastal Virginia Offshore Wind plans to follow this approach, although it is not yet fully operational.
- Some noted the challenge of lack of federal agency authority over navigational safety beyond 12 nautical miles (nm), where most of the leases are currently located, indicating concern for other vessels in transit.
- Developers described their various methods for engaging the maritime community, generally trying to seize the opportunities available plus putting significant effort into local outreach. Some developers noted the importance of tailoring this engagement to specific users or conducting regionally-based outreach to groups that use a specific offshore area. A few noted they have met with the Harbor Ops Committee. They indicated that a forum like the M-TWG would be useful for them, particularly if the membership were more inclusive, as they have experienced difficulty finding a single forum where they can engage all of the relevant maritime stakeholders.
 - *M-TWG members supported using the Harbor Ops Committee as a venue for maritime engagement. Some members also advocated to keep the representative membership of the M-TWG group. They are spokespersons for maritime organizations and described how they serve as a conduit for relaying information from their M-TWG participation to their representatives.*
- Developers noted that that it could be valuable to focus not just on risks of OSW, but also on OSW's benefits and opportunities, including increased search and rescue (SAR) support and business opportunities for mariners.
 - *M-TWG members expressed that they recognize the advantageous aspects of OSW and want this new industry to succeed, just as they want the risks of this development to be avoided or minimized (e.g., adequate justification for deviations from 2 nm setback, address risk of allisions, avoid oil spills).*
- In closing remarks, DOS reaffirmed the State's commitment to continuing the M-TWG as long as these conversations are productive.

II. PARS Update and Discussion

The U.S. Coast Guard provided a Port Access Route Study (PARS) update. The Atlantic Coast Port Access Route Study (ACPARS), conducted from 2011-2017, identified navigational safety corridors along the Atlantic Coast and recommended developing these navigation safety corridors into shipping safety fairways. Establishing shipping safety fairways is intended to serve as a “backbone” to organize traffic flow and ensure freedom from obstructions when mariners are en route to U.S. Ports in the Atlantic Ocean. The presentation also provided updates on ACPARS supplemental studies, including the Northern NY Bight Port Access Route Study (comments are due by August 28, 2020) and the Seacoast of New Jersey Port Access Route Study (Coast Guard will re-open the comment period and hold one or more public meetings during 2020).

Participants asked for clarification on the following topics, with Coast Guard responses in italics.

- What is the potential impact of establishing new fairways on leases?
 - *It is unclear what the potential impact may be. The Advance Notice of Proposed Rulemaking (ANPR) is based on earlier discussions between the Coast Guard and BOEM on buffer zones and deconflicting fairways with leased areas. The Coast Guard noted there is still time to address potential conflicts during the rulemaking process.*
- Do the quality action team report and diagrams already include a buffer from lease area within width of the proposed fairway lane?
 - *The Coast Guard will re-read ACPARS to confirm.*
- How many routes are there off the Rhode Island/Massachusetts Wind Energy Area (WEA)?
 - *There are no routing measures being proposed. The OSW developers within that WEA have recommended a 1x1nm grid to BOEM. BOEM added a project alternative to the Vineyard Wind Supplement to the Draft Environmental Impact Statement that includes transit lanes wider than 1nm.*

III. Key Maritime Topics of Interest:

On the second day of the roundtable discussion, M-TWG members and developers explored key topics named at previous M-TWG meetings and teed up on the first day of the roundtable, including: setbacks, radar, cables depths and routing, and vessel traffic in the Harbor and up the Hudson River to identify areas of common understanding and divergence. For each topic, the facilitator asked some questions to get discussion going, but all participants were invited to share their thoughts and ideas freely. Key points of these discussions are summarized below:

Key Topic 1: Setbacks Between Turbines and Vessel Travel Lanes

What do we know from elsewhere?

- To kick off the discussion about setbacks, COWI provided an overview of primary references used to determine setback distances (see attached slides). The PIANC guidelines use risk assessments as a tool to inform setback distances, and the maximum distance is ultimately a full round turn in a navigation channel plus 0.3 nm. The North Sea guidance defines a safety distance of 2 nm; however, there are pre-determined areas with a smaller setback, but never less than 500m. Lastly, the new UK guidelines issued in 2020 appear to concur with both the PIANC and Dutch North Sea guidelines.
- Participants agreed that the discussion should be focused on establishing appropriate setback distances from wind turbines compared to distances between individual turbines because commercial shipping vessels are not expected to transit through a wind farm.

How do you define an acceptable level of risk?

- M-TWG members and developers agreed that a key first step to determining appropriate setback distances will be to decide how risk should be measured and what an acceptable level of risk is. Several participants suggested the principle of "as low as reasonably practical" (ALARP) for measuring risk, and some thought there might be additional methods for measuring risk to consider. One participant noted the importance of evaluating environmental and economic factors when determining an acceptable level of risk. Participants discussed various components that go into calculating and reducing risk, including the frequency of an event and available mitigations.

What are the major concerns with increasing or decreasing the setback distances?

- While discussing risk, participants discussed the frequency of certain events that need to be considered when determining setback distances. Responding to developer questions, M-TWG members said they could not recall an instance since the 1970s where an emergency 180-degree turn occurred, as there are other safety mitigations in place and sea space to utilize in the event of an emergency. However, planned 180-degree turns are relatively common due to weather or when berth space is unavailable in the Harbor. Another event that increases risk is when ships attempt to pass each other to be the first to pick up the pilot so they can enter the Harbor. Participants suggested that more information is needed to understand why this practice occurs and perhaps clarifying the procedure for ship masters. Participants also noted that, in their experience, loss of propulsion is relatively common, largely due to changes in the sulfur content regulations for fuels, as older ships do not run well on low-sulfur fuel. When the sulfur content regulations changed, there was a big spike in older ships losing power when they switched to low-sulfur fuel. Developers indicated that they would like to base this conversation about loss of propulsion on frequency data rather than general perceptions. Vessels are required to switch fuel types at the Exclusive Economic Zone (EEZ) boundary, but M-TWG members acknowledged this sometimes occurs closer to the Harbor before the pilot boards. Developers said it would be helpful to have clarity on why this practice is happening outside of what regulations require and why it is occurring so much further inshore. The Coast Guard offered to compile data on propulsion losses, but said they would need to determine appropriate parameters for that data.
- Developers advised that the setback area is not the only available space for evasive and emergency maneuvers to occur; several other components should be considered, including the emergency anchoring procedure and traffic separation schemes (TSS).

Key Topic 2: Radar

What are the effects of wind turbines on radar functioning? Is radar interference mitigatable?

- Participants noted that professional mariners with radar certifications typically do not express radar concerns, and that there have been few to no incidents with commercial

fishing vessels in tight turbine spacing and varied layouts. Many did not think this should be much of a concern.

- Several participants noted that radar interference is mitigatable through strategies such as larger setback distances or adjusting radar settings. The latter was a successful strategy for vessels in the UK, although there was some concern among the group that it may limit the ability to detect smaller targets.

What still needs to be studied?

- To respond to local fishermen's concerns regarding their ability to navigate safely, Vineyard Wind is putting together a local study using the turbines off the coast of Block Island. The study will involve a series of sea trials with the most common fishing vessels and will provide a side by side comparison of older and newer radars to identify impacts and potential areas for mitigation, as well as develop a numerical model to show the impacts of a 1x1 nm turbine layout as proposed in the MA/RI WEA. The study report has been delayed due to COVID-19, but will be shareable once it is complete. Developers noted that there are site studies at various wind farms that could be shared. The director of NOAA's IOOS program also has shared some thoughts on radar interference (letter dated July 14, 2014), which a participant forwarded to the group after the session.
 - One participant noted that due to the Block Island wind turbines being close to shore, it is likely that findings of Vineyard Wind's study will only be applicable to small recreational vessels and ferries.

Key Topic 3: Cables Depths and Routing

Where should export cables that have to come into the NY/NJ Harbor be sited (or what areas must be avoided)?

- In response to M-TWG member concern regarding siting cables in the Harbor as opposed to elsewhere, DOS staff emphasized that in addition to cost effectiveness, stakeholder concerns are a key element of siting cables. They said that utilities work in fulfillment of the Federal Energy Regulatory Commission (FERC) regulations and the New York Independent System Operators (NYISO) framework. NYSERDA clarified that the state and developers are working to assess the best options for cable connection based on many factors such as the grid's capacity, reliable sites, and cost effectiveness to connect (given that some areas may require new substations to be built). The State is undertaking a transmission and grid study for this purpose.
- Developers explained that the NYISO interconnection queue operates on a first-come-first-serve basis resulting in a number of developers applying to interconnect to the same site. All developers in queue mature their projects as if they were interconnecting to that site, although ultimately only one project is selected for interconnection.
- Several participants suggested substations accessible from the South Shore of Long Island be considered rather than insisting that cables go through New York Harbor. Developers confirmed that South Shore Long Island substations are also being considered for interconnection.

- M-TWG members recommended that submarine cables be the shortest distance possible; be sited out of anchorage areas whether historically used or formally designated; cross perpendicular to traffic lanes vs. running parallel; and be buried as deep as possible.
- Developers explained that the U.S. Army Corps of Engineers (USACE) is the federal governing body on cable burial and has specific guidance/requirements for burial of cables within federally maintained channels, anchorages, within TSS lanes, etc. Developers are required by the federal permitting process to consult with and gain approval from USACE on their cable burial plans.

How can the liability for cable damages be mitigated for mariners?

- M-TWG members emphasized that the reason for raising this concern is because vessel operators are responsible (i.e., liable) if their vessel anchor strikes an active submarine cable. They described this as a great risk for the shipping industry and cited instances of anchor strikes with cables in the area that are buried at different depths including as deep as 10ft and 15ft.
- In addition to considering substations on the South Shore, one participant suggested bundling the cables and establishing cable corridors to reduce the navigation impact and help developers safely move forward. Developers responded that they agree with this suggestion, but there are limitations preventing this vision, including variation in routing across projects, limits to the number of cables that can be put together before becoming untenable, as well as technical limitations on the burial depth and proximity of high-voltage cables to one another, but could consider cable corridors where possible.
- M-TWG members and developers ultimately agreed that despite challenges, they have the same goal of protecting cables and avoiding accidents. The developers emphasized that they will continue to follow the regulations, work with stakeholders, and work with NYSERDA and the Army Corp of Engineers. One participant noted that the Energy Committee of Harbor Ops has worked out non-regulatory solutions for companies since 2009 and will be happy to work with all companies to develop safe solutions.

Key Topic 4: Vessel Traffic in the Harbor & up the Hudson

What are the vessel traffic pinch points likely to be?

- Participants said key pinch points in the Hudson River are likely to be the stretch from Albany to Kingston, the Highlands for larger vessels going around World's End, and Haverstraw Bay that can be complicated for deep draft vessels.

What needs to happen to start to address or plan for increased vessel traffic?

- Participants expressed broad support for undertaking a vessel traffic simulation or modeling effort to understand potential changes in vessel traffic patterns and develop appropriate control measures. This approach has been successfully implemented in the Harbor in the past. Eric said SUNY Maritime has proposed modeling previously identified pinch points on a simulator to ensure traffic can move safely, but said they need additional funding to update the simulator. Once updated, the simulator could serve other uses, such as helping with setback modeling or better understanding radar interference. One developer expressed their willingness to link their own project-specific marine coordination center with VTS to make sure that marine traffic is appropriately understood by all operators.
- One participant noted that they are less concerned about inshore issues where there is good control and a history of managing issues, than they are about offshore issues. The participant clarified they are not concerned about the developer's vessels, but the fact that most WEAs are outside of the control of most regulatory agencies and there is less control over ships from other countries (e.g., cargo vessels), which could result in potential traffic challenges during construction and operation.
- Several participants noted concerns with development that could increase vessel traffic on the Kill van Kull. Someone noted that it is important to review the limitations in VTS manual with the "Deep-Draft Group" because this may affect developer and State interests in the Kill van Kull.

Key Topic 5: Research and information

Due to time constraints, participants were asked to send research and information topics to Mike Snyder.

Meeting Participants

(T) indicates attendance on Tuesday, August 11th; (F) indicates attendance on Friday, August 14th; (T, F) indicates attendance at both sessions

Working Group Members

- Charles Darrell – New York Shipping Association; (T)
- Michele DesAutels – United States Coast Guard (USCG); (T)
- Captain Eric Johansson – SUNY Maritime, Towboat and Harbor Carriers Association of New York and New Jersey; (T, F)

- Andrew McGovern – Sandy Hooks Pilot Association; (T, F)
- Bethann Rooney – Port Authority of New York and New Jersey (PANYNJ); (T, F)

Project Team

- Farrah Andersen – Cadmus; (F)
- Peter Clouse – New York State Department of State (DOS); (T, F)
- Adrienne Downey – New York State Energy Research and Development Agency (NYSERDA); (T, F)
- Ona Ferguson – Consensus Building institute (CBI); (T, F)
- Megan Lynch – Cadmus; (T, F)
- Laura McLean – New York State Department of State (DOS); (T, F)
- Michael Snyder – New York State Department of State (DOS); (T, F)
- Egan Waggoner – Cadmus; (T)

Others

- Jerry Barnes – United States Coast Guard (USCG); (T, F)
- Cassie Bauer – New York State Department of Environmental Conservation (DEC); (F)
- Lt. Rebecca Blanchflower – United States Coast Guard (USCG); (T)
- Julia Bovey – Empire Wind (Equinor); (T, F)
- Rhianna Bozzi – New York State Department of Environmental Conservation (DEC); (T)
- Morgan Brunbauer – New York State Energy Research and Development Agency (NYSERDA); (T, F)
- Rain Byars – Atlantic Shores Offshore Wind; (T)
- Brent Cooper – COWI; (T, F)
- George Detweiler – United States Coast Guard (USCG); (T)
- Deniz Ekici – Empire Wind (Equinor); (T, F)
- Maria Grønnegaard – COWI; (T, F)
- Russ Hill – Equinor; (T, F)
- Greg Hitchens – United States Coast Guard (USCG); (T, F)
- Captain Maureen Kallgren – United States Coast Guard (USCG); (T, F)
- Liz Kretovic – Sunrise Wind (Orsted); (T, F)
- Ed LeBlanc – Sunrise Wind (Orsted); (T, F)
- Julia Lewis – Equinor; (T, F)
- Anne-Marie McShea – Mayflower (EDPR & Shell); (T, F)
- John O’Keeffe – Sunrise Wind (Orsted); (T, F)
- Caitlin O’Mara – Sunrise Wind (Orsted); (T)
- Paul Phifer – Mayflower (EDPR & Shell); (T)
- Jeannot Smith – Vineyard Wind; (T, F)
- Michael Swanzy – Shell; (T)



NYSERDA

Maritime Technical Working Group

Roundtable Committee Meeting:

August 11, 2020 | Webinar

Agenda

- 9:00 Welcome, Introductions, and Agenda Overview
- 9:20 COWI Report and Response from Developer Teams
- 10:50 Break
- 11:00 PARS updates and discussions
- 11:45 Identify Next Steps and Wrap Up
- 12:00 Adjourn





NYSERDA

Maritime Technical Working Group (MTWG) New York Offshore Wind Updates

Aug 11 7, 2020 | 9 am ET

Adrienne Downey, Principal Engineer, Offshore Wind

Maritime (M-TWG)

GOALS

- To focus on the safe navigation of vessels from/to the harbor and areas adjacent to offshore wind project sites during all phases of their development

Led by NYSDOS

Michael Snyder

Michael.Snyder@dos.ny.gov

Peter Clouse

Peter.Clouse@dos.ny.gov

Laura McLean

Laura.McLean@dos.ny.gov



Facilitation Support

CBI/Cadmus

Technical Support

COWI

Roundtable Purpose & Outcomes

Purpose:

- Provide wind developers an opportunity to share views on draft COWI report and potential management options
- Receive Coast Guard update on studies and rulemaking
- Discuss key topics of special interest to the maritime community related to current and upcoming wind projects

Outcomes:

- Discussion will be folded into the final COWI report
- Identify forward-looking strategies to inform M-TWG next steps

Session I Roundtable Components

- **COWI Report Highlights**
 - Interview results from NYS Maritime Stakeholders
 - Literature review of existing methods and effective management options
- **Developer Panel Discussion**
- **Coast Guard PARS Update & Discussion**

Next Steps

Session II (Friday August 14, 9:00am – 12:00pm)

- Explore key topics in more depth
- Discuss forward-looking strategies

Finalize COWI Report

- Developer feedback to be considered as report is finalized

Harbor Operations Committee outreach

Agenda

- 9:00 Welcome, Introductions, and Agenda Overview
- 9:20 **COWI Report and Response from Developer Teams**
- 10:50 Break
- 11:00 PARS updates and discussions
- 11:45 Identify Next Steps and Wrap Up
- 12:00 Adjourn



Maritime Technical Working Group – Technical Support



Outline

- › Introductions
- › COWI Background
- › Stakeholder Survey - Marine Commerce Trends and Issues related to Offshore Wind
- › Navigation Effective Management Options – Offshore Wind Literature Review

Introductions



Brent D. Cooper, P.E.

- › Project Manager & U.S. East Coast Offshore Wind Sector Lead
- › 13 years experience with coastal / waterfront / offshore engineering



Maria Grønnegaard

- › Lead Technical Specialist, Risk Analysis, COWI International
- › 7 years experience with navigation risk assessments

Group overview

This is COWI



2019 net turnover:
1B USD

Approx. **7,400**
employees

World-class
competencies within
**engineering,
economics and
environmental
science**

Independent –
owned by the COWI
Foundation and
employees

87 years
of history

Stakeholder Survey – Marine Commerce Trends and Issues Related to Offshore Wind

- › Vessel Traffic Volume, Types, and Trends in and around New York Harbor
- › Vessel Traffic and Operations
- › Anchorage Areas and Anchoring
- › Offshore Wind Zone Best Management Practices
- › Opportunities and Open Feedback

Vessel Traffic Volume, Types, and Trends in and around New York Harbor

- › Vessel Quantity
- › Vessel Size
- › Harbor Infrastructure and Vessel Size Limitations
- › Short Sea Shipping



Photo obtained from PANYNJ

Vessel Traffic and Operations

- › Traffic Controls
 - › TSS
 - › VTS
 - › SMA
- › Operational Areas
 - › Kill van Kull
 - › Hudson River
- › Access to Tugs
- › Vessel Supplies

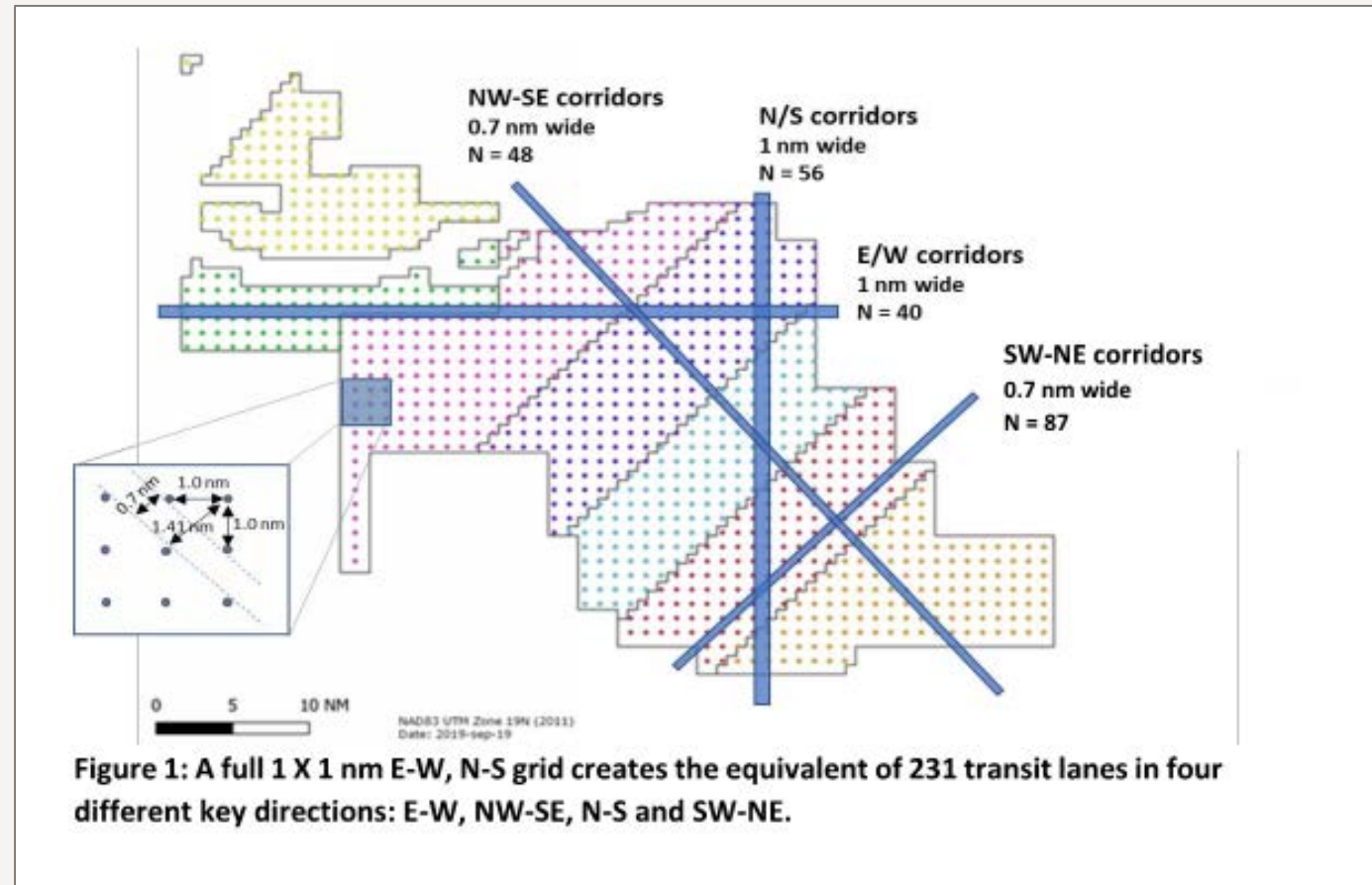


Anchorage Areas and Anchoring



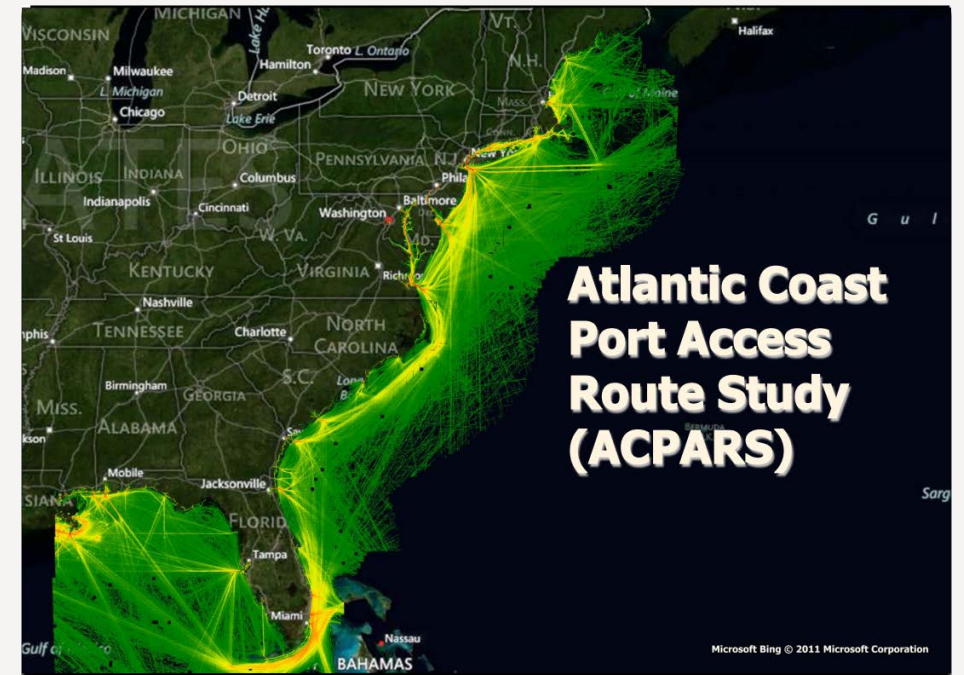
Offshore Wind Zone Best Management Practices

- › Set Back Distance
- › Submarine Cables
 - › Routing
 - › Depth
 - › Protection
- › Traffic Controls
- › Vessel Lanes



Opportunities and Open Feedback

- › Detailed OREI Procurement Process
- › Continuing PARS
- › Maritime Workforce Training
- › Support for Shipyards



Navigation Effective Management Options – Offshore Wind Literature Review

- › Basis of Literature Review
- › Evaluation, Assessment, and Management of Navigational Safety and Risk
- › Adjusting to Advances in Technology and New Information
- › Electrical Transmission System

Basis of Literature Review

- › International guidelines (IMO, UNCLOS, PIANC, IALA)
- › U.S Publications from USCG and BOEM
- › North Sea country guidelines (UK, Netherlands, Denmark, Germany)
- › Navigation Risk Assessment for offshore windfarms
 - › U.S.: Block Island, South Fork, Vineyard Wind
 - › North Sea: Horns Rev, Kriegers Flak



Photo: K. Mikkelsen/Scanpix



Photo: Huang Shengang

Topics considered

- > Evaluation, Assessment, and Management of Navigational Safety and Risk
 - > Evaluation of Navigation Risk Changes
 - > Navigation Safety in WEAs and Cumulative Impacts
 - > Risk Acceptance
 - > Set-Back Distance between Transit Lane and OREI
 - > Anchorage Areas
 - > Radar Interference
 - > Service/project vessel impact
 - > Construction and operational safety zones
 - > Aids to Navigation
- > Adjusting to Advances in Technology and New Information
 - > Accident Prevention using AIS
 - > Deep Water and Floating OREIs
 - > Increased Turbine Size
- > Electrical Transmission System
 - > Risk Assessment for Cable and Pipeline Protection
 - > Cable Burial or Protection

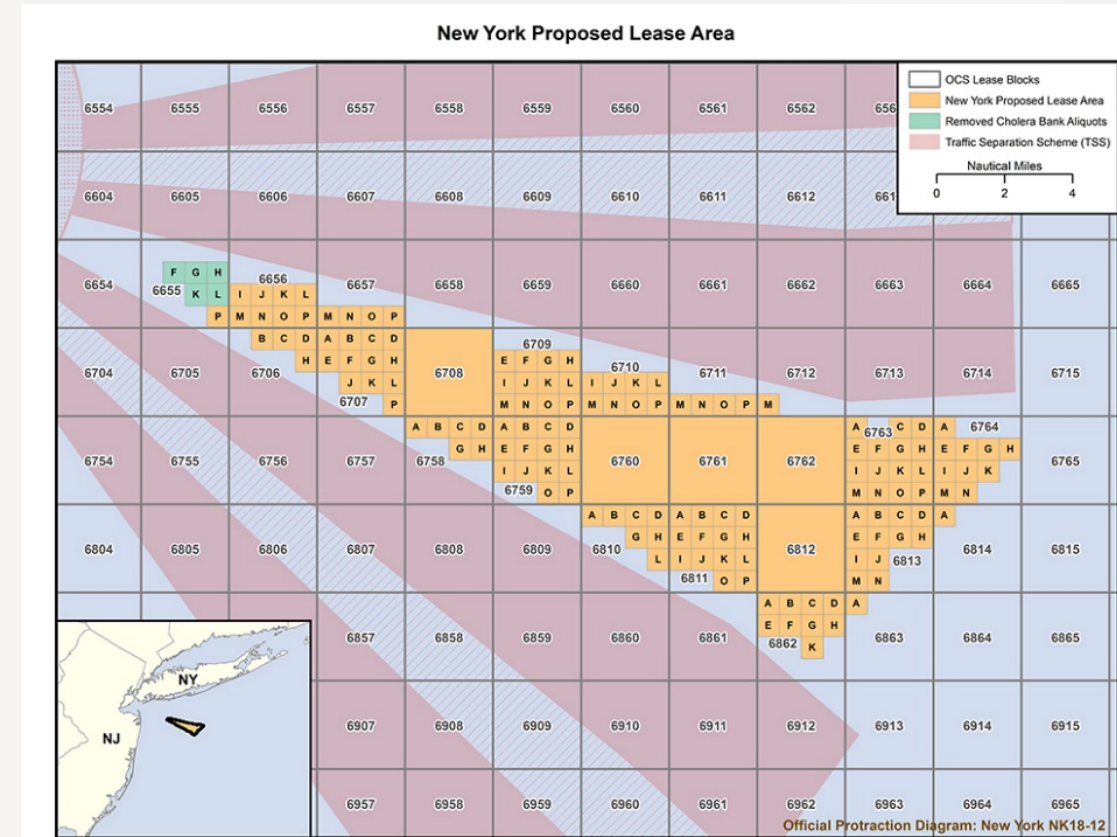


Photo obtained from www.boem.gov

Topics considered

- > Evaluation, Assessment, and Management of Navigational Safety and Risk
 - > Evaluation of Navigation Risk Changes
 - > Navigation Safety in WEAs and Cumulative Impacts
 - > Risk Acceptance
 - > Set-Back Distance between Transit Lane and OREI
 - > Anchorage Areas
 - > Radar Interference
 - > Service/project vessel impact
 - > Construction and operational safety zones
 - > Aids to Navigation
- > Adjusting to Advances in Technology and New Information
 - > Accident Prevention using AIS
 - > Deep Water and Floating OREIs
 - > Increased Turbine Size
- > Electrical Transmission System
 - > Risk Assessment for Cable and Pipeline Protection
 - > Cable Burial or Protection

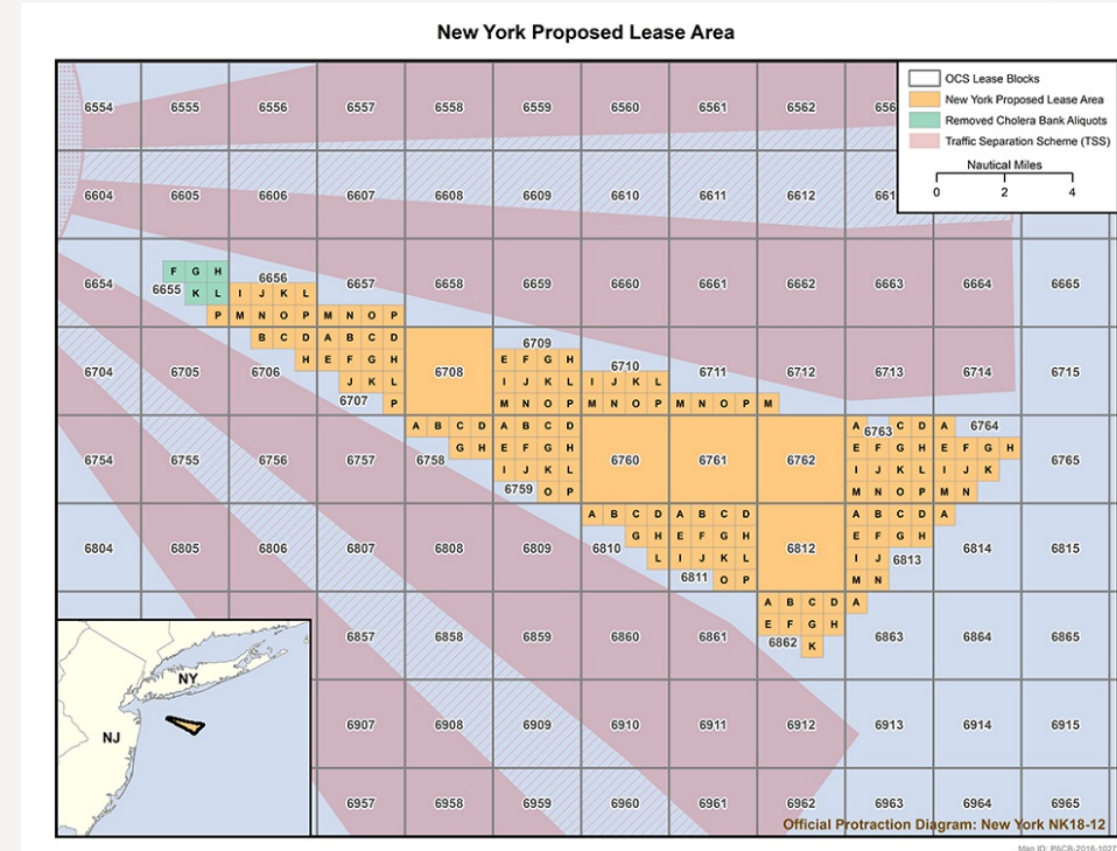


Photo obtained from www.boem.gov

Evaluation, Assessment, and Management of Navigational Safety and Risk

- › Evaluation of Navigation Risk Changes
 - › NRA is required in North Sea countries
 - › IMO Formal Safety Assessment
- › Risk Acceptance
- › Navigation Safety in WEAs and Cumulative Impacts



Phot: [iStock.com/Leadinglights](https://www.istock.com/Leadinglights)

Evaluation, Assessment, and Management of Navigational Safety and Risk

- › Set-Back Distance between Transit Lane and OREI
 - › Consistent reasoning amongst several guidelines
 - › Worst evasive maneuver being 180 turn.
 - › For 400m LOA ship distance becomes 1.9nm

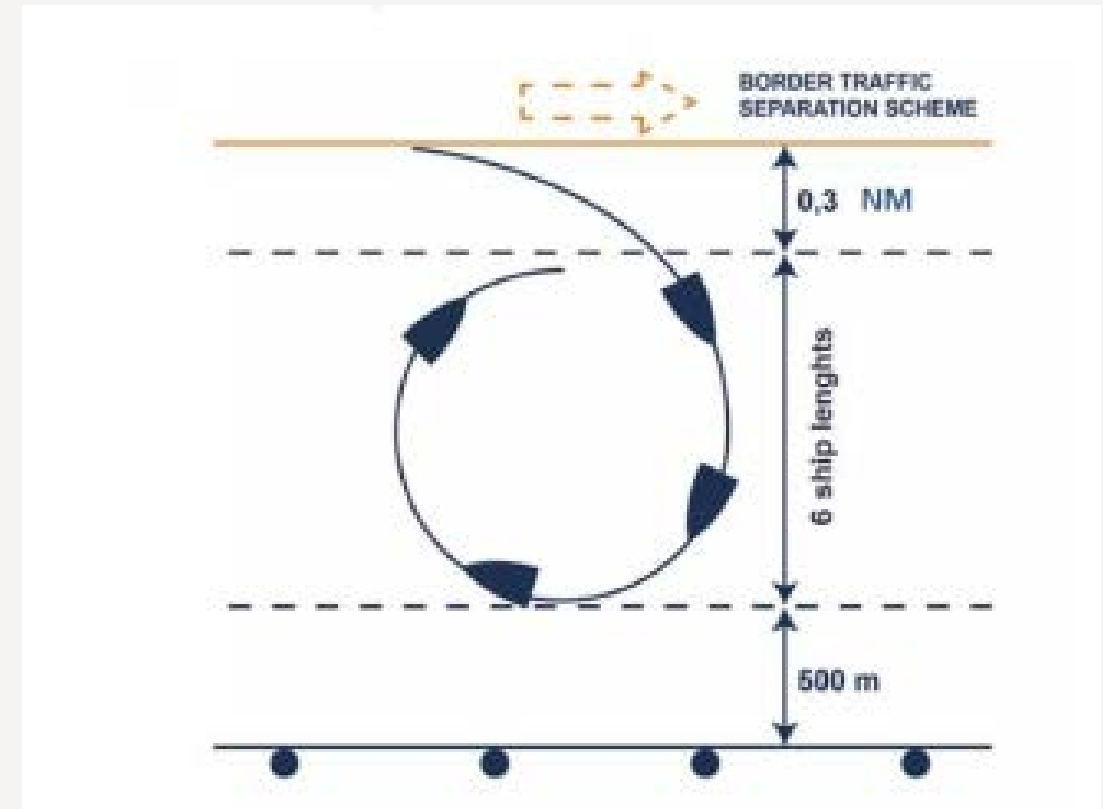


Photo: PIANC MarCom WG Report no 161-2018

Electrical Transmission System

- > Risk Assessment for Cable or Pipeline Protection
 - > Existing literature for pipelines
 - > Level of analysis for cables is varying
- > Cable Burial or Protection
 - > Case-by-case approach
 - > Min 3ft – often 6-9 ft when near significant traffic



Photo obtained from <https://www.subseaprotectionsystems.com/>

Thank you

Brent D. Cooper, BRCO@COWI.com
Maria Grønnegaard, MGNN@COWI.com



NYSERDA

Developer Panel

One member from each of the five developer teams will introduce their team and briefly share a few high level thoughts on the report



NYSERDA

M-TWG Committee Responses and Questions

M-TWG are invited to share their responses with the panels or ask questions



Agenda

- 9:00 Welcome, Introductions, and Agenda Overview
- 9:20 COWI Report and Response from Developer Teams
- **10:50 Break**
- 11:00 PARS updates and discussions
- 11:45 Identify Next Steps and Wrap Up
- 12:00 Adjourn





Developer Panel

One member from each of the five developer teams will introduce their team and briefly share a few high level thoughts on the report

Agenda

- 9:00 Welcome, Introductions, and Agenda Overview
- 9:20 COWI Report and Response from Developer Teams
- 10:50 Break
- **11:00 PARS updates and discussions**
- 11:45 Identify Next Steps and Wrap Up
- 12:00 Adjourn



United States Coast Guard



PORT ACCESS ROUTE STUDY (PARS) PRESENTATION FOR NYSERDA MARITIME TECHNICAL WORKING GROUP

Mr. George Detweiler, Coast Guard Headquarters, Washington, DC
LT Rebecca Blanchflower, First Coast Guard District, Boston, MA
Mr. Jerry Barnes, Fifth Coast Guard District, Portsmouth, VA



Homeland
Security



AGENDA

- Port Access Route Study 101
- Atlantic Coast Port Access Route Study ANPRM
- Northern NY Bight Port Access Route Study
- Seacoast of NJ Port Access Route Study
- Q&A



PORT ACCESS ROUTE STUDY (PARS)

- Coast Guard is required (by law) to conduct a PARS before establishing new or adjusting existing Traffic Separation Schemes (TSSs) or fairways.
- Consult / coordinate with Federal, State, and foreign state agencies (as appropriate) and maritime community representatives, environmental groups, and other interested stakeholders.
- Primary purpose of this coordination is, to the extent practicable, to reconcile the need for safe access routes with other reasonable waterway uses.
- PARS (complete or modified) may be used to determine and justify if safety zones, security zones, recommended routes, regulated navigation areas and other routing measures should be created

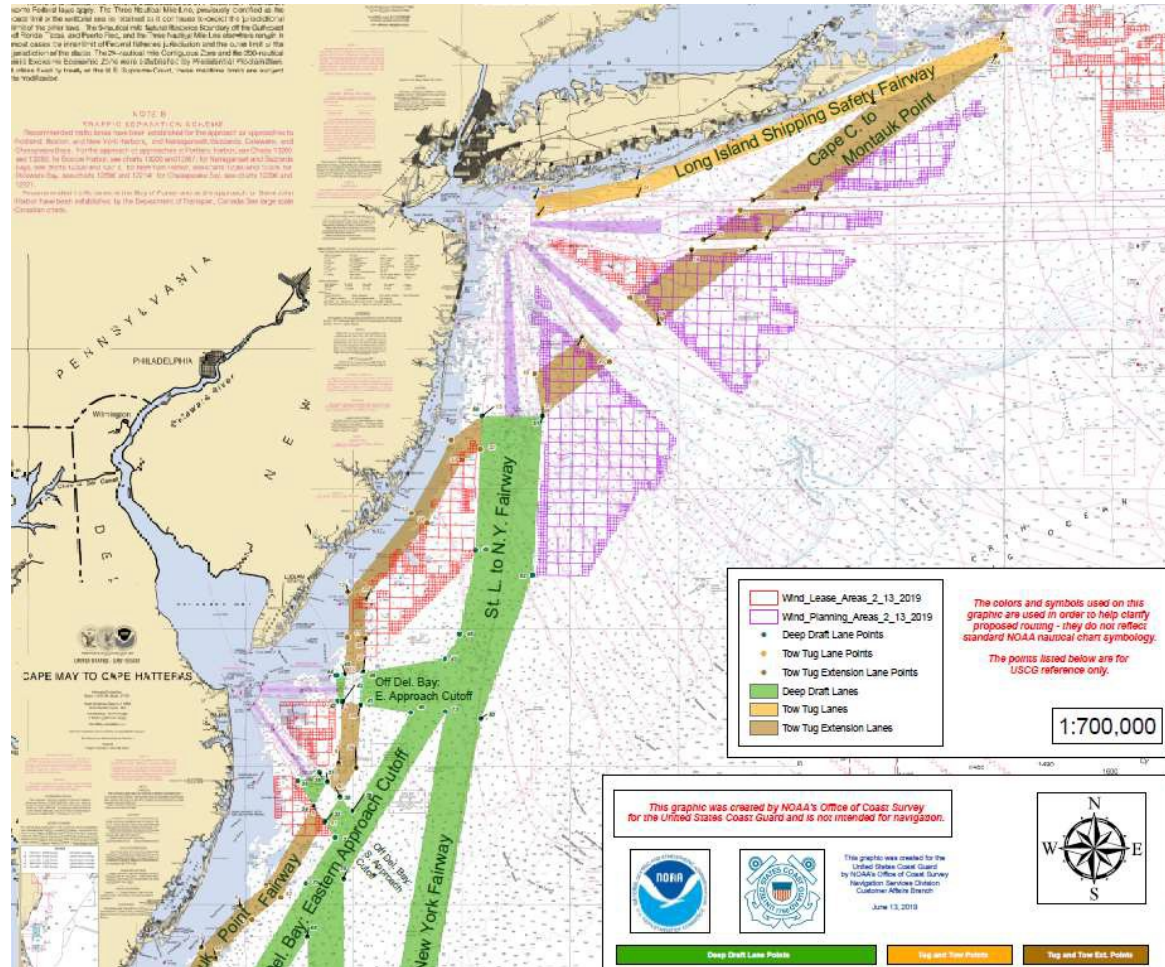


ATLANTIC COAST PORT ACCESS ROUTE STUDY

- Study conducted study between 2011 – 2017
- Identified navigation safety corridors along the Atlantic Coast
 - Corridors included deep draft routes and coastal tug and barge routes
- Report recommended developing these navigation safety corridors into shipping safety fairways (fairways)
 - Must be created vis the Federal Rulemaking Process
 - 1st Step was to publish an Advance Notice of Proposed Rulemaking (ANPRM) on June 19, 2020,
 - Docket # USCG – 2019 – 0279
 - Solicits comments about the establishment of fairways via a suite of questions in the notice
 - Provides a comment period ending August 18, 2020
 - Identifies the fairways by name and geographical position



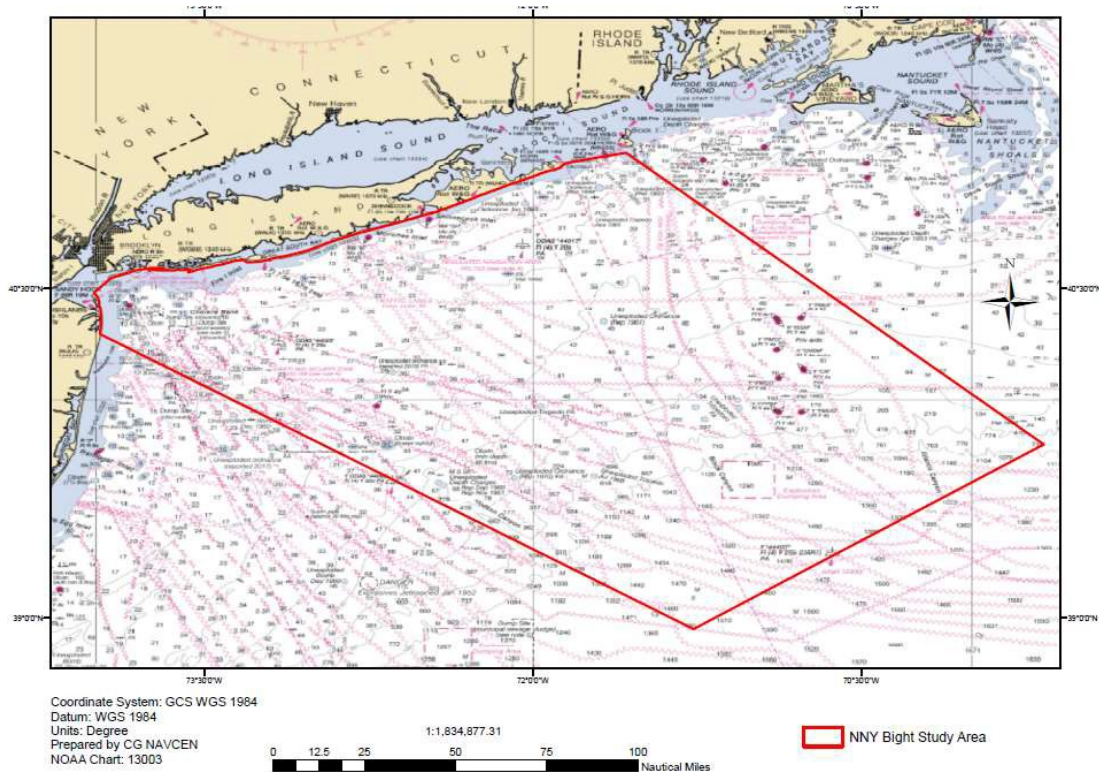
ATLANTIC COAST PORT ACCESS ROUTE STUDY



ACPARS SUPPLEMENTAL

- ANPRM also reminded readers that USCG had announced potential studies of port approaches and international entry and departure areas published on March 15, 2019 (84 FR 9541)
 - These studies have been announced separately by the respective District conducting the PARS.
- 1) The Areas Offshore Massachusetts and Rhode Island (Docket # USCG – 2019 – 0131) Announced complete in the Federal Register May 27, 2020
 - 2) Northern New York Bight (Docket # USCG – 2020 – 0278). Comment period closes August 28, 2020
 - 3) Seacoast Of North Carolina including Offshore Approaches to the Cape Fear River and Beaufort Inlet, NC (Docket # USCG – 2020 – 0093) Comment period closed May 18, 2020.
 - 4) Seacoast of New Jersey including Offshore Approaches to the Delaware Bay, DE (Docket # USCG – 2020 – 0172) Comment period closed July 6, 2020.
 - 5) Approaches to the Chesapeake Bay, VA (Docket # USCG – 2019 – 0862) Comment period closed January 27, 2020.
-

NORTHERN NY BIGHT PORT ACCESS ROUTE STUDY



The Notice of Study was published on June 29, 2020. It is available at Federal Register docket number USCG-2020-0278, on the federal portal at <https://www.regulations.gov/docket?D=USCG-2020-0278>.

The comment period is open until August 28, 2020.

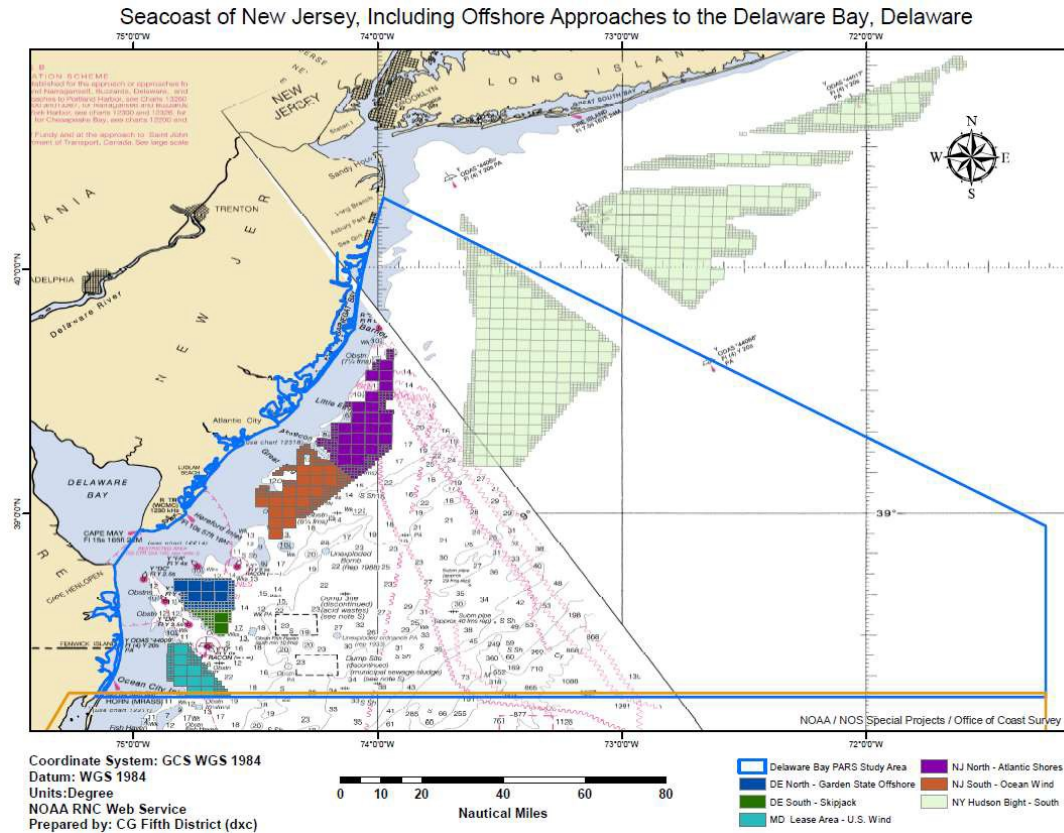
The Coast Guard is hosting two virtual public meetings:

- Thursday, July 30th, 9 a.m. EST (complete)
- Tuesday, August 11th, 6 p.m. EST

To submit your comment online, go to <https://www.regulations.gov>, and insert "USCG-2020-0278" in the "search box." Click "Search" and then click "Comment Now."



SEACOAST OF NEW JERSEY PORT ACCESS ROUTE STUDY



This supplemental PARS will analyze navigation routes to and from the seacoast of NJ, DE, and MD connecting to the ANPRM's proposed shipping safety fairways including international routes to and from the United States.

The notice of study published and comment period opened on May 5 and closed on July 6, 2020.

In the coming months, the Coast Guard will re-open the comment period and hold one or more in-person or virtual public meetings. These meetings will be announced in the Federal Register.

The Coast Guard has partnered with MARCO's Mid-Atlantic Ocean Data Portal team to facilitate public participation, analysis and comment. See "USCG Proposed Areas and Studies" under the Maritime portion of the Data Layers section at <http://portal.midatlanticocean.org/visualize/>

Q&A

Thank you!

Mr. George Detweiler, Coast Guard Headquarters, Washington, DC
George.H.Detweiler@uscg.mil

LT Rebecca Blanchflower, First Coast Guard District, Boston, MA
Rebecca.C.Blanchflower@uscg.mil

Ms. Michele DesAutels, First Coast Guard District, Boston, MA
Michele.E.DesAutels@uscg.mil

Mr. Jerry Barnes, Fifth Coast Guard District, Portsmouth, VA
Jerry.R.Barnes@uscg.mil



Homeland
Security





NYSERDA

Maritime TWG Member Updates





NYSERDA

Maritime Technical Working Group

Roundtable Committee Meeting:

August 14, 2020 | Webinar



Agenda

- 9:00 Welcome & Introductions
- 9:15 Follow up from Session I (Aug 11)
- 9:30 Key M-TWG topic discussions
- 10:20 Break
- 10:30 Discussion, continued
- 11:40 Future engagement and next steps
- 12:00 Adjourn



Groundrules

- Listen carefully
- Speak for yourself and your constituents
- Refrain from making personal attacks
- Strive to bridge gaps in understanding and look for creative solutions
- Offer suggestions with care
- Remember virtual meetings are socially clunky, please assume the best of each other



Maritime (M-TWG)

GOALS

- To focus on the safe navigation of vessels from/to the harbor and areas adjacent to offshore wind project sites during all phases of their development

Led by NYSDOS

Michael Snyder

Michael.Snyder@dos.ny.gov

Peter Clouse

Peter.Clouse@dos.ny.gov

Laura McLean

Laura.McLean@dos.ny.gov



Facilitation Support

CBI/Cadmus

Technical Support

COWI

Roundtable Purpose & Outcomes

Purpose:

- Provide wind developers an opportunity to share views on draft COWI report and potential management options
- Receive Coast Guard update on studies and rulemaking
- Discuss key topics of special interest to the maritime community related to current and upcoming wind projects

Outcomes:

- Discussion will be folded into the final COWI report
- Identify forward-looking strategies to inform M-TWG next steps

Session II Roundtable Components

- Session I Follow-up
- Key Topic Discussions
 - Identify areas of common understanding and areas of divergence
 - Discuss forward-looking strategies

Setbacks

Cable Depths
and Routing

Vessel Traffic

Radar

Research and
information

Follow up thoughts from Session I

Topic A: Setback Distances

1. What do we know from elsewhere?
2. How do you define an acceptable level of risk?
3. What are the major concerns with increasing or decreasing the setback distance?
4. What else do we need to know?

Set-back distance

- > PIANC guideline:
 - > Starting point is COLREGs (action to avoid collision)
 - > Use Risk assessment
 - > Vessel round turn + 0.3 nm for route deviation
- > Netherlands: North Sea Policy
 - > 2nm from shipping lanes, anchorages and national clearways (practical experience). Adjusted up/down in details planning phase
 - > Areas with 500m-2nm distance have been defined.
 - > Assessment framework: round turn (like PIANC)
- > UK guideline 543 (2020 updated guideline)
 - > Marine traffic survey to establish corridor width, 20degree course deviation
 - > Refer PIANC + NL

Maritime technical working group – technical support

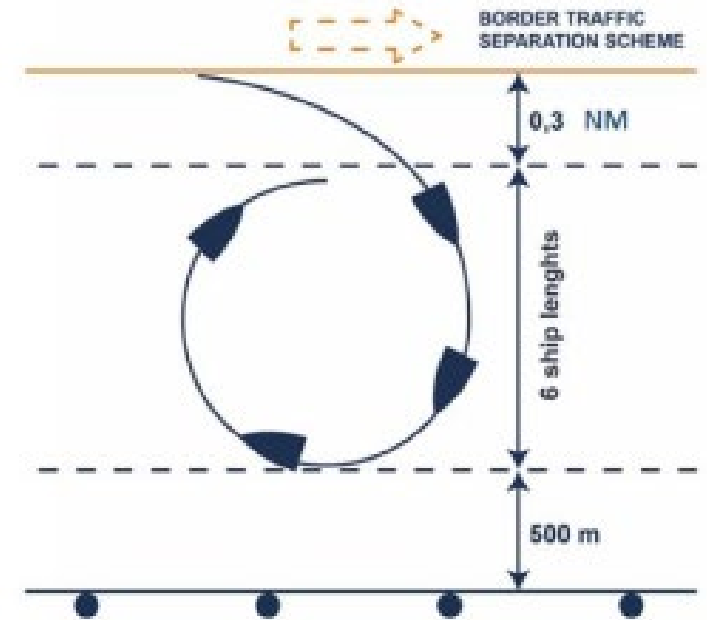


Photo: PIANC MarCom WG Report no 161-2018

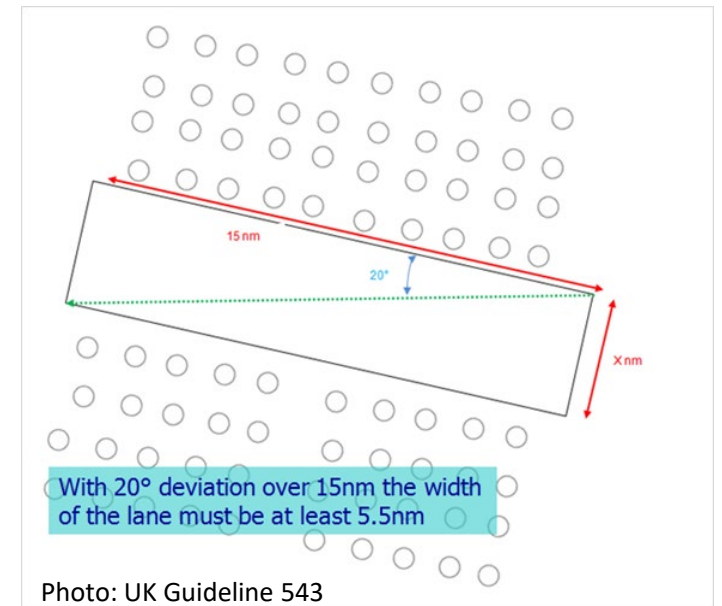


Photo: UK Guideline 543

Topic B: Radar

5. What are the effects of wind turbines on radar functioning?
6. Is radar interference mitigatable?
7. What still needs to be studied?

Topic C: Cable Depths and Routing

8. Where should export cables that have to come into the NY/NJ Harbor be sited (or what areas must be avoided)?
9. How can anchor strike risk be reduced?
10. How can the liability for cable damages be mitigated for mariners?

Topic D: Traffic in the Harbor & Up the Hudson

11. Where are the pinch points likely to be?
12. Are there lessons learned from other major infrastructure projects (e.g., Harbor Deepening, Tappan Zee Bridge)?
13. What vessel coordination/routing measures are proposed by developers?
14. What needs to happen to start to address or plan for increased vessel traffic?

Topic E: Research and Information

15. What else do we all want to learn and know?

16. Is there the potential for some sort of shared research agenda? If so, what would go on it?

Future Engagement, next steps & wrap up

Finalize COWI Report

- Developer feedback to be reflected in report

Harbor Operations Committee outreach

Adaptation/refinement of Maritime Technical Working Group operation