

# 2018 Ports Assessment: Unrestricted Air Draft Facilities

## Alternatives Assessment

Final Report | NYSERDA Report Number 19-06 | January 2019



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### **Vision Statement:**

Serve as a catalyst – advancing energy innovation, technology, and investment; transforming New York's economy; and empowering people to choose clean and efficient energy as part of their everyday lives.

2018 Ports Assessment:  
Unrestricted Air Draft Facilities  
Alternatives Assessment  
*Final Report*

Prepared for:

**New York State Energy Research and Development Authority**

Albany, NY

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**COWI North America, Inc.**

New York, NY

# Notice

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# Acronyms and Abbreviations

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MHHW	Mean Higher High Water
MLLW	Mean Lower Low Water
NOAA	National Oceanic and Atmospheric Administration
NY OGS	New York Office of General Services
NYSERDA	New York State Energy Research and Development Authority
USACE	United States Army Corps of Engineers
WEA	Wind Energy Area

# Executive Summary

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The Unrestricted Air Draft Facilities Alternatives Assessment is one of a collection studies prepared on behalf of New York State as a part of the 2018 Ports Study. The 2018 Ports Study builds upon the Assessment of Ports and Infrastructure [1] completed in support of the New York State Offshore Wind Master Plan [2].

Air drafts, which are the vertical clearances between the water's surface and the maximum height above the water due to a restriction such as a bridge, utility line, or airport glide slope, can provide logistical constraints at a port and along the installation vessel routes that impact the transportation and staging of both components as well as the vessels themselves. Most facilities identified in the Assessment of Ports and Infrastructure were subject to air draft restrictions due to their geographic location either in New York Harbor or along the Hudson River.

The objective of the Unrestricted Air Draft Unrestricted Facilities is to identify additional New York facilities, not subject to air draft restrictions, which may potentially be used as staging and installation facilities to support development of offshore wind in the greater New York area and complement sites in other areas of the State and region.

In his 2019 State of the State Address, Governor Andrew M. Cuomo announced an expansion of the State's Clean Energy Standard from 50% to 70% renewable electricity by 2030. As part of that announcement, New York also increased its commitment to offshore wind from 2,400 MW by 2030 to 9,000 MW by 2035. Achieving this goal will require construction of highly capable, modern, and dedicated port facilities. The intent of this information is to inform the offshore wind industry and other stakeholders of the opportunity in New York and to reduce the lead time associated with developing sites that are not subject to air draft restrictions.

# 1 Introduction

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Waterfront facilities play a critical role in all phases of offshore wind farms. Many large, heavy offshore wind components, such as nacelles, blades, and foundations, can only be transported by water. Facilities will be needed to serve as installation and staging areas where components can be accumulated prior to being loaded onto the installation vessels and transported offshore.

In 2017, The Assessment of Ports and Infrastructure (the 2017 Ports Assessment) [1] was prepared as an appendix to the New York State Research and Development Authority's (NYSERDA) Offshore Wind Master Plan. The 2017 Ports Assessment identified several waterfront facilities potentially capable of servicing the offshore wind industry. Most facilities identified in the assessment were subject to air draft restrictions due to their geographic location either in New York Harbor or along the Hudson River. Following publication of the Master Plan and the 2017 Ports Assessment, NYSERDA received comments from the offshore wind industry that stated the need for additional, complementary waterfront facilities not subject to air draft restrictions.

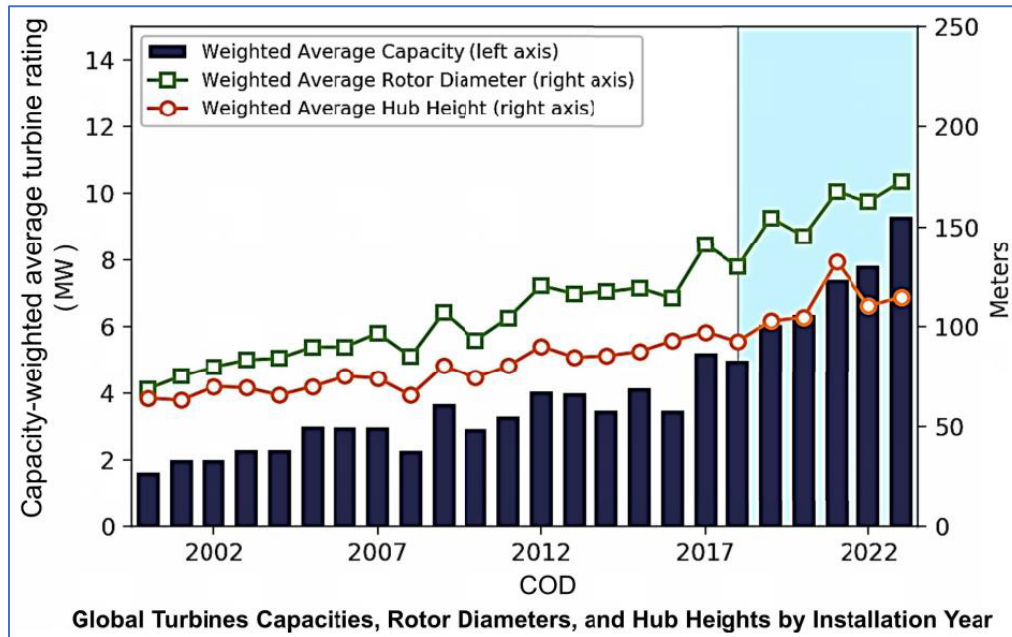
Air draft is the vertical clearance between the water's surface and the maximum height above the water due to a restriction. Air draft restrictions can take several forms. Bridges and utility lines over navigable waterways result in air draft restrictions. Additionally, airport glide paths and military considerations (low-level flight training routes, defense radar interference) may also limit air draft.

Air drafts provide logistical constraints at a port and along the installation vessel routes that impact the transportation and staging of both components as well as the vessels themselves. For early wind projects in the UK, one of the global leaders in offshore wind installations, it had been suggested that installation facilities have a minimum of 100 m (330 ft.) air draft from the staging area all the way to the offshore wind farm. However, due to increasing turbine and foundation sizes, most developers and contractors prefer sites with unlimited air draft for certain scopes of work as trends in offshore turbine height and capacity continue to increase.



**Figure 1. Trends in Wind Turbine Dimensions**

See reference section for more information [3].



Alternative tactics can be used to bypass air draft restrictions, such as shipping components horizontally or utilizing smaller installation vessels. These strategies increase the number of potential inland port facilities, which may have lower development costs due to the presence of existing infrastructure. However, the air draft restricted port facilities may have increased operational costs relative to an unrestricted air draft port facility. As a result, developers and contractors must assess the cost-benefit-ratio of seeking staging facilities without air draft restrictions. This report provides the considerations for site development of select unrestricted air draft port facilities in the New York Harbor.

In his 2019 State of the State Address, Governor Andrew M. Cuomo announced an expansion of the State’s Clean Energy Standard from 50% to 70% renewable electricity by 2030. As part of that announcement, New York also increased its commitment to offshore wind from 2,400 MW by 2030 to 9,000 MW by 2035. Achieving this goal will require construction of highly capable, modern, and dedicated port facilities. The intent of this information is to inform the offshore wind industry and other stakeholders of the opportunity in New York and to reduce the lead time associated with developing sites that are not subject to air draft restrictions.

## 2 Considerations for Site Development

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This section provides a list of considerations for site developers. These considerations are meant to highlight potential paths forward for developments in this region and are not meant to be inclusive of all site development considerations.

### 2.1 Multiple Site Owners

Where potential site locations consist of multiple site parcels and owners such that no single property meets the minimum site requirements, adjacent properties need to be combined for development.

The following steps are recommended to potential developers:

- Identify combinations of sites based on owner, location, and current use
- Evaluate if it will be more effective to develop all or only a portion of the properties
- Identify and evaluate the different means to coalesce properties

### 2.2 Publicly Owned Lands

Some potential development sites are publicly owned lands not currently utilized as industrial port facilities.

The following steps are recommended to potential developers:

- Contact the site owner to discuss potential purchase or lease opportunities
- If needed, contact the local planning board to identify the path forward for rezoning

### 2.3 Lands Under Water

When seeking to fill waterways in New York to create upland areas, the title to the lands underwater should be considered. Per the OGS website (<https://ogs.ny.gov/BU/RE/LM/EGLP.asp>)

*Title to the bed of numerous bodies of water is held in trust for the people of the State of New York under the jurisdiction of the Office of General Services. Structures, including fill, located in, on, or above state-owned lands under water are regulated under the Public Lands Law and may require authorization from the state. Please contact the Bureau of Land Management for assistance prior to submitting an application.*

For information on the conveyance of and New York State real property interest please contact:

OGS Bureau of Land Management

39th Floor, Corning Tower

Empire State Plaza

Albany, NY 12242

518-474-2195

LandUnderWater@ogs.ny.gov

## 2.4 Proximity to Federal Navigation Project

It is generally advantageous for port facilities to be in close proximity to federal navigation channels, as these channels are typically maintained at authorized or published depths. However, there are limitations to the proximity of structures to navigation channels. The USACE New England District has prepared a memo that provides guidance on structures near federal navigation projects.

[www.nae.usace.army.mil/Portals/74/docs/regulatory/Forms/StructurePlacementNavigableWater.pdf](http://www.nae.usace.army.mil/Portals/74/docs/regulatory/Forms/StructurePlacementNavigableWater.pdf)

## 2.5 Modification to a Federal Project

When a proposed development site is located within a federal project site or will require modification to a federal project to provide access to the site, such as extending the vertical and horizontal limits of a federal navigation channel additional authorization is required. The type of authorization is dependent on the project sponsor and separate from State or federal environmental permits.

If the project sponsor is the USACE, such as the New York and New Jersey Harbor Deepening project, congressional authorization is required. For USACE sponsorship, stakeholders may approach the local USACE district as well as congressional representatives from the region to solicit interest in the project and discuss a path forward.

If the project sponsor is a non-federal sponsor, such as New York State or a private developer, USACE authorization is required through the Section 408 process. An overview of the Section 408 process is presented on the USACE website (<https://www.usace.army.mil/Missions/Civil-Works/Section408/>) with the following excerpts listed.

*Through the Civil Works program, the US Army Corps of Engineers (USACE) serves the public by providing the Nation with quality and responsive management of the Nation's water resources. As a result, USACE, in partnership with stakeholders, has constructed many Civil Works projects across the Nation's landscape. Given the widespread locations of these projects, many embedded within communities, over time there may be a need for others outside of USACE to alter or occupy these projects and their associated lands. Reasons for alterations could include improvements to the projects; relocation of part of the project; or installing utilities or other non-project features.*

*In order to ensure that these projects continue to provide their intended benefits to the public, Congress mandated that any use or alteration of a Civil Works project by another party is subject to the approval of USACE. This requirement was established in Section 14 of the Rivers and Harbors Act of 1899, which has since been amended several times and is codified at 33 USC 408 (Section 408).*

*Section 408 provides that USACE may grant permission for another party to alter a Civil Works project upon a determination that the alteration proposed will not be injurious to the public interest and will not impair the usefulness of the Civil Works project.*

## 2.6 Proximity to Airports

The New York metro area is serviced by three international airports. Each airport is located near New York Harbor waterways. Therefore, site developers should consider potential height limitations. The three relevant airports are as follows:

- JFK International Airport (JFK): Queens NY (Jamaica Bay)
- LaGuardia Airport (LGA): Queens NY (East River)
- Newark Liberty International Airport (EWR): Newark, NJ (Newark Bay)

FAA has a model zoning ordinance to limit height of objects around airports [4]. Developers should look at local zoning ordinances at the potential project site to evaluate height limitations.

Another method to evaluate potential height limitations is to assess the airport glide path of an airplane relative to a proposed development site to assess the glide height of an airplane over the proposed site to evaluate potential obstructions and limits. Glide paths angles are typically three degrees and the FAA provides data individual airports [5]. A general rule of thumb for a three-degree glide path angle is a glide path height of 91.4 m (300 ft.) for every 1.9 km (1.0 nm) from the airport runway limits.

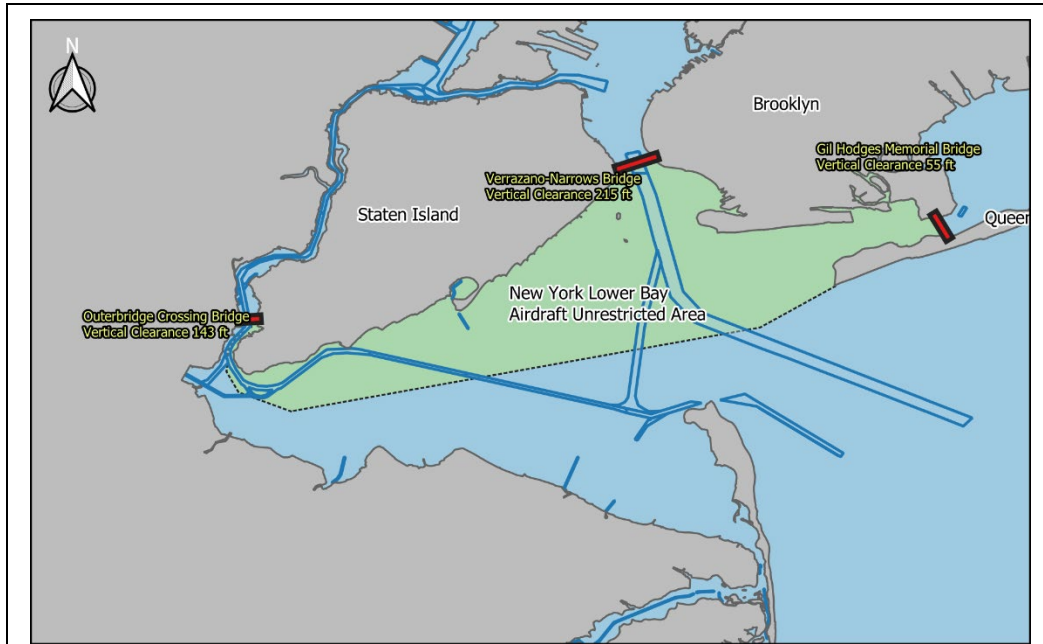
## 2.7 Mitigation

Environmental impacts can occur when development of a site alters the existing site use. For example, impacts can occur when open waters are developed into a port facility or upland natural areas are developed into hardscapes and buildings. During development state and federal regulatory authorities look to mitigate environmental impacts through avoidance, minimization, mitigation, or compensation (in order of preference). Mitigation options may include creation or enhancement and preservation of local habitats of similar nature to those that may be lost due to development. Compensation options generally include purchasing of compensatory mitigation credits from a mitigation bank or in-lieu fee program, which in turn transfer those funds to a sponsor for a restoration, establishment, enhancement, and/or preservation project for natural resources (rules for both programs differ and dictate which projects would be applicable). The quantity of mitigation and compensation are determined by the regulatory agencies and can often exceed a 1:1 ratio of impact to mitigation area. Therefore, potential mitigation and compensation must be considered when planning and evaluating site developments.

### 3 New York Harbor Unrestricted Air Draft Potential Sites

NYSDA seeks to identify additional offshore wind staging and installation facility alternatives in the New York Harbor area that are not subject to air draft restrictions. Entering New York Harbor from the Atlantic Ocean, three New York bridges constrain access into various harbors and channels. Table 1 identifies the limits of these waterways.

Table 1. New York Harbor Unrestricted Air Draft Waterway Summary



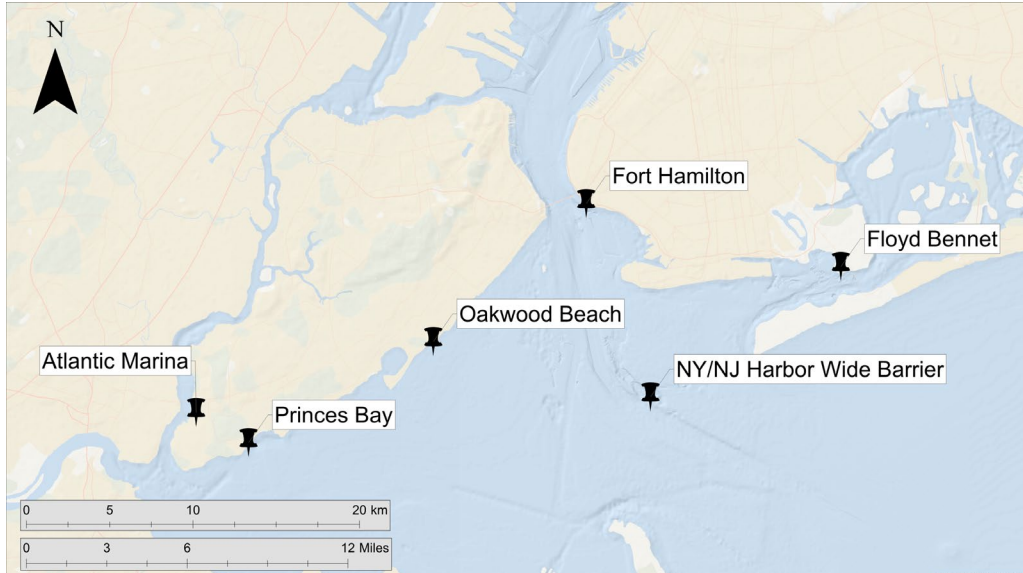
<b>Bridge</b>	Outerbridge Crossing, Cantilever Bridge	Verrazano-Narrows Bridge, Suspension Bridge	Gil Hodges Memorial, Lift Bridge
<b>Waterway</b>	Arthur Kill Raritan Bay	The Narrows Lower New York Bay	Rockaway Inlet Lower New York Bay
<b>Connecting Locations</b>	Perth Amboy, NJ Staten Island, NY	Staten Island, NY Brooklyn, NY	Brooklyn, NY Rockaway, NY
<b>Air Draft* (above MHW)</b>	43 m (143 ft.)	55–65 m (183–215 ft.)	16–46 m (55–152 ft.)
<b>Navigation Draft* (below MLLW)</b>	10 m (35 ft.)	15–21 m (50–70 ft.)	6–12 m (20–40** ft.)

\*Data provided by NOAA Charts  
 \*\* Not a maintained channel by USACE

The waterfront along the New York Lower Bay that offers unrestricted air draft consists of the southern reach of the Arthur Kill below the Outerbridge Crossing, south shore of Staten Island, Gravesend Bay below the Verrazano Bridge, and Rockaway Inlet west of the Gil Hodges Memorial Lift Bridge. Overall the shoreline is sandy with limited industrial water dependent uses along the waterfront. The few water dependent uses consist of marinas supporting recreational and light commercial vessels.

To provide increased flexibility in development of an offshore wind staging and installation facility, COWI identified and evaluated six site alternatives located below the ring of New York Harbor Bridges (see Figure 2) that provide unrestricted air drafts. COWI has included a potential site along a New York/New Jersey Harbor Wide Barrier being considered as one possible alternative to protect the harbor and surrounding low-lying areas against coastal flooding. The facilities identified here have been selected based upon the technical merit of the site; it is the intent of this assessment to begin to quantify the development challenges and identify stakeholders and potential next steps, if any of these are chosen for further development.

**Figure 2. Potential Unrestricted Air Draft Sites**



This technical memorandum provides a summary of the potential development sites followed by a list of considerations for site developers. These considerations are meant to highlight potential paths forward for developments in this region and are not meant to be inclusive of all potential sites or development considerations.

Data sources for this information were obtained from:

- USACE New York District, Navigation, Controlled Depth Reports and Survey: <http://www.nan.usace.army.mil/Missions/Navigation/Controlling-Depth-Reports/>
- NOAA Raster Navigation Charts (RNC): <https://nauticalcharts.noaa.gov/rnconline/rnconline.html>
- NYC MapPluto dataset: <https://www1.nyc.gov/site/planning/data-maps/open-data.page>

Table 2 provides definitions and references for the attributes.

**Table 2. Site Attribute Definitions and References**

<b>Site Location</b>	Upland street and city near project site
<b>Ownership</b>	Owner type and name obtained from NYC MapPluto
<b>Assessed value</b>	Tax assessed value in USD obtained from NYC MapPluto
<b>Total Site Area, incl. water</b>	Approximate total site area of site limits shown calculated in ArcGIS
<b>Upland Area</b>	Approximate existing upland site area of site limits shown calculated in ArcGIS
<b>Water Frontage</b>	Approximate length of shoreline within site limits shown calculated in ArcGIS
<b>Existing Depth</b>	Approximate existing water depth within site limits shown obtained from NOAA RNC
<b>Distance to Design Depth</b>	Approximate distance from site limits to a design depth of 10 m (32.8 ft.) below MLLW as shown on NOAA RNC and calculated in ArcGIS

### 3.1 Atlantic Marina

The Atlantic Marina site consists of a grouping of mostly private properties along the Arthur Kill waterway in Staten Island, south of the Outer Bridge Crossing. This site currently supports a variety of marine and commercial uses and is located adjacent to the Arthur Kill Federal Navigation Channel that has an authorized depth of 35 feet below MLLW.

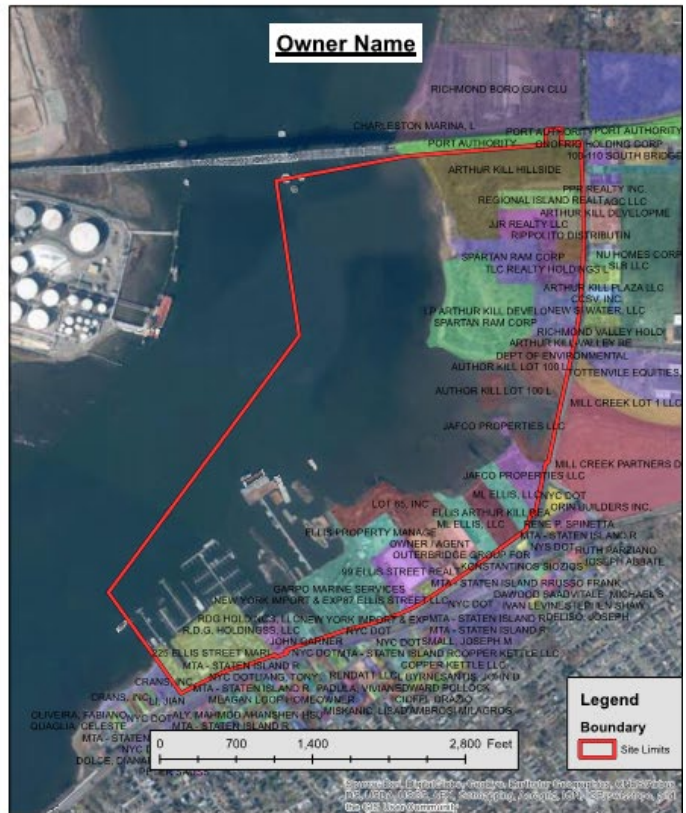
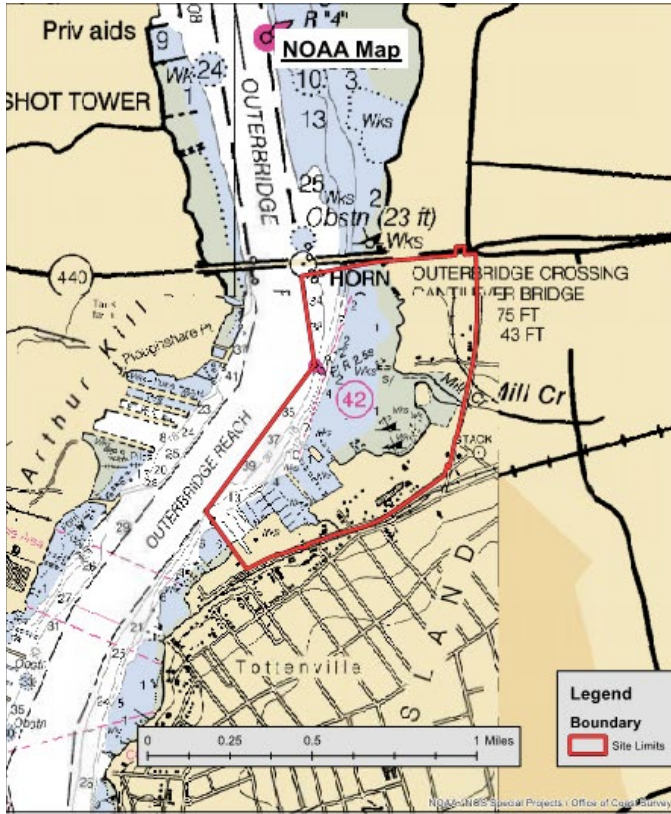


<b>Site Location</b>	Ellis Street, Staten Island
<b>Ownership</b>	47 Lots, Mostly Private (~40 Owners)
<b>Assessed value</b>	~\$21,000,000
<b>Total Site Area, incl. water</b>	70 ha (173 acres)
<b>Upland Area</b>	28 ha (69 acres)
<b>Water Frontage</b>	1,310 (4,300 ft.)
<b>Existing Depth (MLLW)</b>	0–10 (0–33 ft.)
<b>Distance to Design Depth</b>	0.1 km (0.06 mi)



Figure 3. Atlantic Marina and Adjacent Areas

Navigation chart, zoning map, owner type map and owner name map.



## 3.2 Floyd Bennet

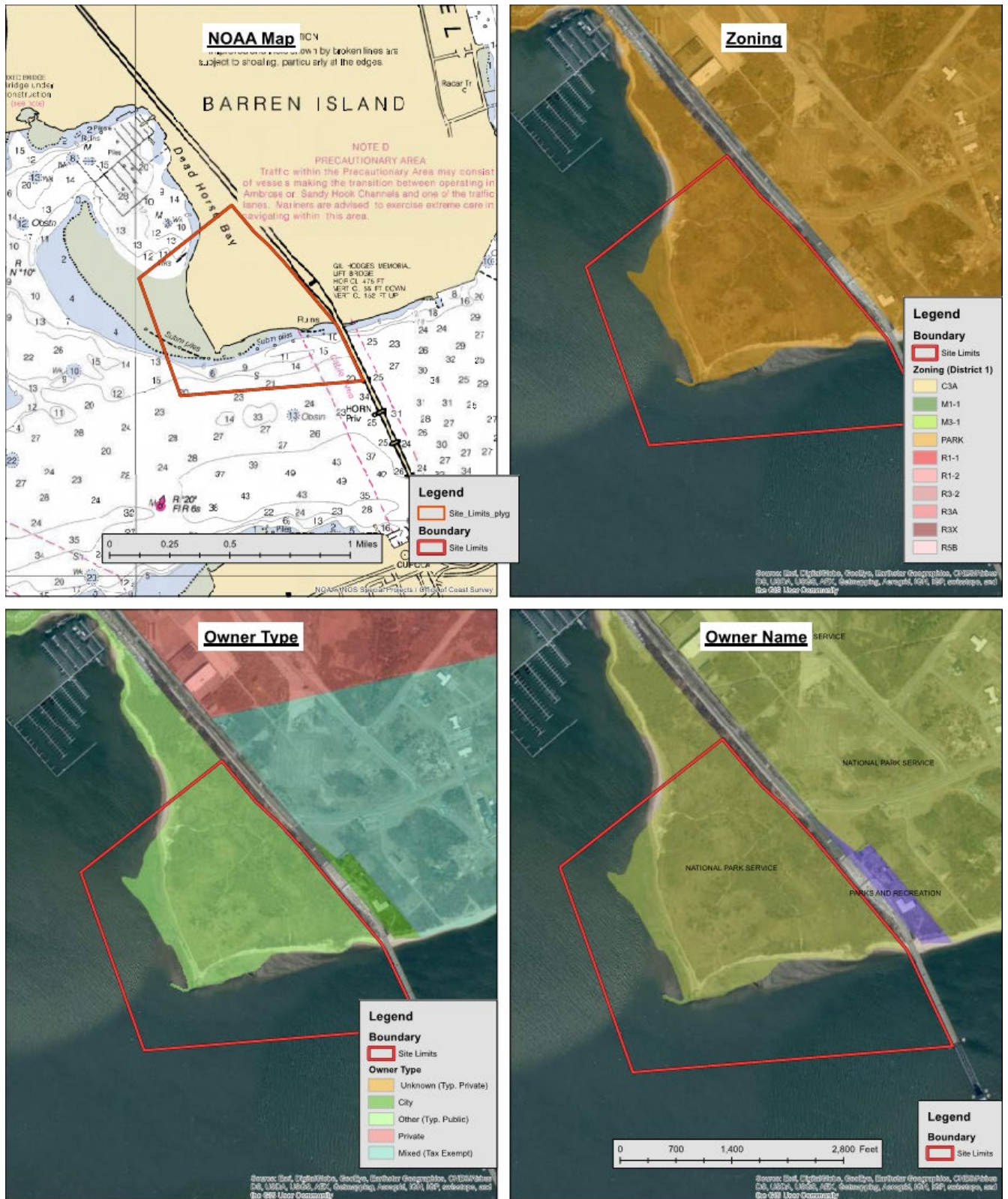
The Floyd Bennet site consists of a portion of the National Park Service Floyd Bennet Park located along the Rockaway/Jamaica Bay Inlet waterway in Brooklyn, west of the Gil Memorial Bridge. This site is undeveloped and located adjacent to the Jamaica Bay Federal Navigation Channel, which has an authorized depth of 6 m (20 ft.) below MLLW.



<b>Site Location</b>	Flatbush Avenue, Brooklyn
<b>Ownership</b>	Public, National Park Service
<b>Assessed Value</b>	~\$346,000,000 (value shown here is proportional value of proposed site area to total lot area.)
<b>Total Site Area, incl. water [ha]</b>	65 ha (161 acres)
<b>Upland Area</b>	33 ha (81 acres)
<b>Water Frontage</b>	1,420 m (4,660 ft.)
<b>Existing Depth (MLLW)</b>	0–6 m (0–20 ft.)
<b>Distance to Design Depth</b>	11 km (7 mi)

**Figure 4. Floyd Bennet Field Area and Adjacent Areas**

Navigation chart, zoning map, owner type map and owner name map.



### 3.3 Fort Hamilton

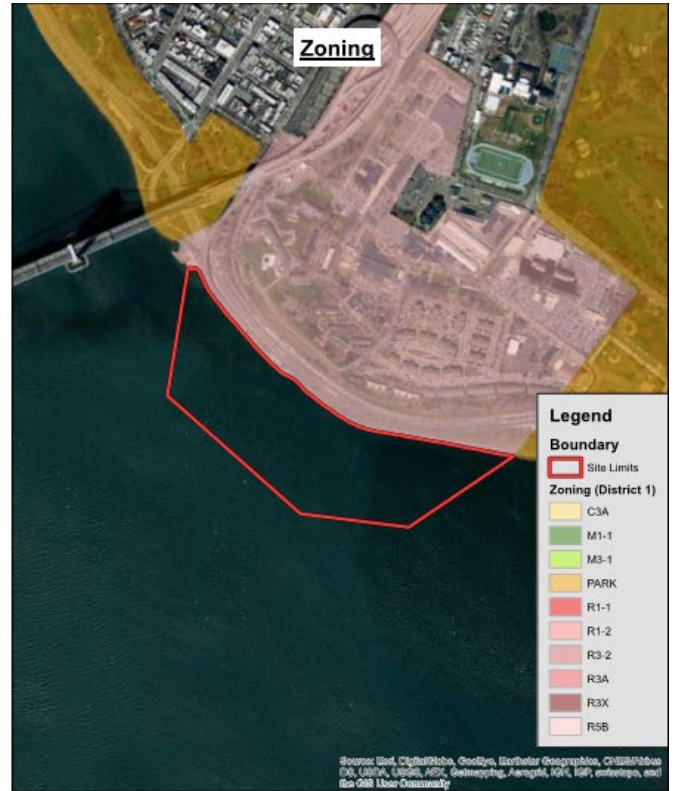
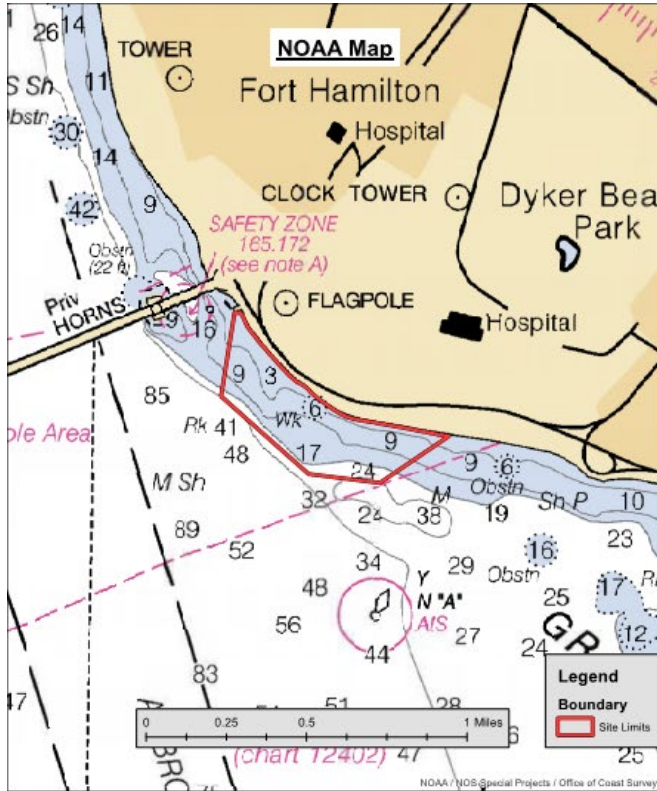
The Fort Hamilton site consists of open waters of the Narrows along a portion shoreline that borders the Shore Parkway Greenway Trail in Brooklyn, south of the Verrazano Bridge. This open water site is undeveloped and located adjacent to the Ambrose Channel Federal Navigation Channel, which has an authorized depth of 16 m (53 ft.) below MLLW. The upland areas adjacent to the site consist of the Shore Parkways Greenway Trail, Shore Parkway, and Fort Hamilton an active military facility.



<b>Site Location</b>	Leif Ericson Drive, Brooklyn
<b>Ownership</b>	Public, State of New York
<b>Assessed value</b>	Not Assessed
<b>Total Site Area, incl. water</b>	20 ha (49 acres)
<b>Upland Area</b>	0 ha (0 acres)
<b>Water Frontage</b>	1,000 m (3,280 ft.)
<b>Existing Depth (MLLW)</b>	0–7 m (0–23 ft.); 16 m (52 ft.) depth available in adjacent federal channel
<b>Distance to Design Depth</b>	0.1 km (0.06 mi)

Figure 5. Fort Hamilton Area and Adjacent Areas

Navigation chart, zoning map, owner type map and owner name map.



### 3.4 Oakwood Beach

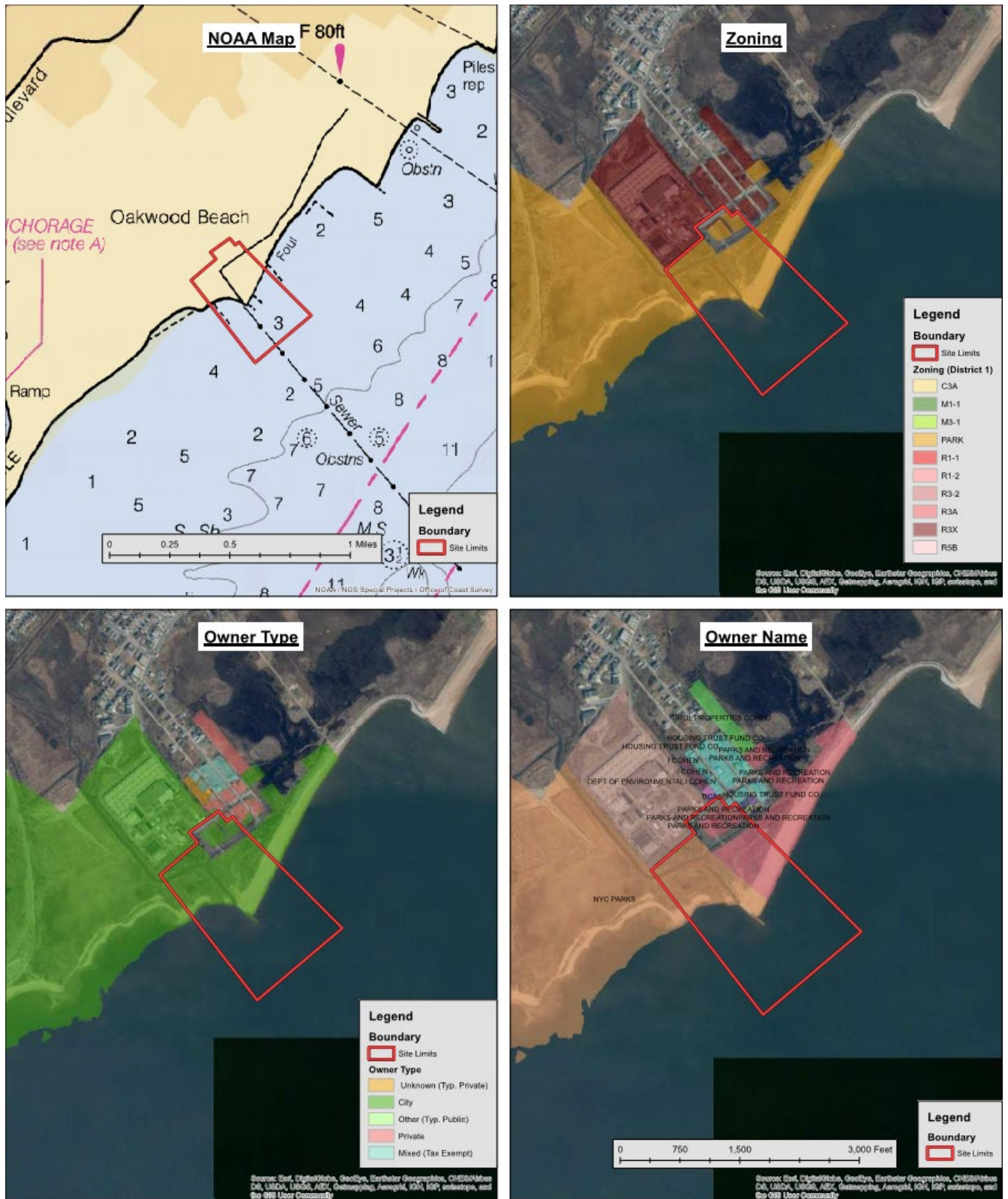
The Oakwood Beach site consists of a portion of NYC Parks and Recreation land adjacent to the Oakwood Beach Wastewater Treatment Plant located along the Lower Bay in Staten Island. This site is undeveloped, and the nearest Federal Navigation Channel is located approximately 6 km (4 mi) from the Raritan Bay East Reach Federal Navigation Channel, which has an authorized depth of 11 m (35 ft.) below MLLW.



<b>Site Location</b>	Cedar Grove Ave, Staten Island
<b>Ownership</b>	Public, NYC Parks and Recreation
<b>Assessed value</b>	\$8,600,000
<b>Total Site Area, incl. water</b>	18 ha (44 acres)
<b>Upland Area</b>	7 ha (17 acres)
<b>Water Frontage</b>	365 m (1,198 ft.)
<b>Existing Depth (MLLW)</b>	0–2 m (0–7 ft.)
<b>Distance to Design Depth</b>	6 km (4 mi)

Figure 6. Oakwood Beach and Adjacent Areas

Navigation chart, zoning map, owner type map and owner name map.



### 3.5 Prince's Bay

The Prince's Bay site consists of New York State Division of Lands and Forest land located along the Lower Bay in Staten Island. This site is undeveloped and adjacent to the Seguine Point Bend Federal Navigation Channel, which has an authorized depth of 11 m (35 ft.) below MLLW.

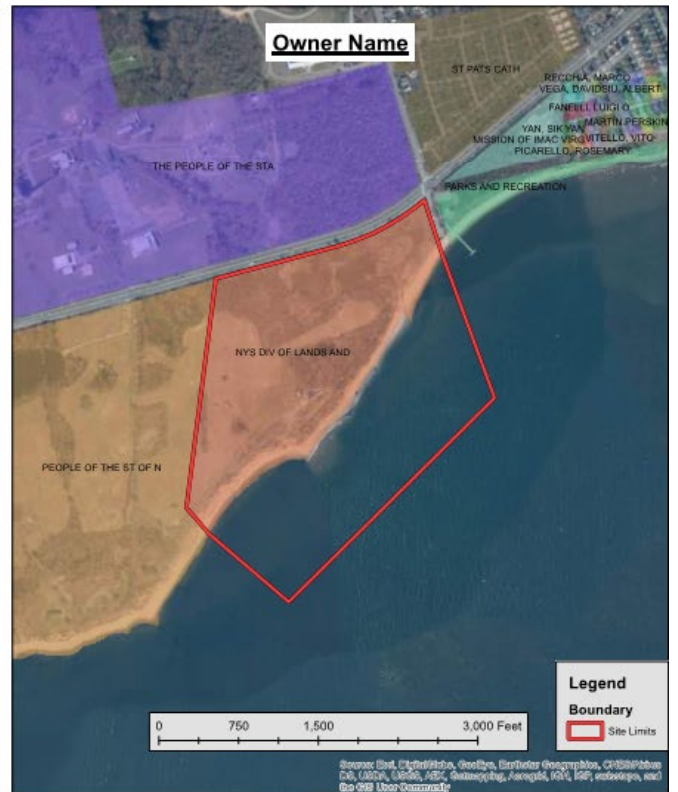
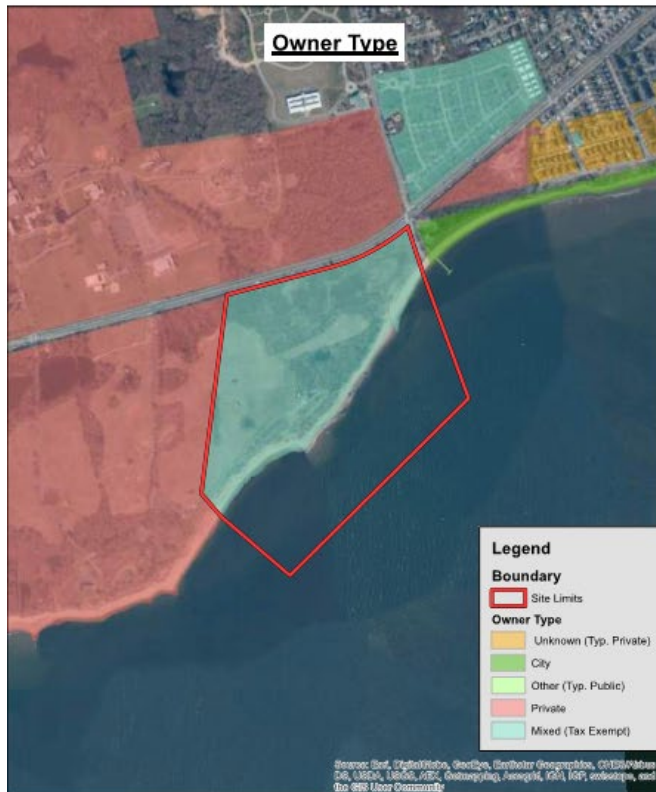
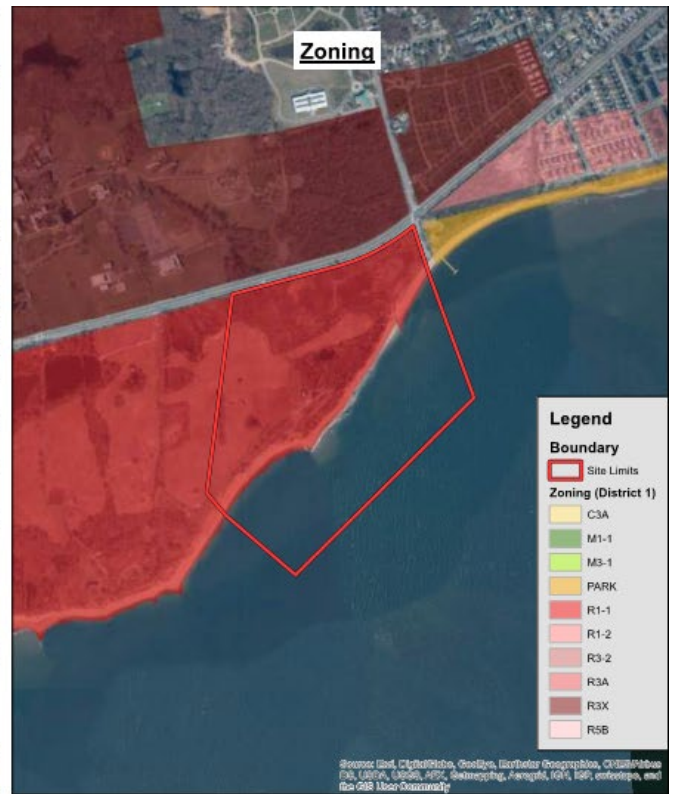
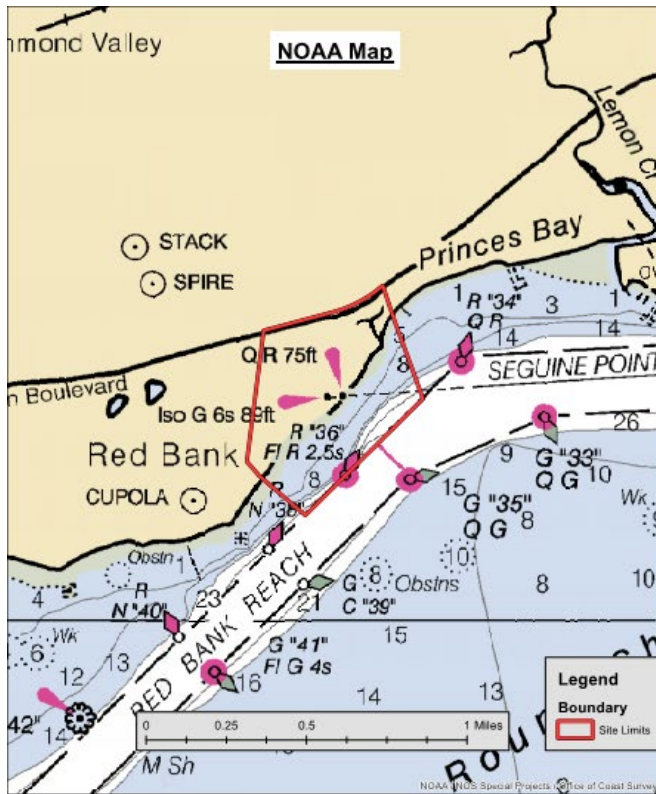


<b>Site Location</b>	Hylan Boulevard, Staten Island
<b>Ownership</b>	Public, NYS Division of Lands, and Forests
<b>Assessed value</b>	\$3,000,000
<b>Total Site Area, incl. water</b>	36 ha (89 acres)
<b>Upland Area</b>	19 ha (47 acres)
<b>Water Frontage</b>	800 m (2,630 ft.)
<b>Existing Depth (MLLW)</b>	0–7 m (0–23 ft.)
<b>Distance to Design Depth [km]</b>	0.1 km (0.06 mi)



Figure 7. Prince's Bay and Adjacent Areas

Navigation chart, zoning map, owner type map, and owner name map.



### 3.6 New York/New Jersey Harbor Wide Barrier

The New York/New Jersey Harbor Wide Barrier is one alternative currently being considered by the USACE for a coastal storm risk management study (CSRSM) that covers the New York and New Jersey Harbor and tidally affected tributaries. This study is currently in progress and the preferred alternative scheduled to be selected in 2020. The inclusion of an offshore wind port facility is not included in the current study scope. Additional information on the study can be found at the USACE project website:

<http://www.nan.usace.army.mil/Missions/Civil-Works/Projects-in-New-York/New-York-New-Jersey-Harbor-Tributaries-Focus-Area-Feasibility-Study/>

The New York/New Jersey Harbor Wide Barrier site could potentially be located on an artificial island constructed as part the flood barrier between Breezy Point and Sandy Hook. The site could be located on the inland side of the island adjacent to the Ambrose Federal Navigation Channel, which has an authorized depth of 53 feet below MLLW.

Figure 8. USACE Alternative 2  
Sandy Hook-Breezy Point Gate [4].

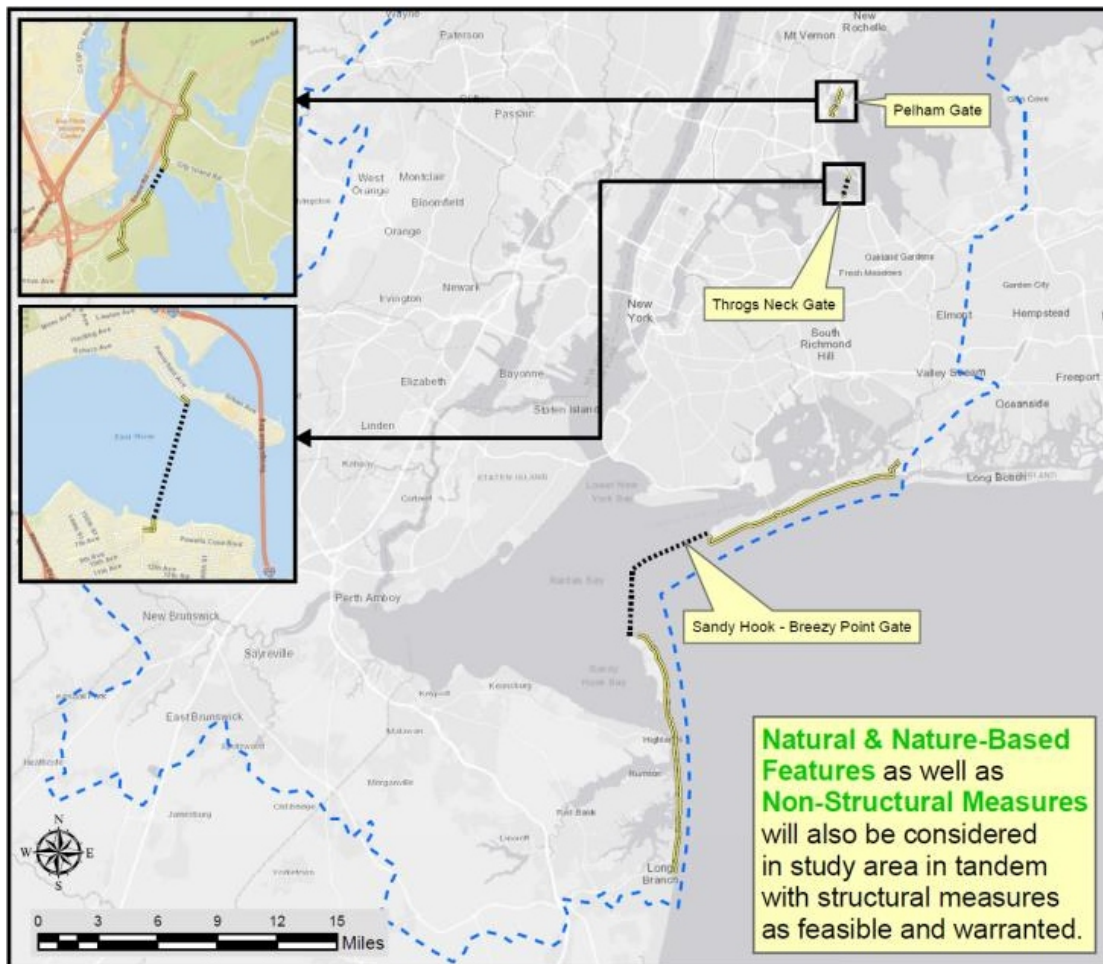
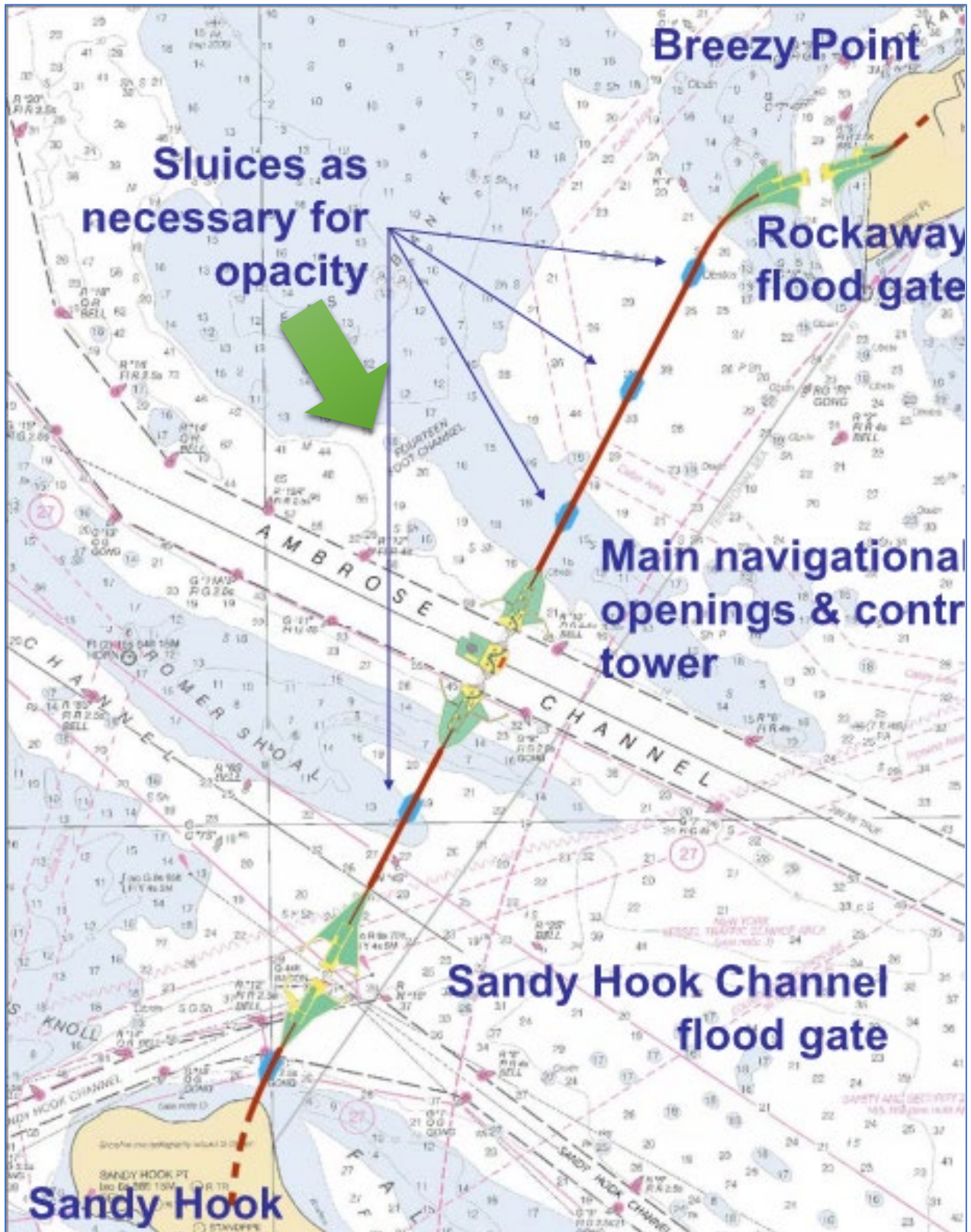


Figure 9. Harbor Wide Barrier Concept Design

See Reference Section [5].



# References

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- [1] COWI, "Assessment of Ports and Infrastructure," COWI, New York, 2017.
- [2] NYSERDA, "New York State Offshore Wind Master Plan," NYSERDA, New York, 2017.
- [3] O. o. E. E. & R. E. US Department of Energy, *2017 Offshore Wind Technologies Market Update*, US DOE, 2018.
- [4] U.S. DOT - FAA, A model Zoning Ordinance To Limit height of Objects Around Airports, Federal Aviation Administration, 1987.
- [5] U.S. DOT - FAA, Website: eNASR Browser, Federal Aviation Administration, September 30, 2017.
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