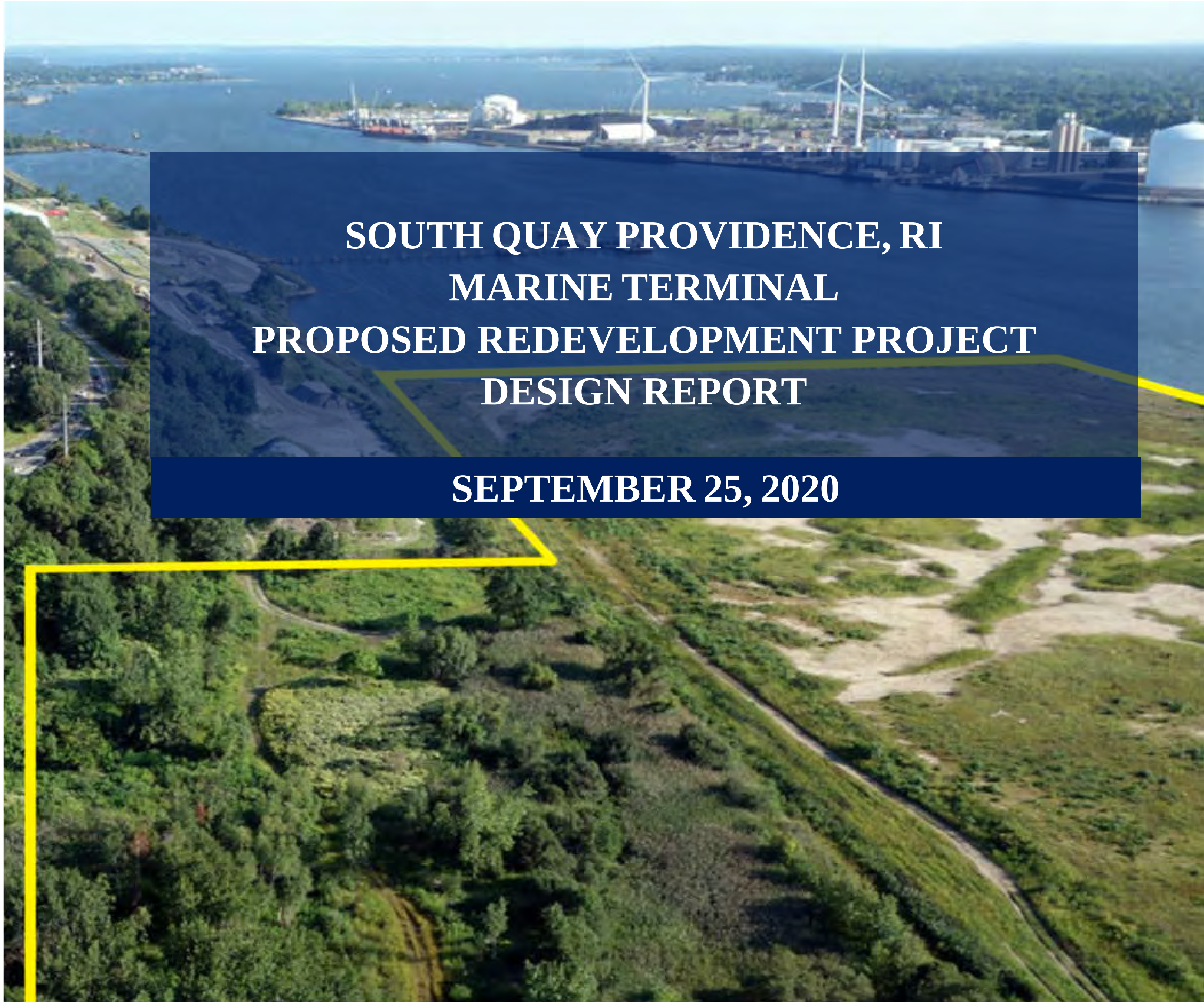

SOUTH QUAY PROVIDENCE, RI
MARINE TERMINAL
PROPOSED REDEVELOPMENT PROJECT
DESIGN REPORT

SEPTEMBER 25, 2020

RI WATERFRONT ENTERPRISES

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Attachment 1: GZA Preliminary Bearing Capacity Memo
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South Quay Marine Terminal Proposed Redevelopment Project Design Report

September 2020

Project Description

In the heart of Rhode Island, East Providence's South Quay Marine Terminal (SQMT) project will create an immense centralized hub of intermodal shipping that will provide thousands of jobs over the years, bring economic revival to the East Providence shoreline, and be key in the growth of the offshore wind industry. The South Quay project in Rhode Island will create a modern intermodal, state-of-the-art, high capacity, high flexibility port that will be specially prepared to handle multiple types of cargo, including bulk, break bulk, container, heavy oversized, and the immense size and weights of equipment and components used for the growing offshore wind market. Situated directly on a protected deep-water channel along the northeastern banks of the Providence River, across the harbor from direct rail lines and another large port facility, within one mile of a heavily trafficked interstates, and along the line of passenger ferry routes, the South Quay is perfectly situated to be the location to unite multiple forms of transportation infrastructure within an intermodal port.

The South Quay's access to the deep-water channel in the Providence River, leads to the mouth of Narragansett Bay which is less than 20 miles from the closest federal offshore wind lease areas with signed power purchase agreements. These lease areas have been leased to multiple international development teams who are committed to over a dozen modern large-scale clean energy projects. Based off state commitments alone, offshore wind farms will supply 14,200 MW of energy to the 4 lower New England states of Massachusetts, Rhode Island and Connecticut as well as New York via Long Island by 2035. Additional projects in NY/NJ will require support infrastructure for freight and are accessible via coastal shipping lanes from Providence Harbor. The need for the heavy freight capability is in demand by every developer with a lease area to begin producing power. The Port of Providence, across the harbor from the South Quay, and Davisville are the first in the nation to support an offshore project wind in US waters; the 5 turbines of Block Island Wind Farm. The deployment of America's first Offshore Wind Farm is a great success and achievement, not the least of which is that the developer was able to deploy a large proportion of the components from the Port of Providence in Rhode Island. Scaling up to meet the increase in demand seen on the U.S. East Coast is more of a challenging task, however. The projected Offshore Wind buildout of the east coast would entail several thousand turbines; each projected wind farm comprised of between 50 and 100 turbine units, creating ocean renewable energy at a scale that has yet to be contemplated in this country. The leap to 80-100 turbines in a single wind farm requires an expanded network of deep-water ports with the ability to accept and distribute heavy freight from multiple transportation nodes. The South Quay's access to roads, railyard potential and deep-water channel meets that demand and encourages developers to concentrate operations in Providence Harbor and Narragansett Bay. The infrastructure to support the construction, installation and freight operations for offshore wind farm components does not exist, creating an opportunity for Rhode Island to lead the region in a national push for offshore wind energy implementation. At this stage in the development of the industry, it is widely recognized that a multi-port facility solution will likely be necessary if the supply chain is to be attracted to the U.S. market. This is an opportunity for East Providence and its ports to play a pivotal role in the development of a new multi-use transportation commercial/industrial freight shipping facility to house the growing Offshore Wind Industry along the East Coast.

Project History

The South Quay was created on title land by the Army Corps of Engineers in the 1940's during the forging of a 16.8-mile-long commercial waterway now principal to the New England Region. Under authority of the Rivers and Harbors Act of 1965, a modification to the navigational channel project was completed in 1976, the channel modified, extending its depth to 40 feet (MSL).

The site was planned as a maritime terminal in the late 1970's when it was owned by the Providence & Worcester Railroad. The channel adjacent to the parcel was dredged and repurposed for filling the South Quay parcel. Additional sandy fill was placed on top. The Army Corp of Engineers approved permits for the rail and maritime cargo use of the South Quay in 1978 and continues to maintain the deep-water channels in Providence Harbor in support of the numerous automotive, wet & dry bulk and passenger transport in the Narragansett Bay region. The plan showed a filled area extending to the existing pier for an area of around 45 acres and included a reinforced concrete relieving platform along the eastern edge. Construction did not begin until 1981 when P&W Railroad started construction of the site by building out a berm perimeter and filling in the area with dredged material from the Providence River. The fill occurred gradually through the next decade.

The plans for the marine terminal, including a full acreage buildout, and concrete relieving platform were never fulfilled, and the 32 acres of fill have remained empty since the 1990s. Despite the potential for development, the South Quay sat idle for nearly 40 years. In 2019 the site was bought by RI Waterfront Enterprises, LLC with plans of redevelopment. The growing need for heavy freight and the ability to establish the South Quay as a primary player in the Providence Harbor port network prompted the owners to place focus on the industrial development.

Site Access

One of the main project advantages is the location of the site, nestled nicely on a deep-water navigable channel and near interstate highways. The site is located less than 1 mile from the on-ramp to Interstate 195, which connects Rhode Island and Massachusetts, as well as leads into

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Interstate 95, which is the major transportation corridor connecting all major hubs on the eastern seaboard.

The Rhode Island Department of Transportation has announced an additional exit off Interstate 195 which will increase transportation directly to Waterfront Drive[1], the road which connects through the South Quay. Furthermore, RIDOT has a long term, $70 million plan to rehabilitate the Washington bridge, situated next to the South Quay. Construction of the new Waterfront Drive exit will provide a significant increased connection to transportation infrastructure, demonstrates the City of East Providence's commitment to rehabilitating transportation, and is another step in the construction of a Multimodal port facility.

Project Team

Lloyd's Register
Lloyd's Register Group Limited is a technical and business services organization and a maritime classification society, wholly owned by the Lloyd's Register Foundation, a UK charity dedicated to research and education in science and engineering. The organization dates to 1760. Its stated aims are to enhance the safety of life, property, and the environment, by helping its clients to ensure the quality construction and operation of critical infrastructure.

GZA GeoEnvironmental, Inc.
GZA GeoEnvironmental, Inc. (GZA) is a multi-disciplinary, employee-owned firm providing geotechnical, environmental, ecological, water, and construction management services. GZA's more than 700 professionals are based in offices in New England, the Mid-Atlantic, and the Great Lakes States.

Pare Corp.
Pare Corporation is a growing engineering and planning firm operating throughout the Eastern US. Pare offers clients 50 years of successful project expertise, and we offer potential employees nearly unlimited job opportunities in the areas of civil, structural, geotechnical, environmental, traffic, transportation, bridge, dams, marine, water supply, wastewater, solid waste, wetland science, permitting, and more.

In addition to the three main design team members, this design is being supported by project partners, Sage Environmental and Orson and Brusini. Sage Environmental is handling the environmental remediation/compliance aspects of the project and Orson and Brusini is the legal team handling permitting, compliance and other legal issues for the site.

[1] https://www.eastprovidencewaterfront.com/news/ridot-confirms-new-east-providence-exit-says-gano-street-exit-will-stay-open/

Design Criteria

The site considered for the multimodal maritime facility is in the central area of the property along the Providence River.

Design analysis has been completed to ensure the requirements of the port are enough to support the Offshore Wind industry. Although the port will be flexible to handle many port operations and heavy load activity, due to the scale of OSW components, the defining design criteria is dictated by the OSW industry. This will become the Basis of Design, and further design analysis will verify these requirements. Furthermore, safety and resiliency have been a leading criterion with Basis of Design requirements to ensure that the site can respond to changing climate, sea levels, and storm events.

Table 1. Design Criteria

	Requirements
Quayside Crawler Crane Corridor	180 ft (55m)
Site Acreage	32 acres
Inbound Berth	525x97 ft (160x30m)
Outbound Berth	460x127 ft (140x40 m)
Inbound Quay Load Bearing Capacity	5,120 psf (25 mt/m^2)
Outbound Quay Load Bearing Capacity	6,144 psf (30 mt/m^2)
Uniform Load Bearing Capacity	5,120 psf (25 mt/m^2)
Berth Depth	32 ft (9.9m)
Other Requirements and Services	• Fire Bunkering • Fire protection, potable water and wastewater disposal capabilities along the quayside • Ship-to-shore power outlets along the quayside • 1100 kVA power supply to the site with enough distribution of power outlets • Work and security level lighting for around-the-clock activities • U.S. Coast Guard regulated, secure maritime facility ISPS Level 1 • Fenders • Bollards
Site Surface	• Dense Graded Aggregate • Stormwater Management to RI Standards • Located above FEMA Flood Plain (Elev. 16.5 MLLW) and with additional room for sea level rise considerations
Facilities	Office mobile trailers: security, office, warehouse (not on main parcel… to be added later)

Property Functional Goals (Qualitative)

The South Quay Marine Terminal is being designed to be a state-of-the-art port facility with access to deep water and high ground bearing strength. The goal is to be able to receive international vessels with heavy cargo consisting of large components such as those that are used in offshore wind farms. The facility should be equipped to berth the vessel, provide a stable surface to offload those components, and have utilities to allow the vessel to take on fresh water and plug in to power so as to not need to run off its generators. These same characteristics are desirable for vessels or barges calling on the port to load out the components for installation at their final destination.

For the offloaded components, the site needs to be designed to have sufficient bearing capacity to allow maximum flexibility on storage and movement of those components, and the capacity to support crane picks and movement. The upland surface should be flexible and easy to maintain so as to not have cracks or damage caused by movement and storage of parts, which is why a granular surface is preferred to a hardened one.

In addition to supporting this emerging industry, the South Quay is being designed to be well suited to meeting the growing demand for northeastern shipping and construction markets. Planned as an intermodal port, it is the South Quay's goal to enhance trade and economic growth while upholding freight efficiency, safety, and connectivity for the state and regional residents and businesses.

The Project will have a major economic development impact and part of that impact will be recruiting and expanding industrial and commercial business throughout the region. To have this impact take hold, there is a commitment to developing partnerships, not only with offshore wind developers and industrial users but with the larger local and regional community.

Code and Regulatory Review

The South Quay site is located along the banks of the Providence River, a navigable waterway, lies within the FEMA floodplain, and abuts a property with delineated wetlands that need to be protected. Therefore, in order to show that the project will have no deleterious effects on neighboring resources and that it complies with governing regulations, a series of environmental permits will be required for this development, some of which are in place or in process.

United States Army Corps of Engineers (USACE): As stated previously, the South Quay was constructed under an USACE permit. The existing permit (RI-PROV-78-425), was issued by the Department of the Army, August 22, 1978. The permit was renewed on December 31, 2019 and expires on September 30, 2020 (it has been previously extended for decades). The project will need to request an additional extension, however the proposed project is entirely consistent with the footprint and intended use of the original project, so it is presented as part of that permit extension request.

RI Coastal Resource Management Council (CRMC) Assent: Generally, a CRMC permit is required for any construction in the coastal region or tidal waters of Rhode Island. Additionally, permits are required for work within 200 ft of the mean high-water mark. To meet regulations of CRMC, the project will require an Assent. We have taken the first step in this process by filing a Preliminary Determination application to gain their initial perspective and note which regulations will need to be addressed. Subsequently, the project will need to obtain a CRMC Assent after reviewing and address the comments and input received from the Preliminary Determination process.

Rhode Island Department of Environmental Management (RIDEM) Remedial Action Workplan (RAWP): The property has contamination above the Industrial/Commercial Direct Exposure Criteria that will be addressed by filling and then capping. Project sampling has demonstrated that there is a reporting requirement and that the proponent will need to submit a Site Investigation Report that will lead to obtaining an approved RAWP from RIDEM that will allow this. This work will be performed separately (but in close coordination with the engineering team) by Sage Environmental and Orson and Brusini.

RIDEM 401 Water Quality Certificate: Under the Clean Water Act, states need to certify all projects that involve dredge, fill or flow alterations. As the project will require dredging at the quayside berth (though significantly less than what was originally proposed and permitted under the USACE permit and RICRMC Assent), a Water Quality Certificate from the RI DEM will be required.

National Environmental Policy Act (NEPA) Review: NEPA is used to evaluate environmental and related social and economic effects. The existing project permitting has not triggered a NEPA review.

Rhode Island Department of Transportation (RIDOT): The project may require approvals from the RIDOT relating to infrastructure that will be explored as the project becomes more defined.

Approvals from the City and the Waterfront District Commission: The project will require various approvals from each.

Background Research

In order to compile data and understanding of historical and current conditions of the South Quay Marine Terminal, a background research study has been conducted. This information is used to guide design choices, inform on site conditions, and provide site and project limits. The following information has been collected and reviewed and a summary of it and its use in the design process is listed below:

13224 National Oceanic and Atmospheric Administration's (NOAA) Navigational Chart (Providence River) which provides a digital image with information and water depths for the Providence River, the adjacent Federal Channel (Fox Point Reach), and leading channels to the site. Bathymetric information is used in planning of quayside location and potential dredging activity.

Army Corps of Engineers (USACE) Application to Construct a Quay Permit (1975) and **Permit (RI-PROV-78-425, 1978)** is the original ACOE application used to approve the construction of the South Quay Marine Terminal.

The Army Corp of Engineers approved the permits for the rail and maritime cargo use of South Quay in 1978. The USACE Application is used to provide design and construction considerations. Of these considerations includes the stability information and use of cross sections of the retention berms and placement of basin areas. Additionally, this permit provides property and permitting limits on the project, bedrock characteristics, potential bulkhead designs and construction activities.

This permit, issued in 1978, covered and authorized the discharge of dredge or fill material into navigable waters, creation of a berthing area adjacent to the Federal Channel, a reinforced concrete breasting platform and 45 acres of fill. The plan shows a filled area extending to the existing pier for an area of around the 45 acres and included a reinforced concrete relieving platform along the eastern edge. Construction began in 1981 and occurred gradually through the next decade by building out a berm perimeter and filling in the area (only 32 acres) with dredged material from the Providence River, although the planned use of a rail and maritime cargo facility have yet to be achieved.

USACE Navigational Program Channel Condition Survey (2017) This survey gives the latest federal navigational channel surveyed bathymetry.

Pare Engineering's Historic Drawings and Borings (1991, 1998) that provides past drawings and design for the site from the dredge plan, berm placement, riprap slope design, and site elevations. These provide a recent site layout, information on previous designs, and site elevation details for this design. These drawings provide a detailed layout of the site after it was dredged and created from the USACE permit and approval. In addition, the historical borings on the site provide geotechnical information of what lies within the berm, within the filled site and within the river itself.

GZA Geotechnical Report (2017) provides geotechnical observations and recommendations for the evaluation of conceptual development options of the South Quay. Created for other purposes that were being explored as a potential redevelopment, the report provides useful information and analysis for many redevelopment options. Additionally, the report provides background information on bedrock geology, subsurface explorations, and subsurface conditions. This report has been used in the design process the identify a upland soil bed cross section and which guides the design of the upland and cofferdam structures.

Diprete Engineering Site ALTA/NSPS Title Survey (2019) was created to show all improvements of the property, utilities and observations that may impact the ownership and the use of the property. It is used to determine site boundaries and locate current appurtenances.

Recorded Quitclaim Deed (2019) which provides detail on the sale of the South Quay property from Providence and Worcester Railroad Company to RI Waterfront Enterprises LLC. This document is used to identify Tax Assessor Parcel information and specific site boundaries.

RI GIS Data taken from the RI GIS web platform is used create contour, estuary, flood hazard, glacial deposit, inundation, land use, sea level marsh model, submerged aquatic vegetation, topography and wetland maps of the site and the surrounding area. This provides information on the environmental concerns on or around the site as well as understanding of elevation and the neighboring zoning.

Alternatives Analysis

In order to identify alternative and most suitable design choices for the SQMT, an alternative analysis is required. Four elements of the design have been identified to be analyzed for design choices:

1. Site development limits,
2. Type of quayside infrastructure,
3. Method of geotechnical improvements, and
4. Limits of heavy lift buildout.

Multiple possibilities for each design choice are identified then ranked based on the design criteria: cost, ease of permitting, construction timeline, site development benefits, appeal to end users, and maintenance requirements (1= least desirable, 5= most desirable). Based on the unweighted scores (a summation of the design criteria scores), the design choices are ranked (1=best, 3=poorest) to identify the most suitable choice for each area of design.

The **Site Development Limits**, defined as the alternatives for the extent of the project buildout with respect to the current development boundaries and the authorized development limits. The three options identified as the three possible design choices were: Within the existing berm, at the toe of the existing berm, and out to the Harbor Line. Overall, building within the existing berm of the site leads to more straightforward permitting, less need for more mitigations and would be the least expensive and quickest to construct. The further into the waterline the site development limits would go, the more complicated the permitting would become, and the costlier and longer construction timeline would result.

Table 2. Site Development Limits Design Choice's Pro's and Con's

Site Development Limits	Pro's	Con's	Rank
Within Existing Berm	Ease of Permitting, Least Expensive	Smaller footprint, more boulders	1
Start in front of berm	Medium Cost, Less Boulders	Still Permitting	2
Out to Harbor Line	Maximize Footprint	Heavy Permitting	3

Table 3. Site Development Limits Design Criteria Ranking

Site Development Limits	Cost	Ease of Permitting	Construction Timeline	Site Development Benefits	Appeal to End Users	Maintenance Requirements	Score
Within Existing Berm	4	5	5	4	3	3	24
Start in front of berm	5	3	4	4	4	3	23
Out to Harbor Line	2	1	2	5	5	3	18

Quayside Infrastructure encompasses the different design choices of the design and construction of the quayside and materials, with the design criteria in mind that the project requires a deep draft berth for larger vessels and heavy loading strength to support the movement of heavy cargo. Therefore, the design choices evaluated include a cofferdam structure, kingpile sheetpile system, and an open pile supported system. These are the most common quayside infrastructure construction that would satisfy the project's goals. The cofferdam system ranked the highest largely due to its ability to support larger loads and provide the bearing support for the upland site and use somewhat shallower piles when compared to the other systems, which makes it better for site development and appeal to the end users. Additionally, the open pile supported system is typically not used in heavy load industrial structures, which would likely require more vigilance and cost in constructions and the maintenance would be higher to ensure it maintains the capacity.

Table 4. Quayside Infrastructure Design Choice's Pro's and Con's

Quayside Infrastructure	Pro's	Con's	Rank
Cofferdam	Commonly Used for High load Support Structures, Greater Strength, High Soil Bearing Capacity Along Quayside	Strict Construction Controls (due to installing sheet piles in circular cofferdams). Increased Cost.	1
Kingpile Sheetpile System	Less Soil Management and Cost Relative to Cofferdam, Greater Strength Relative to Pile Supported	Increased Cost Relative to Pile Supported Option. Need for Increased Soil Stability Required Behind Sheet Piles	2
Pile Supported Option	Light Weight, Easily Adaptable, Low Cost, Less Excavation	Rarely Used in Heavy Load Industrial Structures, Increased Soil Stability Required Behind Sheet Piles	3

Table 5. Quayside Infrastructure Design Criteria Ranking

Quayside Infrastructure	Cost	Ease of Permitting	Construction Timeline	Site Development Benefits	Appeal to End Users	Maintenance Requirements	Score
Cofferdam	2	3	3	5	5	3	21
Kingpile Sheetpile System	3	3	4	3	3	3	19
Pile supported	4	3	5	1	1	3	17

Geotechnical Improvements relates to upland improvements in order to increase the load bearing capacity of the site. As noted in other sections of the report, the majority of the site was created with dredged fill, often silty material that doesn't compact well and retains water. Thus, the existing surface is "spongy" and susceptible to settling. This is not desirable for an industrial port used for marshalling large and heavy components such as those used in offshore wind projects. Therefore, geotechnical improvements will be needed to provide a stable working surface with sufficient bearing capacity. To achieve this goal, we have looked at design choices ranging from removing and replacing fill, to constructing concrete piles within the current fill (design choices listed in *Table 6*). The fill and densify design choice, which would fill the site with dredge material and offsite fill then densify the surface with dense graded aggregate and material with a high load bearing capacity, ranks first as the most suitable design choice as there are lower maintenance considerations due to lack of a formal structure, a suitable load bearing capacity, and the construction timeline is faster. The advantage this project has that makes that option the most desirable is that the project requires filling to get out of the floodplain and address sea level rise. Additionally, to remove and replace design choice is likely not suitable as to handle the capacity of soil needed would delay construction past scope for this project and the stone columns design choice would require a grid network of stone columns to take on high loads which is incredibly costly.

Table 6. Geotechnical Improvements Design Choice's Pro's and Con's

Geotechnical Improvements	Pro's	Con's	Rank
Remove and Replace	Medium Cost, Low Permitting, Commonly Used	Inconsistent Bearing Capacity Potential (due to underlying native materials), Large Amount of Soil Handling, Environmental Considerations	5
Fill and Densify	Low Permitting, Medium Increase in Bearing Capacity	Onsite Infrastructure Requires specific materials for fill	1
Fill with Geogrids	Proven Long Term Solution could reduce thickness of fill material needed	Requires more construction controls, maintenance could be more difficult, Costly	2
Stone Columns	Largely Increase and Stabilize Bearing Capacity	Costly, Large footprint, timely	3
Rigid Inclusions / Concrete Piles	Large Load Bearing Capacity	Costly, timely	4

Table 7. Geotechnical Improvements Design Criteria Ranking

Geotechnical Improvements	Cost	Ease of Permitting	Construction Timeline	Site Development Benefits	Appeal to End Users	Maintenance Requirements	Score
Remove and Replace	1	3	2	5	5	5	21
Fill and Densify	4	4	3	5	5	5	26
Fill with Geogrids	3	4	2	5	5	4	23
Stone Columns	2	4	2	5	5	4	22
Rigid Inclusions / Concrete Piles	2	4	2	5	5	4	22
Remove and Replace	1	3	2	5	5	5	21

Table 8 and *9* demonstrate the pros and cons as well as the design criteria matrix for a **Heavy Lift Buildout**. This area of design is analyzed to determine to what extent a heavy lift capacity area is needed. The three design choices are to build the entire site to the heavy lift capacity requirements, to construct crane lanes throughout the site for heavy lift movement and cranes, or to structure heavy lift areas along the quayside only. The full site buildout would make the site more flexible and give the ability for cranes to move freely throughout the site. This ranks as the top choice as it provides the most flexibility and functionality for those using the port.

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Table 8. Heavy Lift Buildout Design Choice's Pro's and Con's

Heavy Lift Buildout	Pro's	Con's	Rank
Full Site	Ability to Move Cranes Around Site, Flexible	High Cost	1
Crane Lanes	Ability to Move Cranes at Quayside	Medium Cost Restricts to Quayside	3
Quayside only	Low Cost	Inability to Move Cranes Around Site or Quayside	2

Table 9. Heavy Lift Buildout Design Criteria Ranking

Heavy Lift Buildout	Cost	Ease of Permitting	Construction Timeline	Site Development Benefits	Appeal to End Users	Maintenance Requirements	Score
Full Site	1	4	2	5	5	4	21
Crane Lanes	3	4	3	3	3	3	19
Quayside only	5	4	4	1	1	5	20

Design Components

After analyzing the most suitable design choices, the design components are selected and described below:

a. Quayside Infrastructure

In order to facilitate the berthing of cargo ships and the loading and unloading of transported components, this project is designed with a 1,020 long deep-water (-32 MLLW) berth abutted by a series of sheet pile cellular cofferdam structures to support the horizontal and vertical loads that will result from operations at the port. In addition to the cofferdam structure, a 1000-foot-long by 50-foot-wide concrete relieving platform (which will be covered with dense graded aggregate to have the same surface as the rest of the site) will overhang the cofferdam structure by approximately 12 feet and be supported by steel pipe piles.

The last piece of quayside infrastructure is the 150-foot-wide, concrete ramp for roll-on/roll-off barge services. This will be located at the south-eastern edge of the site next to the berthing area.

More information is provided with attached drawings provided by Pare Engineering Corp.

b. Upland Geotechnical

The geotechnical goals of the project, most notably the high bearing capacity site area, will be achieved through a process of filling and shallow densification in small lifts (typically

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6”-12”) throughout the developed site. There will be several different loading areas on the property, with the highest loading (6,144 psf) occurring at the outbound berth and along the relieving platform, the majority of the site with a high loading capacity (5,120 psf) and the utility corridor and site perimeter being loaded to HS-20 loading. These bearing capacities may be achieved through filling with dense graded aggregate from 3 to 5 feet or reinforcing the fill zones will be complemented with 2 layers of geogrid, to accentuate the bearing strength. It is important to note that this is a critical design element that will require further investigation and study. As of this report however, with the existing information available, it does appear that these loading conditions can be met, subject to the limitations noted in the geotechnical bearing capacity evaluation. For instance, the highest loading rate (6,144 psf) can be achieved for a 6 ft wide strip loading on 3 feet of dense graded aggregate, 10.5 ft wide strip loading on 5 feet of dense graded aggregate, and 11 ft wide strip loading on 3 feet of dense graded aggregate with 2 layers of geogrid. There is also the consideration of settlement that results from the thick layer of organic silts that underlies the site, which is further evidence why having a granular surface coarse is best, as site maintenance of the surface needs to be factored in.

More information and detail on the geotechnical evaluation including the assumptions and limitations of the loading scenarios is provided in the attached GZA memorandum dated September 15, 2020.

c. Stormwater Management

The Rhode Island Stormwater Design and Installation Manual sets forth specific design criteria for which the site must comply. The manual sets forth 11 individual standards to be addressed, with the overall goal of balancing pre and post development runoff rates and volumes, encouraging groundwater recharge, protecting sensitive receptors and natural resources, and ensuring that the system will be maintained to continue its operations and goals.

The stormwater goals of the South Quay project are achieved with several key actions:

- Limiting the use of impervious materials on the surface - The site will use a granular wearing surface of dense graded aggregate, which is a well graded, pervious and relatively permeable material. This will help promote more initial abstraction and reduce the volume of runoff compared to an impermeable surface.
- Avoiding steep slopes- While the site is being raised several feet, the vast majority of the site will be graded at a shallow slope of 0.005 ft/ft and the edges will be graded at a 4H:1V (horizontal distance (H), vertical rise (V)) slope to meet up with surrounding grades. This will keep runoff rates lower than what they would be at steeper slopes.

- Promoting Recharge - The use of crushed stone infiltration trenches spaced throughout the property will capture runoff, provide water quality treatment and recharge stormwater into the subsurface. Promoting infiltration will reduce runoff rates and volumes and mimic natural hydrology.

d. Utility Infrastructure

As the site is intended to serve various cargo vessels that make stay in port up to 72 hours, the following utilities are being provided:

- Water Service - An 8" ductile iron buried water service will loop around the facility with fire hydrants spaced roughly every 500 feet to provide fire protection and two water service standpipes along the bulkhead to allow vessels to take on water when in port.
- High Mast Lighting - As port operations need to be available to operate 24 hours a day and as a security measure, the facility is designed with high mast lighting that operates on two lighting levels to illuminate the site.

e. Environmental

Environmental investigations, permitting and activities are being performed by Sage Environmental and Orson and Brusini. The construction of the South Quay will comply with necessary environmental permits and governing regulations during construction and operations.

f. Waterway Improvements

The South Quay has a prime location situated adjacent to the federally maintained, deep draft (40 ft) Providence River navigable channel. RIWE has made the decision to limit the extent of the dredging and filling authorized by the USACE (out to the Federal channel). As set forth in these design plans, RIWE will be constructing the bulkhead from the edge of current fill landward with the associated jack-up pad attached (described below). This will involve significantly less dredging and filling than originally contemplated and authorized by the USACE under the existing permit and that approved by the RI CRMC. The area to be dredged will be approximately ⅓ less than the original dredge footprint approved by USACE and the dredge depth will be 8 feet less than originally permitted or 20% less than the authorized depth authorized by the USACE.

i. Dredge - The scale of dredging has been reduced (from the original 1978 permit) to only along the edge of the bulkhead to allow for a berth of -32 MLLW (plus allowable overdredge). This is a significant reduction in both the area and depth permitted under the current USACE permit, which authorized dredging of a much larger area to the greater depth. The original permit authorized a berth dredge of

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1900 ft x 200 ft down to a depth of -42.5 MLLW. The current project is proposing a 1400 ft x 180 ft dredge to a depth of -32 MLLW.

ii. Jack-up pad - A jack-up pad is a stable platform with high load bearing capacity, capable of supporting jack-up barges (described further below) that will be used in the construction of offshore wind projects. To better support the barges and vessels that will utilize the port for off-shore wind project support and other port uses, the final design may involve constructing the pad with crushed stone to provide better bearing strength than the underlying river sediments. In order to do this, the jack-up area would be overdredged (beyond the proposed -32 MLLW berth target) and then backfilled with clean washed crushed stone up to the target berth depth of -32 MLLW. Should that be required, then the work shall meet the same strict Federal and State legal requirements for use as those related to the dredged materials. As described above, this work is well within the area originally approved by USACE and RICRMC for the port construction and will involve far less dredging and filling.

iii. Design Vessels - This project is being expressly designed to be used as a marshalling (main construction base) port for Offshore Wind projects (amongst other heavy cargo activities) and therefore there are several types of vessels that may call on the port that would need to be accommodated:

1. Heavy Lift Transport Vessels - Typically the largest type of vessels that may call on the port, they are typically used for transferring large and heavy components from the manufacturing facility to the marshalling port. These vessels (such as the Big Roll Beufort) typically range from over 400 ft to 560 ft in length, with a beam of 80-140 ft and drafting 23-30 feet.
2. Scour Protection Vessels - Another large type of vessels that may call on the port, they are typically used for seabed rock installation. These vessels (such as the Boskalis Seahorse) are typically over 500 ft in length, with a beam of 80-120 ft and drafting 20-26 feet.
3. Tug boats - When moving and berthing large vessels and barges within the harbor and out to open sea, tugs (often multiple) are used to safely navigate and berth. The tugs may be single screw or twin-screw engines, and can be anywhere from 60 to over 100 ft long, 30-40 feet in beam, and drafting between 8-20 ft. The biggest design factor consideration with relation to tugs is associated with propeller wash, as these powerful engines have a tendency to displace loose surface sediments.
4. Jack-up feeder barges - These vessels are smaller than the larger heavy transport vessels, however they are equipped with jack-up spuds to provide a stable platform when loading components on and off. These vessels (such as the L/B Kayd) are typically over 100 ft in length with a beam of 80 to

100 feet, relatively shallow drafting, and equipped with two or three jack-up spuds. These vessels are likely used to transport equipment from the marshalling port to the installation vessel, located in the water at the wind turbine construction site.

5. Survey and Geotechnical Vessels - These research vessels are typically deployed in the exploratory phases of an offshore wind project. They vary greatly in size, but with lengths from 60-260 feet, beams of 15 to 50 feet, and drafting anywhere from 8 feet to 20 feet. Multiple survey and geotechnical vessels may be used at a time during the initial phases of construction.
6. Crew Transfer Vessels – These vessels are used to transport crew members from a port facility to the OSW farm. These vessels typically range from 50-100 ft in length, 20-30ft in beam, and draft typically between 5-8 ft. These vessels may utilize the site during construction and cable installation but are more typically used at operation and maintenance port facilities.

g. Site Security

This site, as it will be hosting international vessels, will have a security plan meeting Maritime Transportation Security Act (MTSA) requirements. Proposed security measures to be implemented include new 8 ft high chain link fencing and a secured entrance gate which will be monitored by a site security contractor when international vessels or cargo are in port. An added measure to the site security is the high mast lighting system, which will illuminate the property throughout the site.

Design Methodology and Governing Standards

Quayside Infrastructure

The design of bulkhead structures will be in accordance with:

- USACE Engineering Manual 1110-2-2504 "Design of Sheet Pile Walls."
- USACE Engineering Manual 1110-2-2906 "Pile Design Manual"
- Design of marine facilities for the berthing, mooring, and repair of vessels, John W. Gaythwaite.—[2nd ed.]
- SEISMIC DESIGN OF PIERS AND WHARVES (61-14), American Society of Civil Engineers, Books & Standards 2014

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Geotechnical

Geotechnical assessments and design elements will be performed in accordance with:

- SBC-1-2013 (2013) Rhode Island State Building Code
- IBC (2012) International Building Code
- ASCE 7 (2010) Minimum Design Loads and Associated Criteria for Buildings and Other Structures
- ASCE 24 (2005) Flood Resistant Design and Construction
- Journal of Geotechnical and Geoenvironmental Engineering (2006) "Liquefaction Susceptibility Criteria for Silts and Clays", Boulanger and Idriss, 2006.

Stormwater Management

Stormwater management design elements will be performed in accordance with:

- Rhode Island Stormwater Design and Installation Standards Manual (2015)
- Technical Paper 40 - Rainfall Atlas of the United States, US Department of Commerce, 1961
- TR-55 Urban Hydrology for Small Watersheds, USDA, 1986

Dredge

The design of the dredge footprint will be in accordance with:

- USACE Engineering Manual 1110-2-1613 "Deep Draft Channel Design"
- USACE Engineering Manual 1110-2-1902 "Slope Stability"
- Underwater Investigations: Standard Practice Manual: ASCE Manuals and Reports on Engineering Practice No. 101. 2001.

Construction Sequencing

Upon mobilization to the site, the Contractor will first install all erosion control and protective structures as indicated on the project plans and required by the project permits. Prior to any ground disturbance, these devices will be reviewed by the engineer.

The erosion and sedimentation controls selected and maintained by the Contractor will be such that water quality standards and regulatory requirements are not violated as a result of the Contractor's construction activities. The Contractor will install sufficient erosion control measures to protect existing resource areas, including those above and beyond those listed on the Plans or described in the specifications. The Contractor will be responsible for any necessary sedimentation controls within the Contractor's proposed laydown area. No soil or discharge waters will be allowed outside of the proposed laydown area to prevent soil from entering nearby waters or municipal systems.

Anti-tracking pads will be installed at the Site entrance. The Contractor will inspect this area daily and clean the area as necessary. The Contractor will employ anti-tracking measures (street sweepers, anti-tracking pads, etc.) at the staging, transfer and/or temporary storage area to ensure that vehicles that exit the staging, transfer and/or temporary storage area do not track soils from the staging, transfer and/or temporary storage areas onto a public roadway at any time.

If any dewatering is required, that groundwater will be pumped to a settling area outside of the buffer zone and shall be done in compliance with the RIPDES Permit. All excavated materials will be stored on site in a manner that will minimize erosion from stockpiles, per the Erosion and Sedimentation Controls specifications/plans and the governing RIPDES Permit. Stockpiles will be located in the staging area, well away from the buffer zone and resource area to ensure that the impacts to the resource area are minimized.

When equipment arrives on site it will be in good working condition. Equipment and machinery delivered to the Site, including haul trucks that have visible oil or hydraulic fluid leaks, will not be allowed on site until satisfactorily repaired. The Contractor is responsible for the cleanup of any oil or hydraulic fluid spills at Contractor's expense.

Once erosion controls and protections are in place, site preparations can commence.

Staging Area Operations

All the contractor's operations not involving dredging or hauling must occur up gradient of the River and in the designated staging area. All refueling, and maintenance operations will occur here, as well as equipment and material storage, in appropriate areas with proper spill controls in place.

In the event of a spill or release of a hazardous substance (as designated in 40 CFR 302), pollutant, contaminant, or oil (as governed by the Oil Pollution Act (OPA), 33 U.S.C. 2701 et seq.), or a Release of oil or hazardous material as defined under 250-RICR-140-25-2.1 to 250-RICR-140-25-2.17. The Contractor will notify the Owner's Representative immediately. If the spill exceeds the reporting threshold, the Contractor will follow the pre-established procedures for immediate reporting and containment. Immediate containment actions will be taken to minimize the effect of any spill or leak. Cleanup will be in accordance with applicable federal, state, and local regulations. As directed by the Owner's Representative, additional sampling and testing will be performed to verify spills have been cleaned up.

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The Contractor will provide spill response materials including, but not limited to the following: containers, adsorbents, shovels, and personal protective equipment. Spill response materials will be available always in which hazardous materials/wastes are being handled or transported. Appropriate spill response materials will be available always to respond to a leak of fuel or other hazardous material from Contractor's vehicles or other mechanical devices. Spill response materials will be compatible with the type of materials and contaminants being handled.

The Contractor is responsible for the construction, protection and maintenance of temporary stockpiles through the final disposal. The Contractor will place stockpiled soils within the designated stockpile area, graded to shed water, and will cover the stockpiled soils prior to inclement weather and at the end of each work week with an impermeable barrier of a minimum six-mil-thick (0.006) black polyethylene cover overlapped and weighted to form a continuous waterproof barrier over the soil. The cover will be maintained by the Contractor throughout the stockpile period to prevent water from entering the soils and to prevent blowing dust. The cover will be suitably weighted to prevent the soil from being exposed by wind. Stockpile areas will be graded such that storm water runoff is diverted from stockpiled soils;

The Contractor will properly transport and dispose of all items, including solid hazardous and nonhazardous wastes removed from the Site, to appropriate disposal facilities. Contractor will characterize all wastes prior to offsite disposal, to determine if they are hazardous or non-hazardous and appropriate for the receiving facility.

In Water Construction: The dredging associated with the project is anticipated to alter existing conditions to final depths of -32 MLLW (for the Quayside Areas) with an allowable overdredge to ensure that the final dredge footprint meets the minimum berth depth set out.

On-Land Construction: The main area of the facility, which will be adjacent to the harbor, is an approximately 32-acre area. This area will be designed to accommodate the heaviest loads at the facility. The bulkhead for the South Quay project is a one-of-a-kind construction that supports heavy-lift loads that are upwards of four times the capacity of any similar bulkhead in the United States. The bulkhead was designed with a cofferdam construction, with a marginal wharf system that bridged the scalloped edges of the facility to allow berthing of vessels.

Given that both on-land and over-water construction operations will be mobilized and initiated simultaneously and conducted in parallel, the various activities in completing the work will be performed in the following general sequence:

- Installation of site perimeter controls
- Installation of erosion control devices
- Setting up staging areas on site

- Mobilization of equipment and materials
- rock removal activities within the dredge footprint and along the existing berm
- installation of cellular cofferdams
- dredging of the berth area
- general upland site construction – clearing, grubbing, debris management, etc.
- Site filling and heavy compaction.
- concrete work for relieving platform
- Construct roll-on/roll-off ramp
- installation of wharf appurtenances, such as fendering and ladders,
- installation of utilities (water, electrical, communications, lighting), and
- final grading of the facility.

More detail of the construction sequencing will be developed as the project design continues to develop. Mobilization of construction materials, equipment, and personnel is anticipated to start within a month of the formal issuance of the notice to proceed. Dredging and general Site construction activities will commence within one month after mobilization.

Design Assumptions for this Stage

- Fill material is somewhat granular, acting as a hydrologic soil group B soil
- Cofferdam configuration for bulkhead
- 3 pipe pile supporting 3 ft concrete deck
- DGA surface cover over relieving platform
- Projected bathymetry down from toe of berm to Federal Channel Bathymetry
- Bearing capacity stated is only for the strip loading scenarios noted in the GZA September 15, 2020 memorandum.
- Some differential settlement of the surface is acceptable
- Differential settlement of the utilities will be within the level of tolerance of the materials.

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Data Gaps

Gaps in data have been identified as areas where more exploration or research is needed in order to move forward to a more comprehensive design. These data gaps are identified as:

- Bathymetry between the quayside and the federal navigational channel.
- Sediment sampling data from dredge footprint
- Infiltration data of onsite soils for stormwater management
- Surveyed location of MHW and MLW
- Utilities in the Harbor
- Source of Fill and number of trucks
- Location of Utilities to tie into
- Geotechnical characterization of the berm
- Soil profiles of bulkhead location
- Depth of fill for jack-up pad

ATTACHMENT 1

GZA Preliminary Bearing Capacity Memo

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Memo

To: John McAllister, P.E., Jay Borkland (Lloyd's Register)

From: William Ladd, P.E., David Carchedi, Ph.D., P.E.

Date: September 16, 2020

Re: South Quay Upland Bearing Capacity Evaluation

This memo has been prepared to summarize our preliminary bearing capacity evaluation for the upland area of the South Quay site.

According to the design requirements provided by you, the following bearing pressures for the upland site are required:

- Outbound Quay Loading: 6,144 psf (30 mt/m^2)
- Uniform Bearing Capacity: 5,120 psf (25 mt/m^2)
- Inbound Quay Loading: 2,000 psf (9.8 mt/m^2)

Based upon our review of the existing subsurface information, the upland soil profile consists of approximately 5 to 15 feet of surficial fill, underlain by soft organic silt up to approximately 50 feet in thickness, underlain in turn by stratified silt, sand and gravel deposits. The upper 10 to 15 feet of the organic silt is believed to consist of remolded dredge spoils placed during the construction of the site. The surficial fill is generally sandy in nature, but may be mixed with organic silt, cobbles, boulders, and debris. The thickness of the surficial fill layer is variable across the site and may include thinner areas due to the method of placement. It is recommended that additional borings be performed to further assess the thickness of the surficial fill. Refer to the attached Subsurface Profile for a typical cross section of the site.

The existing surface grades at the site range from approximately elevation 12 to 14 feet MLLW, with a high point of approximately elevation 16 feet in the northwest corner. The proposed finished grades for the site range from approximately 19 feet at the west edge, to 18 feet across the interior. The site grades are therefore expected to be raised by approximately 3 to 6 feet above existing grades. The proposed surface is anticipated to be a minimum of three feet of compacted dense grade aggregate, with the remainder of the fill to be imported granular soils.

The following generalized upland subsurface profile was used for the evaluation of the bearing capacity:

- El. 18 to 15 – Dense Graded Aggregate (3-foot thick)
- El. 15 to 13 – Imported Compacted Granular Fill (3-foot thick)
- El. 13 to 7 - Existing Granular Fill (5-foot thick)
- El. 7 and Below – Soft Organic Silt

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The bearing capacity of the upland surface will be a function of the size and shape of the loaded areas. For design purposes, we evaluated both strip and square footings, or loaded bearing areas, at the surface ranging in size from 2 to 40 feet (strip footings have a length much greater than the width, say 5 times or more).

The bearing capacity was evaluated using limit equilibrium methods with the computer program Slope/W to account for the layered profile, and the potential inclusion of geogrid reinforcement layers. We evaluated the proposed surface treatment as 3 feet of Dense Grade, as well as 5 feet of dense grade, and 3 feet of dense grade with two layers of geogrid reinforcement (one at the bottom, and one at the midpoint). A Factor of Safety of 2 on the calculated ultimate bearing capacity was used to determine the allowable bearing pressure. The results of this analysis are summarized below and are plotted on the attached Allowable Bearing Capacity vs. Footing Dimension figures.

Allowable Bearing Capacity (psf)						
Loading Width	3ft Dense Grade		5 ft Dense Grade		3 ft Dense Grade w/ 2 Layers Geogrid	
ft	Strip	Square	Strip	Square	Strip	Square
2	5500	4400	5500	4400	12000	9600
3	6750	5400	6750	5400	11500	9200
5	6250	5000	11000	8800	8500	6800
10	6000	4800	6500	5200	6625	5300
15	3750	3000	3750	3000	4000	3200
20	2750	2200	2750	2200	3000	2400
30	2125	1700	2125	1700	2125	1700
40	1750	1400	1750	1400	1750	1400

The sizes of the loaded areas ("footings") that meet the design bearing capacity requirements are summarized in the following table:

Maximum Loaded Area Size (ft)						
Design Bearing Capacity Required	3ft Dense Grade		5 ft Dense Grade		3 ft Dense Grade w/ 2 Layers Geogrid	
psf	Strip	Square	Strip	Square	Strip	Square
6,144 psf	6 (and >2.5)	NG	10.5 (and >2.5)	8.5 (and >3.5)	11	8.8
5,120 psf	12	4 (and >3.5)	12.5	10 (and >2.5)	12.5	10
2,000 psf	33	24	33	24	33	25.5

From the above tables and attached graphs, the allowable bearing capacities decrease as the size of the loaded areas increase. This is due to the presence of the underlying soft organic silt, which begins to control the bearing capacity for the larger loaded area sizes. Note also that the two dense grade options without geogrid reinforcement have a minimum loaded area size for some cases as well as a

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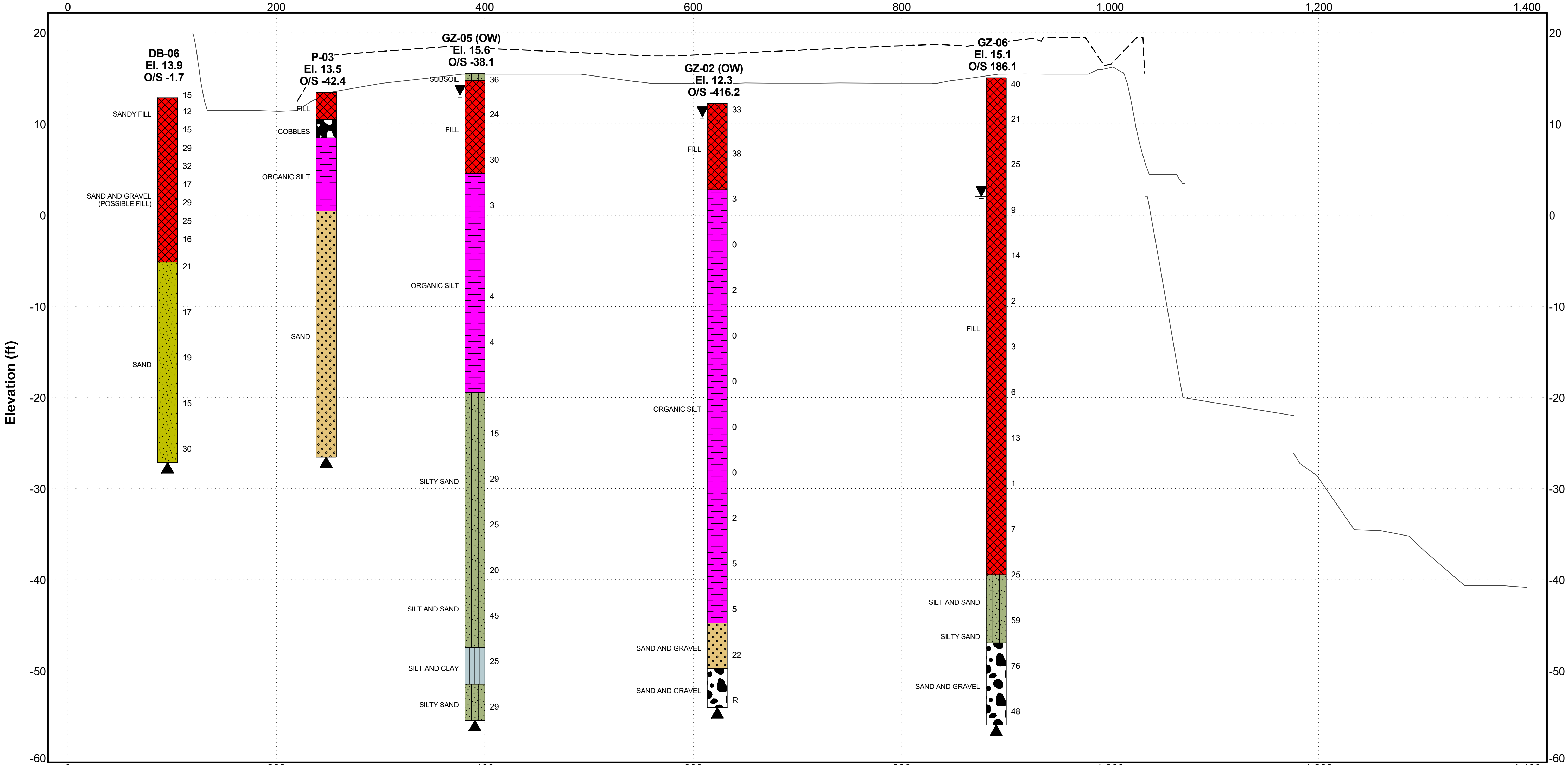
maximum. The option of 3 feet of Dense Grade with Two Layers Geogrid provides the highest bearing capacities and does not have the minimum size limit.

The proposed sizes of the loaded areas were not provided. If the loaded areas exceed the maximum sizes above, it will be necessary to provide ground improvement such as rigid inclusions, or a pile-supported relieving platform.

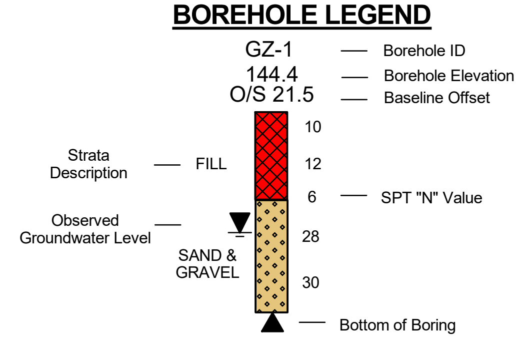
The organic silt will also experience significant consolidation settlement from the increased loading due to the placement of fill and loaded bearing areas. The magnitude of the settlement for 20 to 50 feet of organic silt is anticipated to range from approximately 12 to 24 inches, and will occur over a period of approximately 1 to 5 years. In order to maintain the final grade elevation, it will therefore be necessary to periodically import additional Dense Grade material to re-fill the surface as settlement occurs.



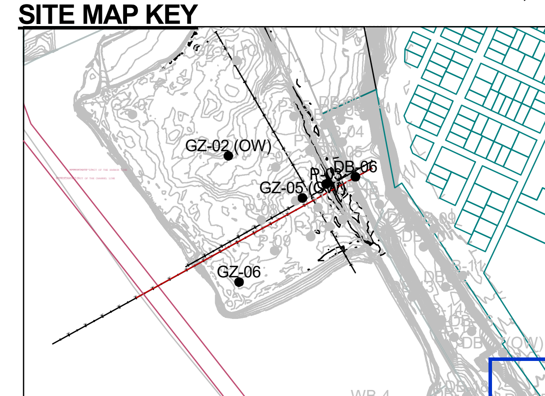
SUBSUFARCE STRATIGRAPHY LEGEND

- Fill (made ground)
- USCS Poorly-graded Sand
- USCS Low Plasticity Organic silt or clay
- USCS Well-graded Sand
- USCS Well-graded Gravel
- USCS Silty Sand
- USCS Silt
- Boulders and cobbles

BOREHOLE LEGEND



SITE MAP KEY



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Engineers and Scientists

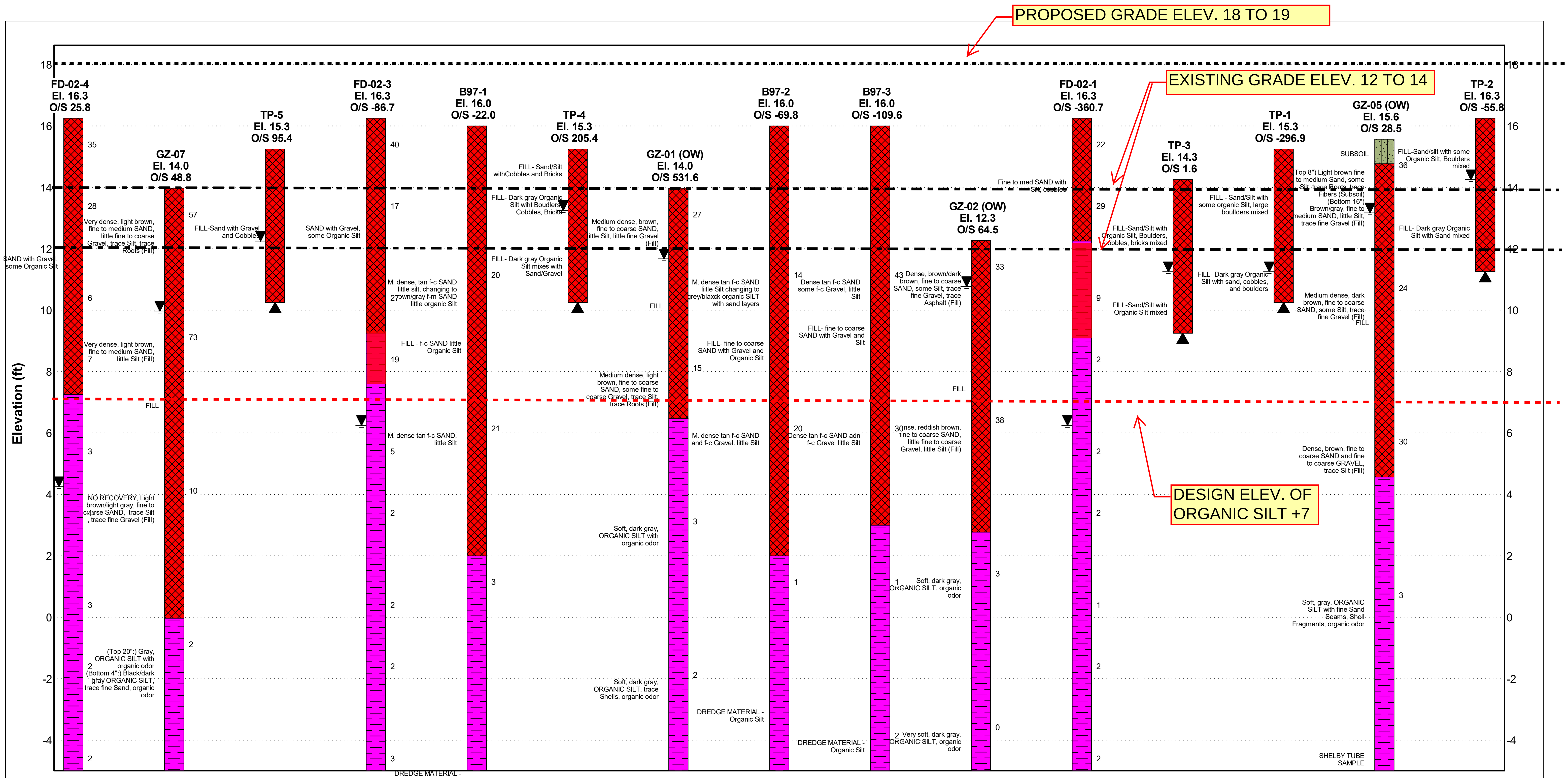
P&W South Quay Wind
East Providence, Rhode Island

Project No.: 34821

Date: 9/10/2020

Title: Subsurface Profile

Figure No.:



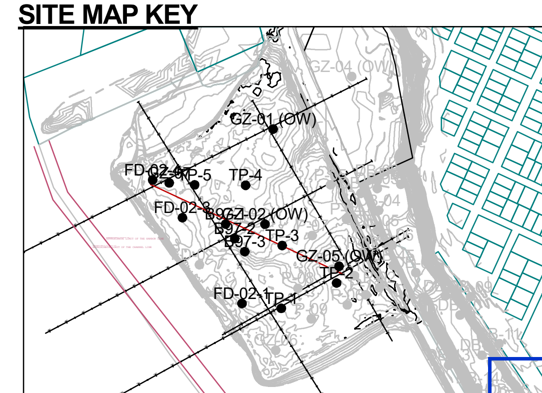
SUBSUFARCE STRATIGRAPHY LEGEND

- Fill (made ground)
- USCS Low Plasticity Organic silt or clay
- USCS Silty Sand

BOREHOLE LEGEND

GZ-1 — Borehole ID
144.4 — Borehole Elevation
O/S 21.5 — Baseline Offset
Strata Description — FILL
10, 12, 6 — SPT "N" Value
28, 30
Observed Groundwater Level
SAND & GRAVEL
Bottom of Boring

SITE MAP KEY



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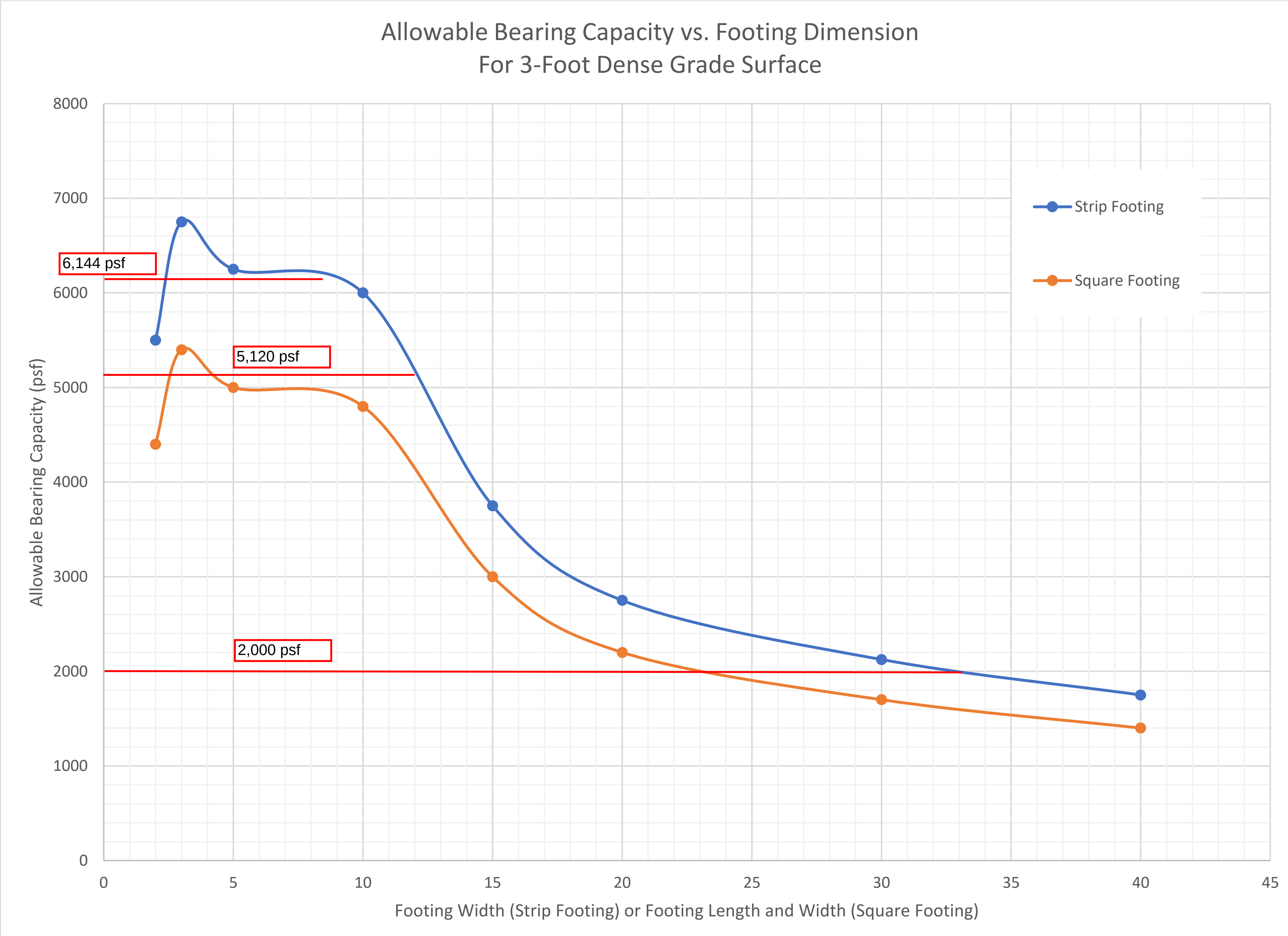
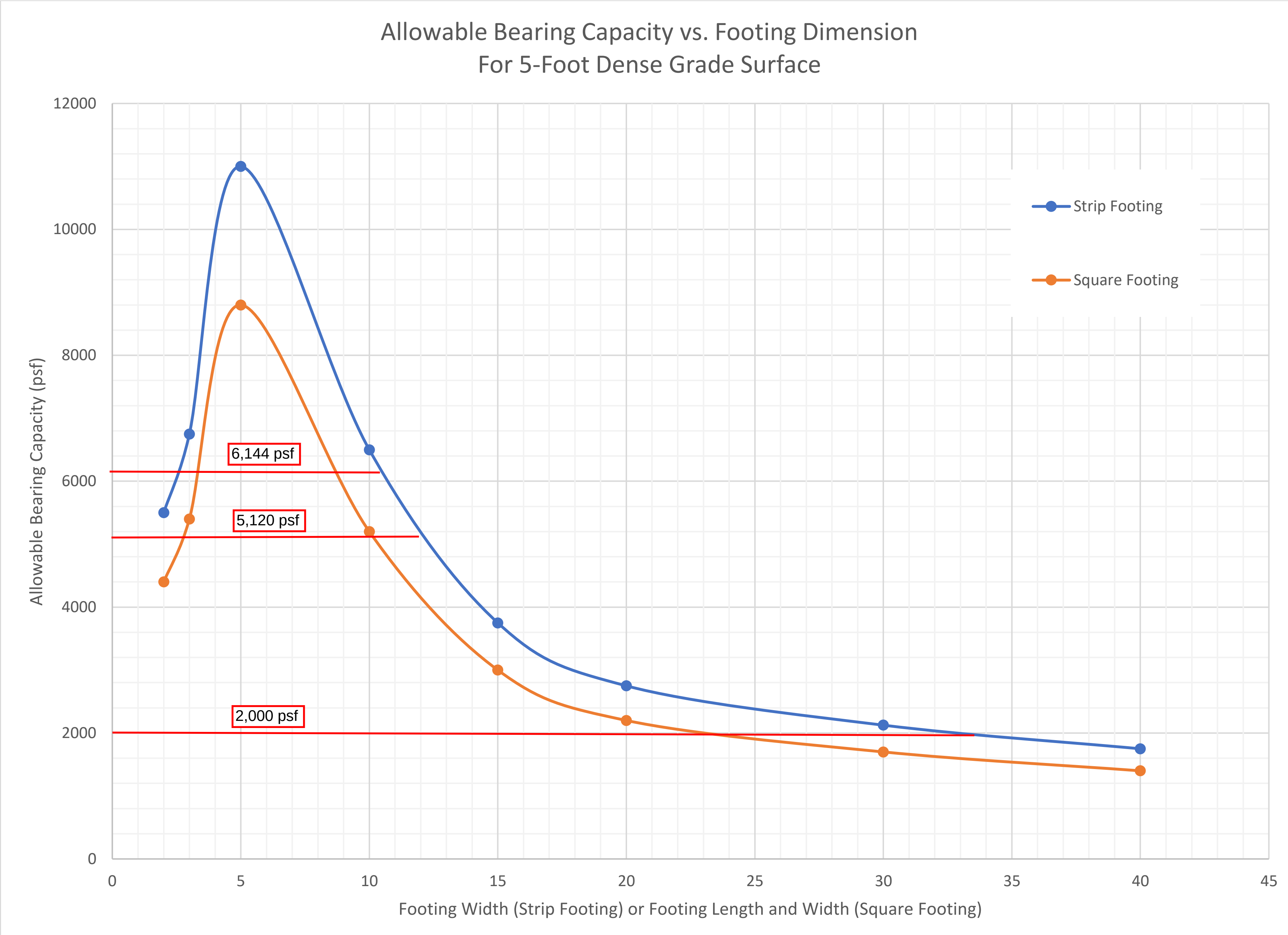
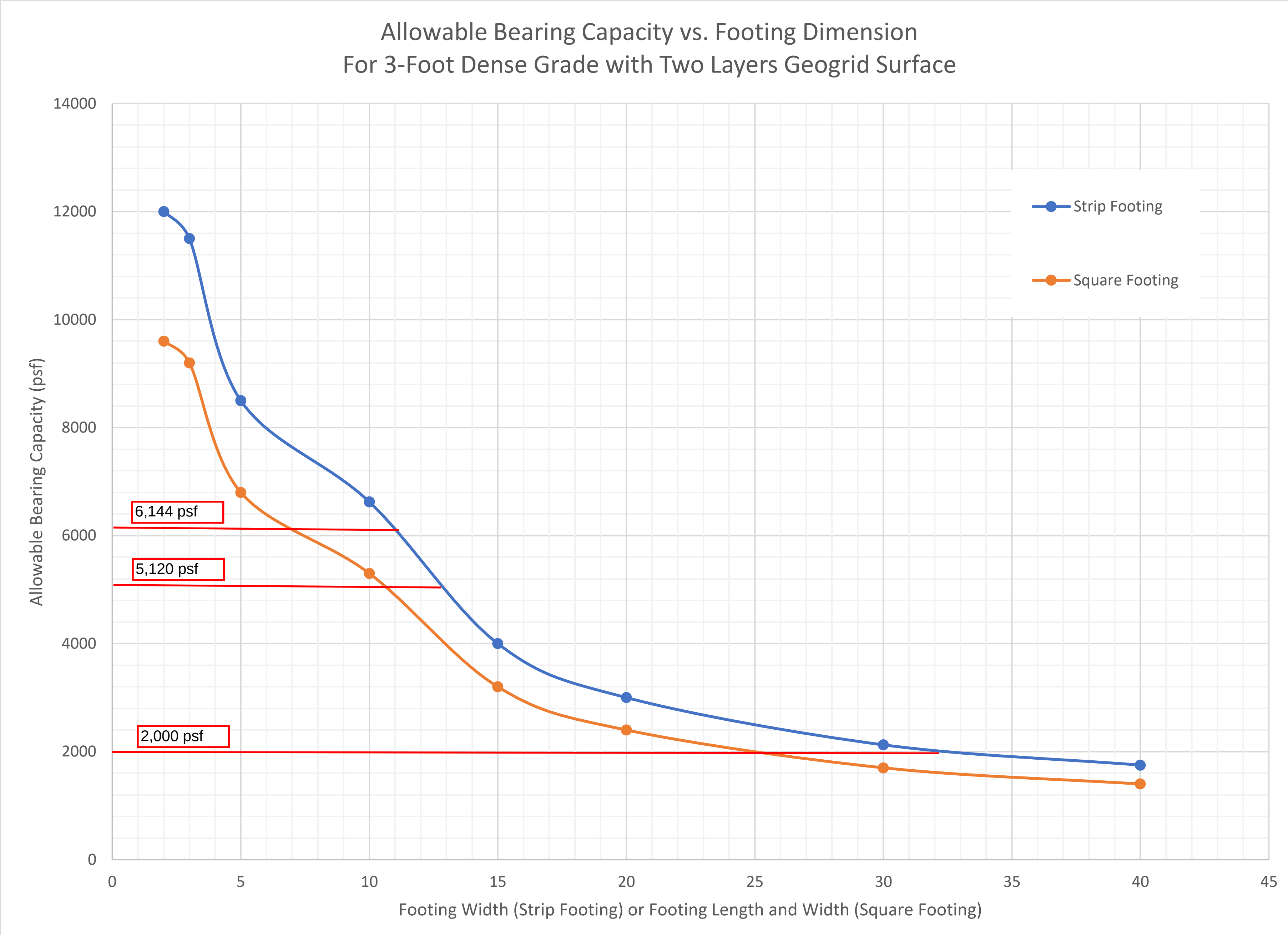
South Quay Wind
East Providence, Rhode Island

Project No.: 34821
Date: 9/15/2020
Title: Upland Borings Graphic Summary
Figure No.:


Allowable Bearing Capacity vs. Footing Dimension
For 3-Foot Dense Grade Surface
Allowable Bearing Capacity (psf)
Footing Width (Strip Footing) or Footing Length and Width (Square Footing)
Strip Footing
Square Footing
6,144 psf
5,120 psf
2,000 psf
8000
7000
6000
5000
4000
3000
2000
1000
0
0
5
10
15
20
25
30
35
40
45


Allowable Bearing Capacity vs. Footing Dimension
For 5-Foot Dense Grade Surface
Allowable Bearing Capacity (psf)
12000
10000
8000
6000
4000
2000
0
0
5
10
15
20
25
30
35
40
45
Footing Width (Strip Footing) or Footing Length and Width (Square Footing)
Strip Footing
Square Footing
6,144 psf
5,120 psf
2,000 psf


Allowable Bearing Capacity vs. Footing Dimension
For 3-Foot Dense Grade with Two Layers Geogrid Surface
Allowable Bearing Capacity (psf)
14000
12000
10000
8000
6000
4000
2000
0
0
5
10
15
20
25
30
35
40
45
Footing Width (Strip Footing) or Footing Length and Width (Square Footing)
Strip Footing
Square Footing
6,144 psf
5,120 psf
2,000 psf

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ATTACHMENT 2

RI GIS

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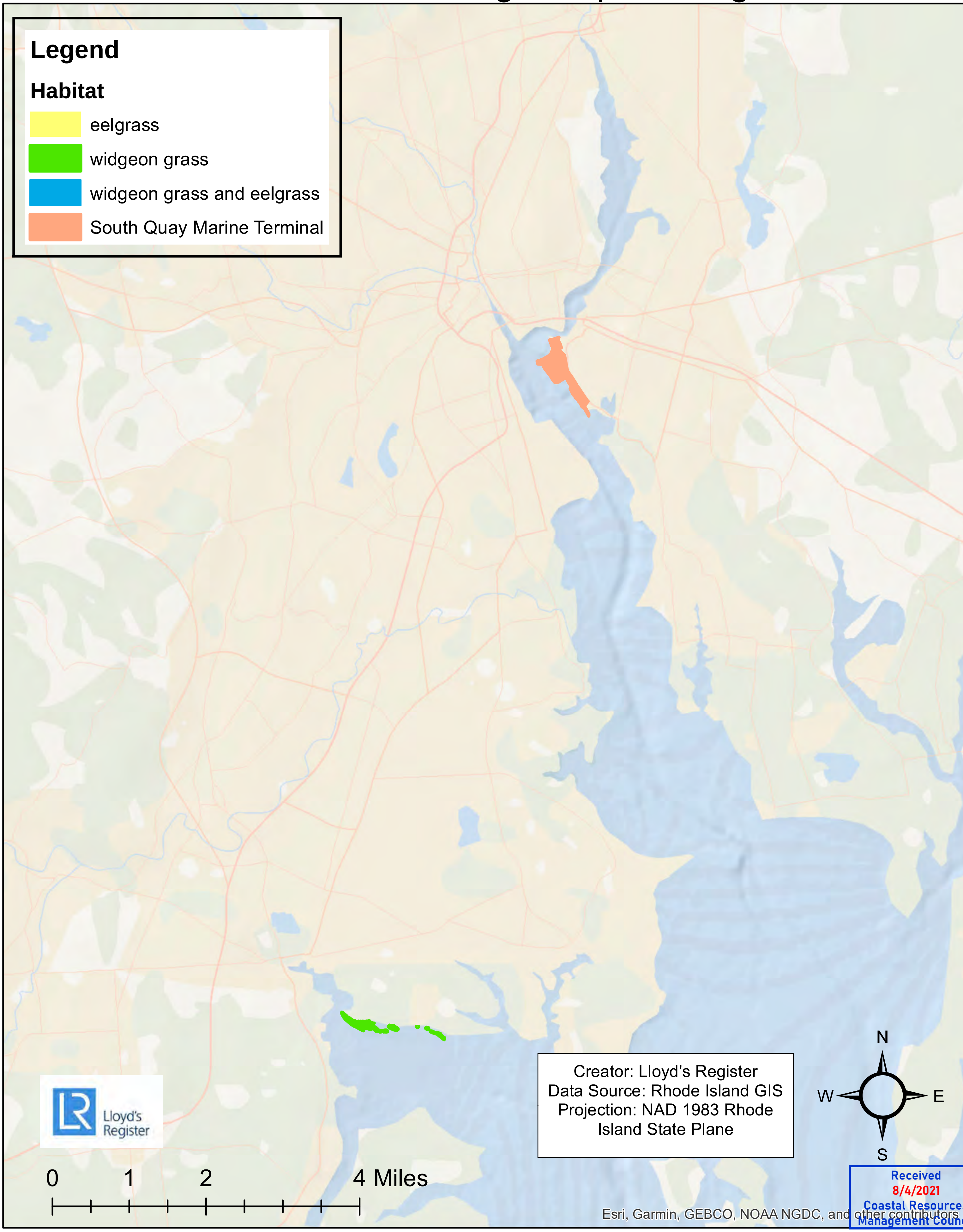
Rhode Island Submerged Aquatic Vegetation



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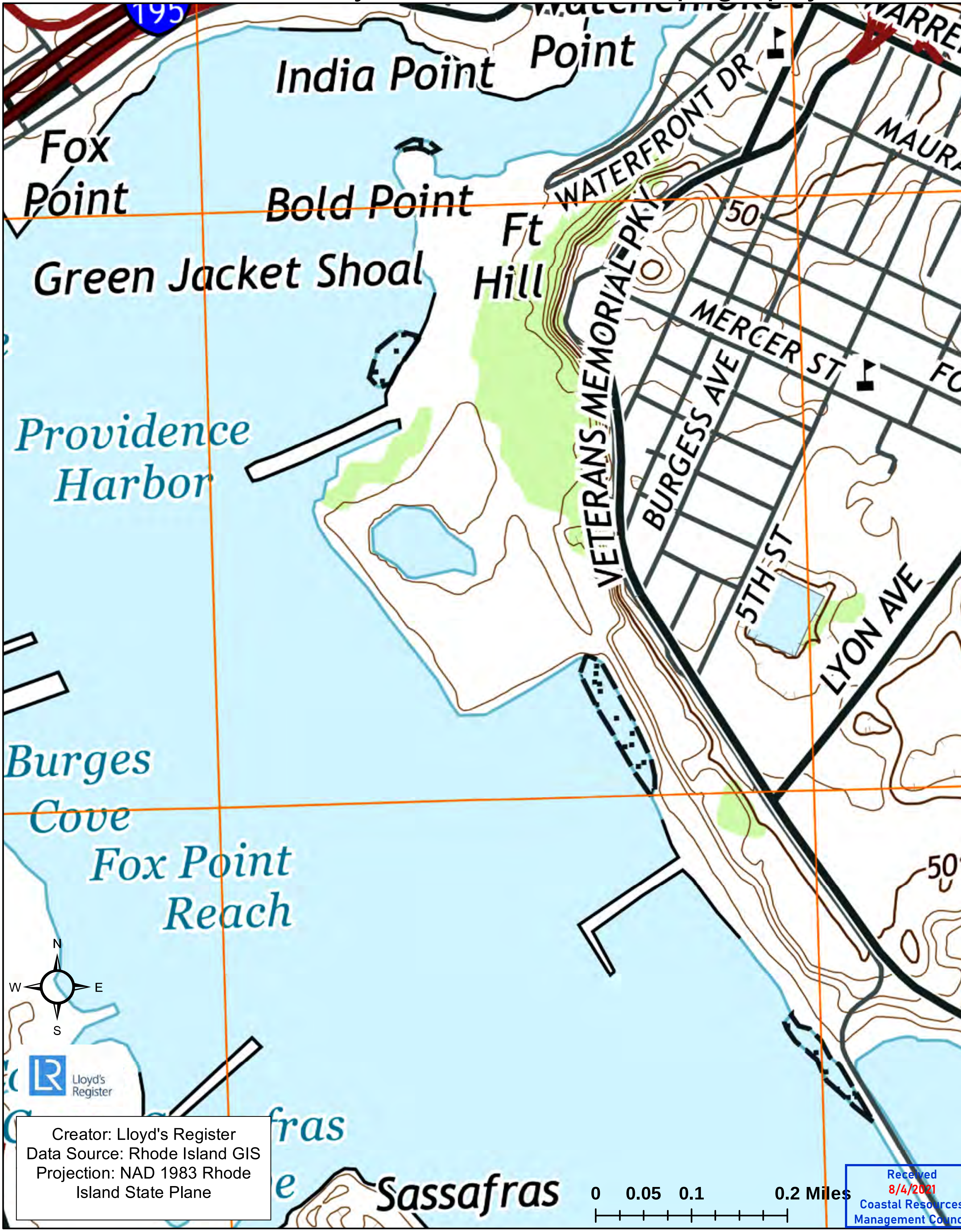
South Quay Marine Terminal Topography



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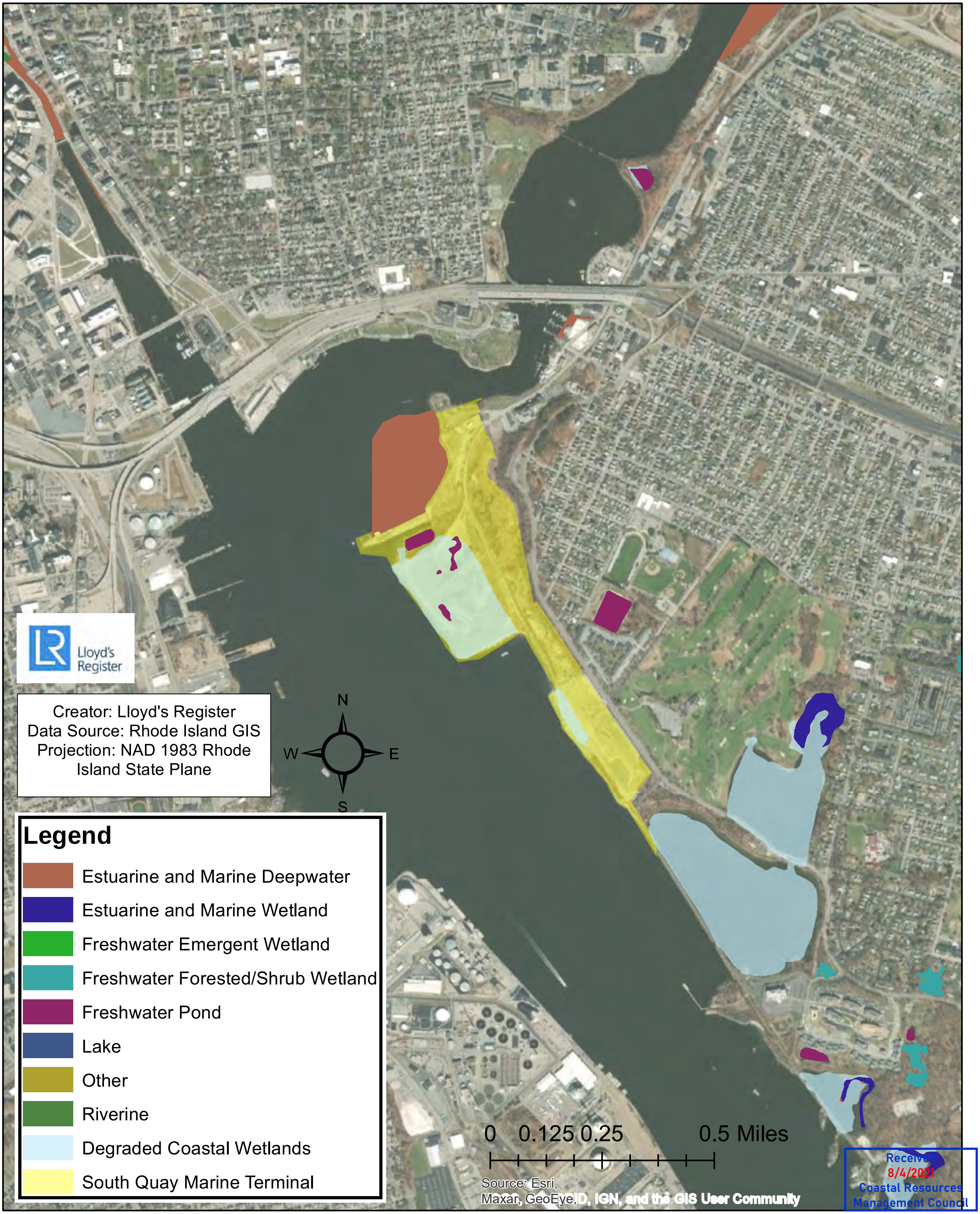
South Quay Marine Terminal and Surrounding Area Wetlands



South Quay Marine Terminal Contour Maps

2 Foot Contour Lines

5 Foot Contour Lines

10 Foot Contour Lines

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Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

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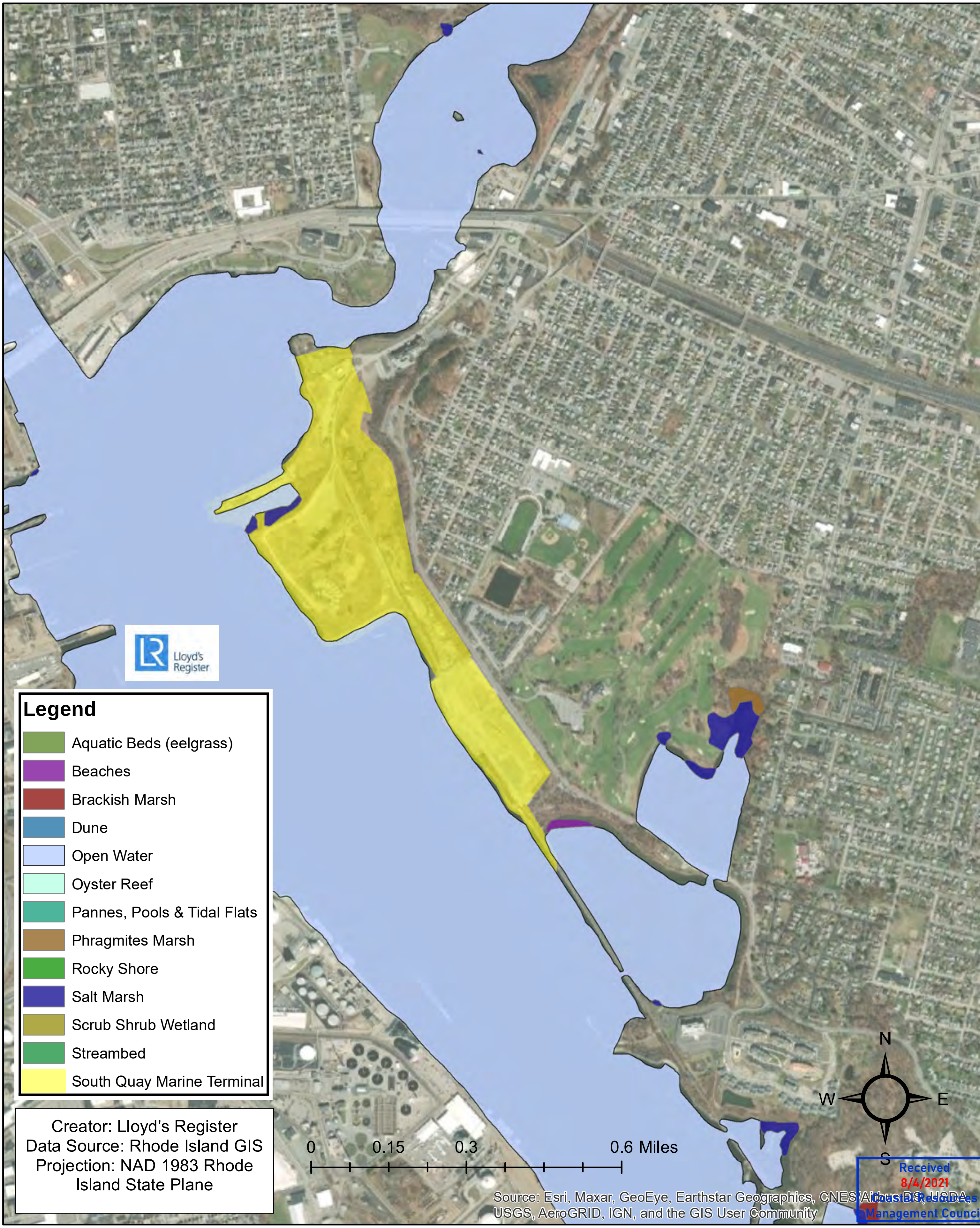
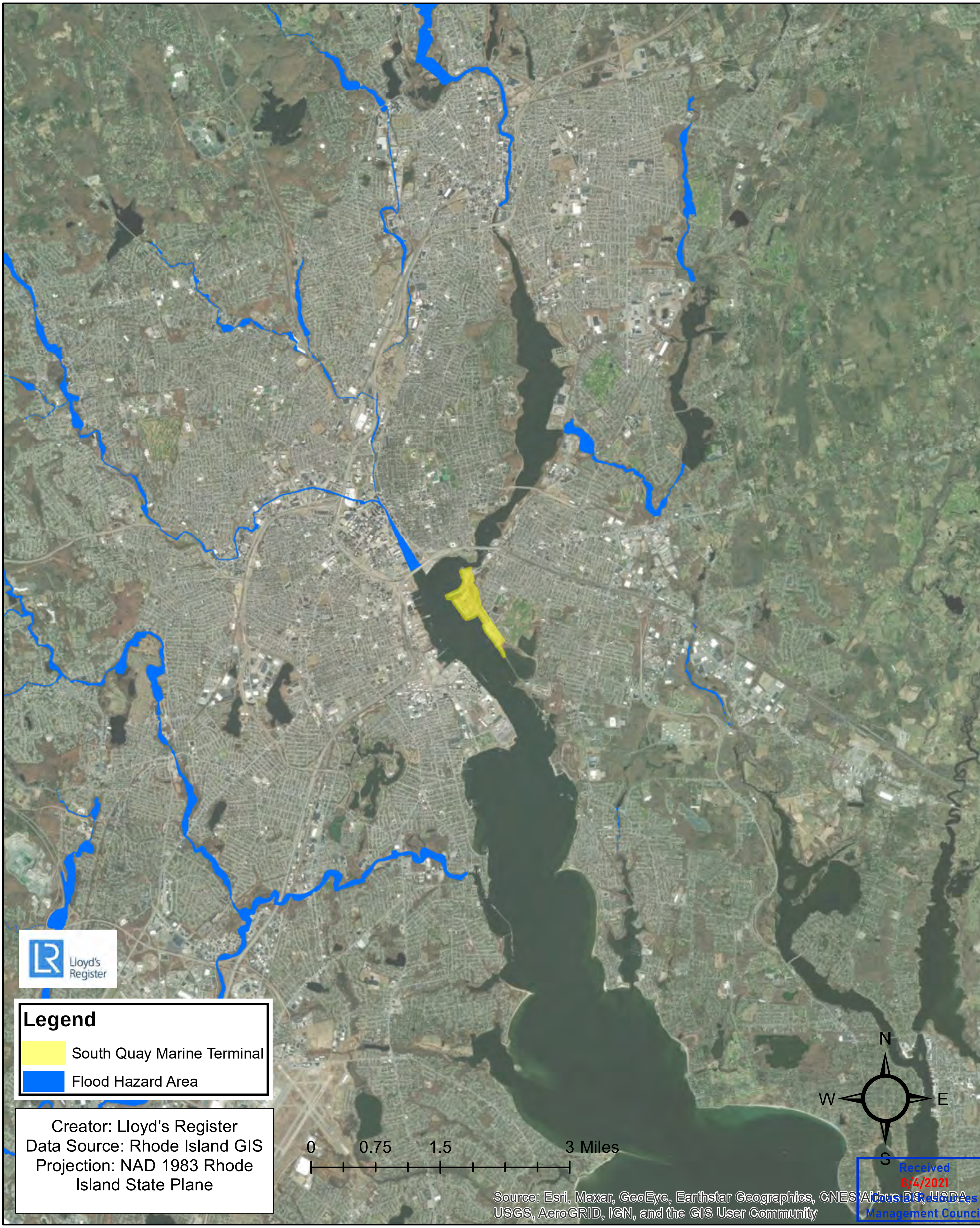
Data Source: Rhode Island GIS
Projection: NAD 1983 Rhode Island State Plane

South Quay Marine Terminal and Surrounding Area Esuarine Habitat



South Quay Marine Terminal and Surrounding Area Flood Ways



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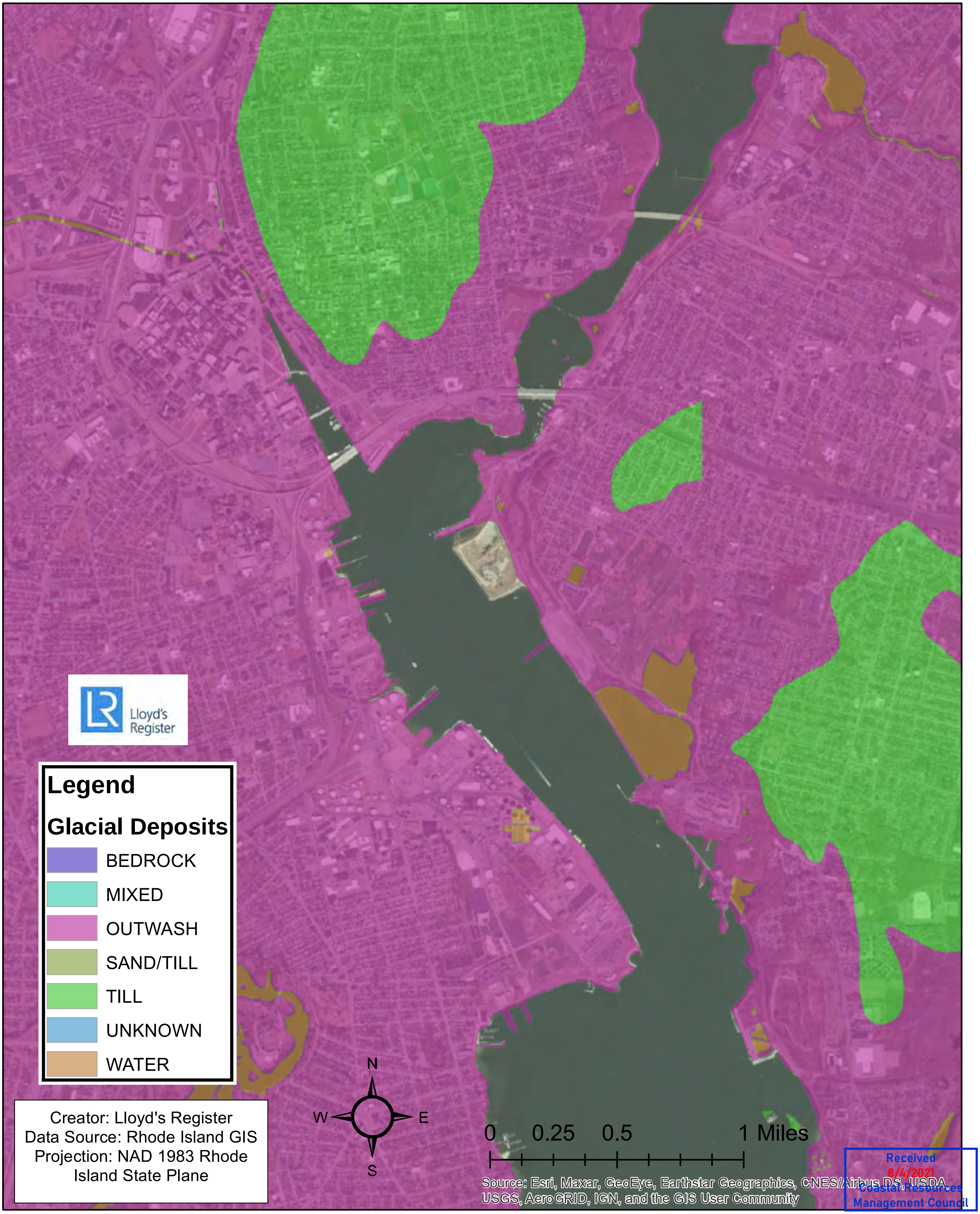
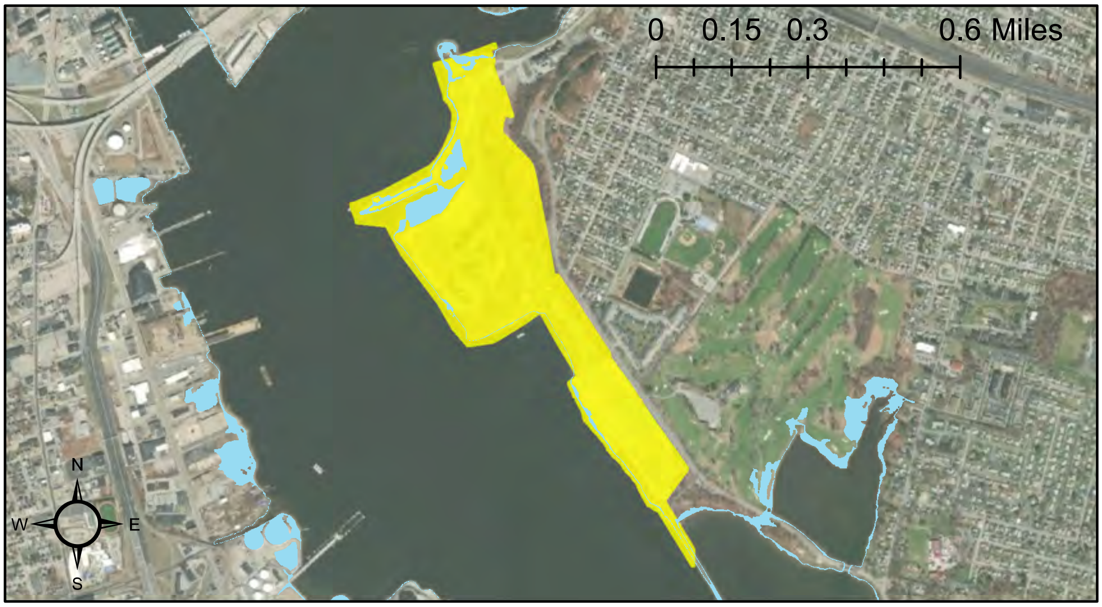
South Quay Marine Terminal and Surrounding Area Glacial Deposits



South Quay Marine Terminal 3,5, and 7 ft Sea Level Rise Inundation

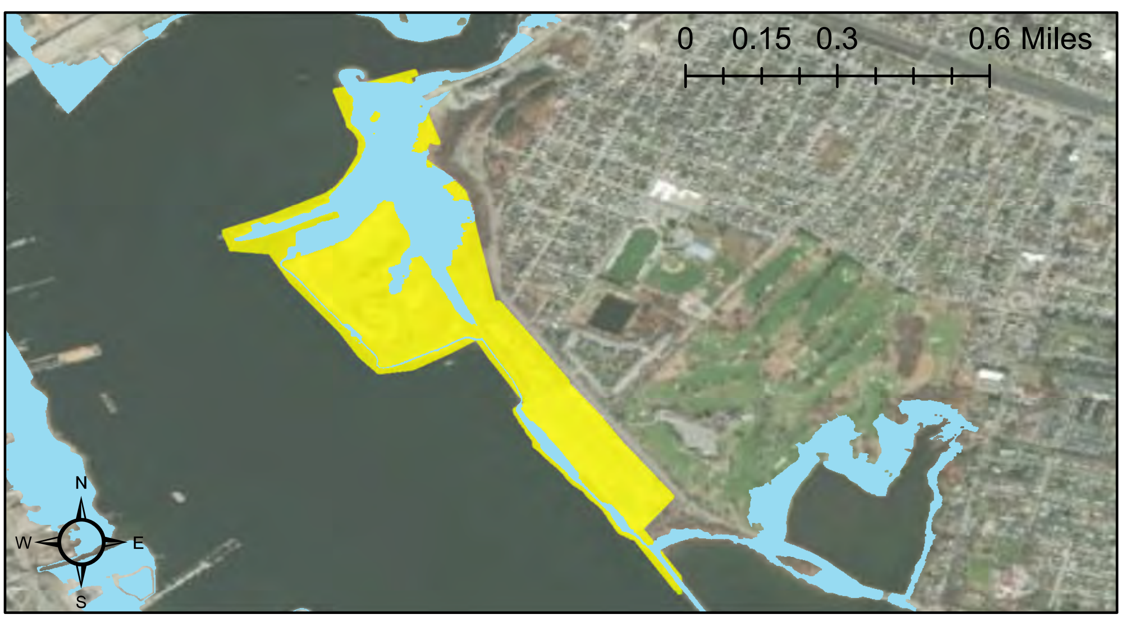


3 Foot Sea Level Rise

Inundation

South Quay Marine Terminal

5 Foot Sea Level Rise



7 Foot Sea Level Rise

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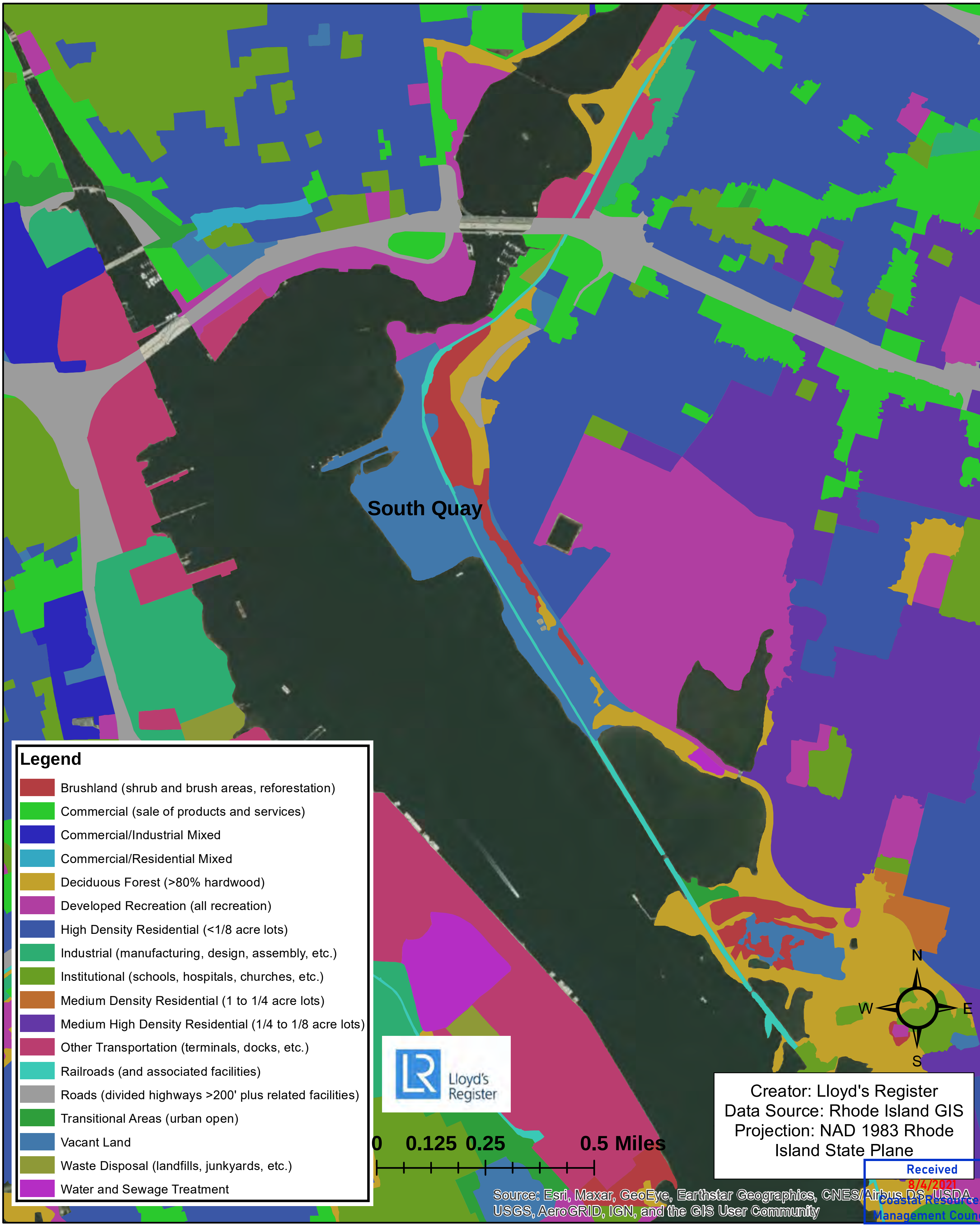
Projection: NAD 1983 Rhode Island State Plane

South Quay Marine Terminal and Surrounding Area Land Use



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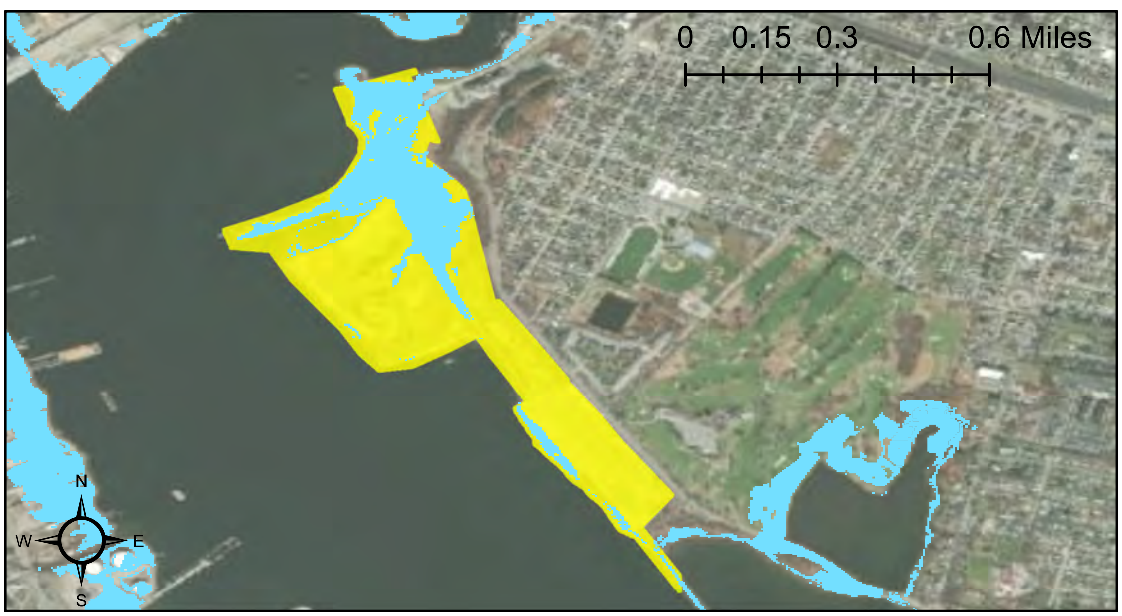
South Quay Marine Terminal 1,3, and 5 Foot Sea Level Rise

1 Foot Sea Level Rise

Affected Marsh Area

South Quay Marine Terminal

3 Foot Sea Level Rise



5 Foot Sea Level Rise

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Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User

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Data Source: Rhode Island GIS
Projection: NAD 1983 Rhode Island State Plane