OCEAN HIGHWAY AND PORT AUTHORITY
Port of Fernandina

PORT OF FERNANDINA

2024 SEARIP

Seaport Enhancement, Adaptation, and Resilience Implementation Plan

FDOT

EXECUTIVE SUMMARY

The Port of Fernandina ("Port") Seaport Enhancement, Adaptation, and Resilience Implementation Plan ("SEARIP, Resiliency Plan, or the Plan") was developed in coordination with the Ocean Highway and Port Authority (OHPA) of Nassau County, and the Florida Department of Transportation (FDOT) Office of Policy Planning and Seaport Office, in consultation with HNTB Corporation. This Resiliency Plan provides an overview of the Port's existing infrastructure and equipment required to support the day-to-day operations of the Port. The SEARIP is intended to provide FDOT and OHPA with a comprehensive resource to assess existing impact conditions, determine vulnerabilities, provide an infrastructure mitigation plan for priority solutions, initiate intergovernmental coordination, and generate opportunities for project funding and potential future implementation.

The Port, owned by OHPA, is situated on approximately twenty-three waterfront acres located adjacent to a historic residential neighborhood and is zoned for commercial and industrial development. The Port's waterfront provides a 1,200 linear feet (LF) concrete wharf with two berths and an apron width between 85 to 120 feet. The dock can accommodate two handy class vessels simultaneously serving container, bulk, or break carriers. Ships are served by two rail-mounted ship-to-shore gantry cranes, a mobile harbor crane, and a Clyde "Whirley" crane. The Port's harbor is dredged to -40 feet of Mean Low Low Water (MLLW), allowing access to most panamax-sized freight vessels and many container vessels. The US Army Corps of Engineers (USACE) maintains the channel and turning basin, which measures 1,600 feet and has a depth of 36 feet MLLW. The Port terminal area has approximately 200,000 square feet of covered storage space, comprised of both warehouses and open sheds. An additional nine acres of open air or outside storage is available with three to four acres or one-third reserved for container storage, and four to five acres for general storage, containers, or non-weather sensitive breakbulk cargoes like wrapped lumber, ingots, billets, or barrels.

The Port is an economic engine that, as of 2021, generates nearly 600 direct, indirect, and induced jobs. The 236 jobs classified as "direct" generated $15.2 million in wages, for average earnings of $64,269 per direct employee – more than 20% above the local average. In total, $55.3 million of personal income and local consumption was supported by Port operations. Additionally, the total economic value of the marine cargo, vessel, and logistics activity at the Port is estimated to be $73.3 million. The OHPA continues to expand on previous efforts while incorporating market conditions that impact the Port and surrounding commercial industries and community as described in the 2023 Master Plan[1].

Naturally occurring or anthropogenetic causes create disruptions for the ports that impair and halt critical domestic and international trade, terminal operations, and related economic activities. This study considers the Port of Fernandina terminal impacts along with other potential impacts to its operator Savage Marine, the Genesee and Wyoming (G&W) First Coast Railway that bisects the terminal, and the adjacent WestRock paper mill. Loss of revenue workdays for the Port and partners caused by impacts including flooding, storm surge, and wind damage have created past challenges and can create future challenges for the Port Authority if not mitigated. The Port's adaptive capacity to recover from disruptions defines its resiliency as it relates to risk management, mitigation, business continuity, and resumption of trade and logistics. Ports offer waterfront infrastructure like docks, storage, and equipment necessary to connect domestic and international supply chains, provide FTZ's (Foreign Trade Zones) and other incentives to facilitate trade, create high-paying skilled workforce, generate local economic opportunities, and provide safe, stable, and secure facilities supporting many event recovery efforts.

[1] *OHPA Port of Fernandina 10-Year Strategic Master Plan Update,* *OHPA 10-Year Strategic Master Plan*

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GLOSSARY OF ACRONYMS AND TERMS

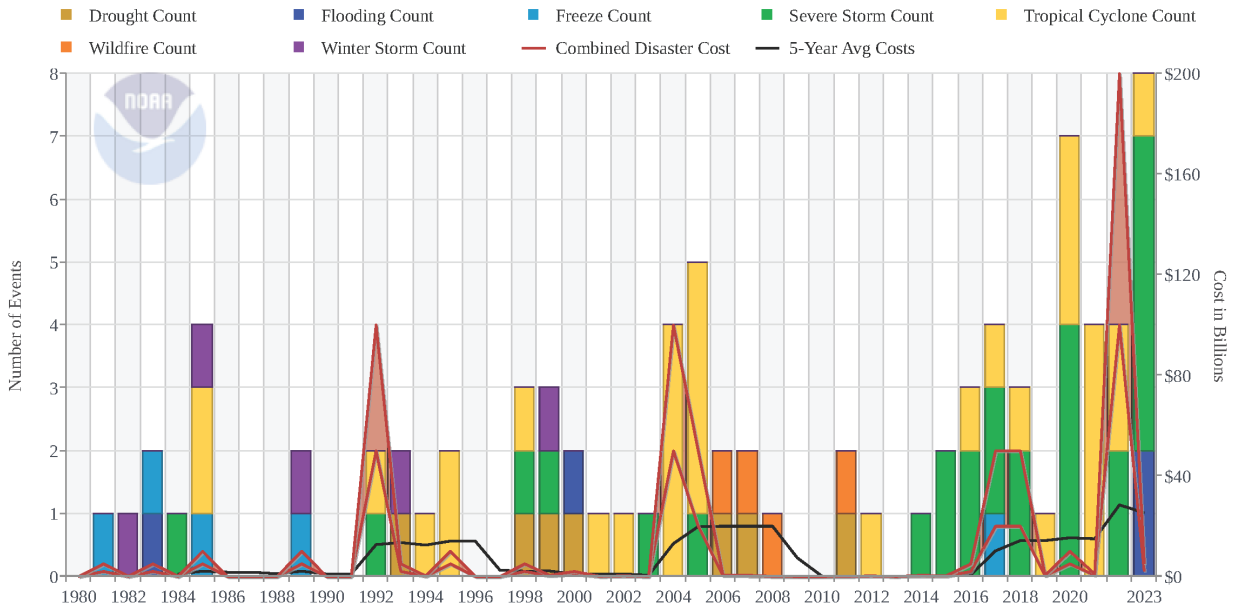
A list of acronyms and terms used in this plan are defined below. These terms are related to the seaport industry, state and federal transportation, science, and resilience resources.

Adaptation	Adjustment in natural or human systems in anticipation of or in response to a changing environment in a way that effectively uses beneficial opportunities or reduces negative effects
AIWW	Atlantic Intracoastal Waterway
Break-Bulk	System of transporting typically like cargo or goods by the piece separately, rather than in a container typically with crates, bags, boxes, drums, barrels, or bundles
Bulk	Cargo or goods unpackaged moved in large quantities and transported in vessels, trains, trucks, and pipelines and come in two typical forms dry and liquid
Exposure	When an asset or system experiences direct effects of climate variability or extreme weather events. Exposure is a prerequisite for vulnerability
Hazard	Encompasses both shocks and stresses as defined below
FDEP	Florida Department of Environmental Protection
FDOT	Florida Department of Transportation
FEMA	Federal Emergency Management Agency
FPC	Florida Ports Council
FSTED	Florida Seaport Transportation and Economic Development
G&W FCRD	Genesee and Wyoming First Coast Railroad
HAZMAT	Hazardous cargo is considered 'dangerous goods' and encompasses substances or materials that pose some type of risk
King Tide	Exceptionally high tide, typically occurring during a new or full moon
MARAD	United States Department of Transportation Maritime Administration
MHW	Mean high water
MHHW	Mean high high-water
MLW	Mean low water
MLLW	Mean low low-water
NHFN	National Highway Freight Network
NOAA	National Oceanic Atmospheric Administration
PHFS	Primary Highway Freight System
Resilience	The ability to adapt to change and prepare for, withstand, and recover from disruption
Risk	A combination of the likelihood that an asset will experience a particular impact, and the severity or consequence of that impact
SEARIP	Seaport Enhancement, Adaptation, and Resilience Implementation Plan
Shocks	Unexpected short-term deviations from trends that can have a range of substantial negative effects. These include events such as hurricanes
SF, Sqft.	Square Feet
Storm Surge	The extraordinary rise in seawater level during a storm event, measured as the height of the water above the normal predicted astronomical tide at a given time
Storm Tide	Total observed water level during a storm; the combination of storm surge and normal high tide
Stresses	Long-term trends or pressures that undermine the stability of a system and increase vulnerability, such as sea level rise and changing climate patterns
TEU	Twenty-foot equivalent unit, an equivalency measures due to various shipping container lengths in the global shipping market (e.g., 20 ft, 40 ft. 45 ft, and 53 ft)
USACE	United States Army Corps of Engineers
Vulnerability	The degree to which a system is susceptible to, or unable to cope with adverse effects of weather, climate, terrorism, theft, fire, accidents, and other events

INTRODUCTION

With ***76.5% of Florida's population living in coastal managed areas***, communities like Fernandina Beach play a crucial role in the state's economy. Florida remains the 3rd most populous state with a 2023 growth rate of 1.6% and 22,610,726 total population[2] and 137,401,000 visitors in 2022[3]. According to the National Oceanic and Atmospheric Administration's (NOAA) Office of Coastal Management, $302.8 billion is contributed to annual employment wages from the state's coastal communities[4]. Florida's shoreline Gross State Product (GSP) exceeds $402 billion, more than double that of inland economies.[5] While coastal communities offer world-renowned quality of life and regularly rank among the top U.S. coastal communities to live and work, they also come with major risks and impacts caused by flooding, severe storms, tropical cyclones, and other disaster events. Costs from major events have been on the rise in Florida communities since 2014 as shown in Table 1, which provides impact costs from top event types by year. 2023 was a record year with impacts exceeding $200 billion threatening the State's economy, insurance costs, critical assets, environmental habitat, international trade, and tourism, which includes the state's public seaports system.

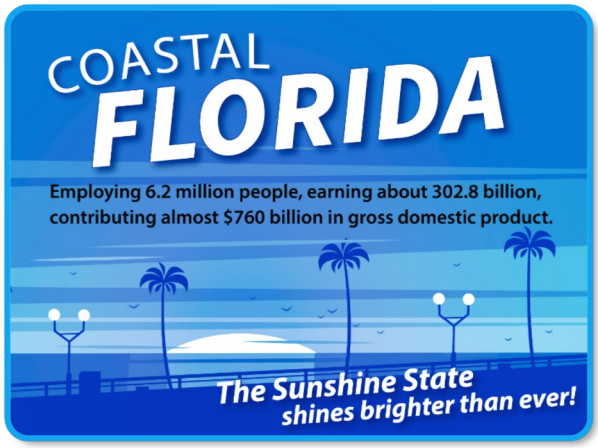
Table 1 - Florida Billion-Dollar Disaster Events 1980-2023(CPI Adjusted)



Source: NOAA, Billion-Dollar Weather and Climate Disasters, updated January 9, 2024, Florida Summary

From 1980–2023, there were 83 confirmed disaster events across Florida that exceeded the $1 billion impact threshold. These events included four major floods, four wildfires, five freezes, five winter storms, seven droughts, 26 severe storms, and 32 tropical cyclones. The overall 43-year period saw an annual average of 1.9 events per year and 4.8 annual event average for the most recent five-year period (2019–2023).

[2] *United States Census Bureau, Quick Facts Florida, US Census Florida Quick Facts US Census Bureau Florida Fast Facts*
[3] *Visit Florida, Research, Visitor Study 2022, https://www.visitflorida.org/resources/research/*
[4] *National Oceanic and Atmospheric Administration, Coastal Management Office, Florida Facts, NOAA Florida Coastal Economy*
[5] *Florida Department of Environmental Protection (FDEP), Investing in Florida's Coastal and Oceans Future (floridadep.gov)*



Source: NOAA Florida Fast Facts

Florida's Ports

Ports offer unique infrastructure that facilitates the movement and transfer of goods and services across multiple modes of transport including, trucks, trains, and ships, and are hubs for both domestic and international trade. Florida's 16 deepwater ports contribute more than $117 billion in economic value to the state's economy. Florida's coastal contributors like ports, the cruise industry, and beaches employ 6.2 million people earning over $300 billion and contributing $760 billion to the State GDP[6]. Florida's ports contribute over 13.3% of the state GDP and provide investments in robust infrastructure enhancing supply chain resiliency and establishing capability for resistance and recovery[7]. This means providing a plan to mitigate disruptions and greatly limit impacts by identifying vulnerability and abating the greatest risks feasible. Operational risk and interruption threaten multiple areas of the supply chain, and ultimately impact the safety, profitability, and sustainability of a port facility, its governing body, or the broader region they serve. Ports are vital connections within a supply chain that generate economic activities including jobs, skilled labor, supply chain activities, goods and materials movement, industrial development, security, and disaster recovery.

Source: Photo Courtesy of Ocean Highway and Port Authority, 2023

Overview of Port of Fernandina

The Port of Fernandina is located on Florida's Atlantic Coast, providing port and terminal service for imports and exports to more than 14 pulp and paper producers located throughout Florida and the Southeastern United States. Lumber export services are included in these imports and exports to several companies with mills in the Southeast. In FY2022/2023, the Port reported moving 9,355 twenty foot equivalent units (TEUs) containers and a total cargo tonnage of 269,504. With in five years the Port projects to grow to a total of 13,500 TEUs and increase tonnage to 400,000. The Port's top international trading partners by value include exports to Sweden of wood pulp, Brazil of hard board, Norway of lumber, and imports from Ecuador of KLB (Kraft Liner Board)[8]. According to the OHPA Port of Fernandina Master Plan the distribution of KLB, lumber, and Wood pulp has been steadily growing.[9] To better accommodate customers, capital investments of nearly $10 million have been made in recent years, and additional

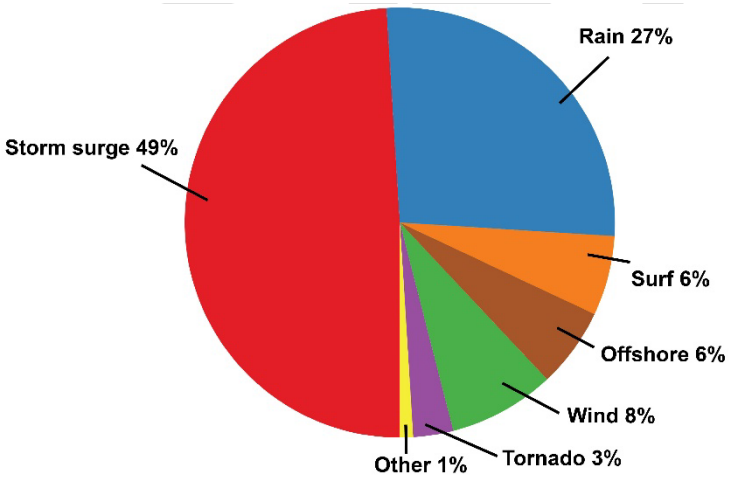
[6] *NOAA Fast Facts, https://coast.noaa.gov/states/florida*
[7] *Florida Ports Council (FPC), 2023-2024 Seaport Mission Plan, pages, 4-5, printed version, online version forthcoming https://flaports.org/*
[8] *Ibid, FPC Seaport Mission Plan, page 39*
[9] *OHPA Port of Fernandina Master Plan, pages 72-73, OHPA Master Plan*

investments are planned to include Florida Seaport Transportation and Economic Development (FSTED) grants for FY 2024/2025 of $2 million for other structures and $3 million for decarbonization of operations.[8] The Port recently deepened its berths to 40 feet MLLW, added 3 new cranes, and a new Terminal Operating System. It has replaced and upgraded its fleet of cargo handling equipment for all types of cargo. The USACE recently maintenance dredged the federal access channel to the Port providing access for vessel drafts of up to 40 feet.

The Port is contemplating expansion opportunities to increase the capacity of the Port's on-dock warehouses and rail trans-loading facilities, as well as to modernize the Port's truck gates. The Port currently has 230,000 SF of on-port warehouse facilities, over 130,000 SF of off-port warehouse facilities, and daily on-dock rail services. It also has a fully certified Container Freight Station and will soon be adding Foreign Trade Zone designation.

Located in Nassau County on the Atlantic Intracoastal Waterway (AIWW), which is designated M-95 a MARAD Marine Highway and direct access to the Atlantic Ocean. Due to the Port's geographic location, the terminal and operating areas are natural catchments for tidal flows and hydraulic currents. The Atlantic Coast in general is specifically vulnerable to water-related natural disasters and effects including hurricanes, king tides, and flooding[10]. Rainfall flooding, storm surge, and tidal flooding are the most common impacts that Florida's coastal communities face during and after storms. NOAA recognizes water, in the form of storm surge, as the greatest threat to life during hurricanes. NOAA defines storm surge as the rise in seawater level during a storm, measured as being over and above the predicted astronomical tide. Storm surge is primarily caused by wind, pushing the water to shore. On the other hand, storm tide is the total observed seawater level during a storm, or the combination of storm surge and normal high tide.

Figure 1 – Deaths from Atlantic Tropical Cyclones 1963-2012



Source: NOAA Resource Hurricanes, NOAA Online

Note: Chart adapted from Fatalities in the United States from Atlantic Tropical Cyclones: New Data and Interpretation by Edward N. Rappaport, 2014

82% OF TROPICAL CYCLONE DEATHS CAN BE ATTRIBUTED TO STORM SURGE, RAIN, AND SURF. Impacts from sea level-rise, and tidal flooding have profound effects on surrounding areas and communities. Extensive infrastructural damage is one of the most common effects of water-related disasters. Common infrastructural damage includes power, water, and gas outages; disruption of transportation routes and the supply chain; and physical damage to buildings and roads.[11] These effects can be mitigated though the construction of resilient infrastructure and are addressed in this plan.

Population density is increasing in Nassau County, meaning that more people have the potential to be impacted by natural disasters. Most of the Atlantic coastline is less than 10 feet below mean sea level, and additional storm surge makes

[10] *NOAA Maritime Transportation Terms, https://oceanservice.noaa.gov/facts/oceanfacts-maritime.php*
[11] *FEMA Protection Act Flood Impact, Flood | Impact (fema.gov)*

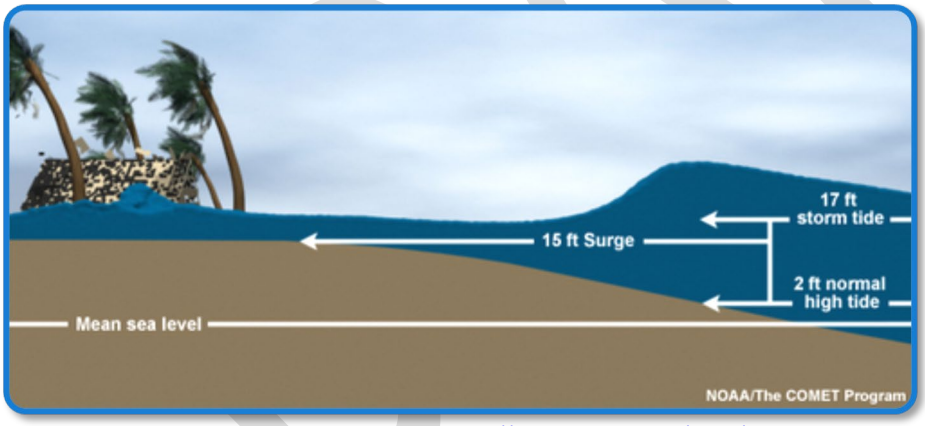
these areas even more vulnerable to flooding. Similarly, 72% of ports in the State are at or below 4 feet elevation.[12] Storm surges and other types of flooding can significantly impact port operations due to their coastal locations and low mean sea levels.

SEARIP Purpose and Need

The Port of Fernandina has experienced naturally occurring or anthropogenetic impacts and disruptions that impair and even halt critical terminal operations including freight handling, safe and secure storage, trade and logistics, and revenue-generating economic activities. ***The Port's adaptive capacity to recover from disruptions defines its resiliency as it relates to risk management, mitigation, business continuity, and resumption of trade and logistics.*** Port operations must be resilient in times of disruption and are expected to remain connected to the global shipping network, as well as to provide infrastructure and services. When terminal operations are disrupted with regular or increasing frequency, businesses and tenants that directly or indirectly rely on a port may have an economic obligation to consider options better prepared to overcome or withstand impacts.

Common outcomes of port disruption include cargo loss, degradation of handling performances, loss of revenue, and ultimate loss of customers. It is important that ports are resilient to economic downturns, natural disasters, maintenance-related accidents, and other disasters that could potentially affect the Port, key stakeholders, and surrounding areas.

Figure 2 - NOAA Storm Surge vs. Storm Tide



Source: NOAA Resource Storm Surge Overview, https://www.nhc.noaa.gov/surge/#FACTS

Building resilient infrastructure is important to combat flooding caused by storm surges and to preserve the built environment. Figure 2 illustrates storm surge and storm tidal impacts on inland resources. Resilient infrastructure is also integral to maintaining economic activity. Over half of the nation's economic productivity is in coastal zones, and port operations are integral to this productivity.[13] Planning for resiliency is a means to harden infrastructure, mitigating negative impacts from economic downturns and natural disasters at the Port of Fernandina. This resiliency plan aims to analyze the Port and possible strategies for enhancing and protecting its coastal infrastructure.

Existing Conditions of Fernandina Port

The Port of Fernandina is located within the boundaries of the City of Fernandina Beach in the northeast corner of the State of Florida, two miles offshore from the Atlantic Coast and along the Amelia River. Consisting of one deep water shipping terminal, the Port is strategically located, giving the terminal

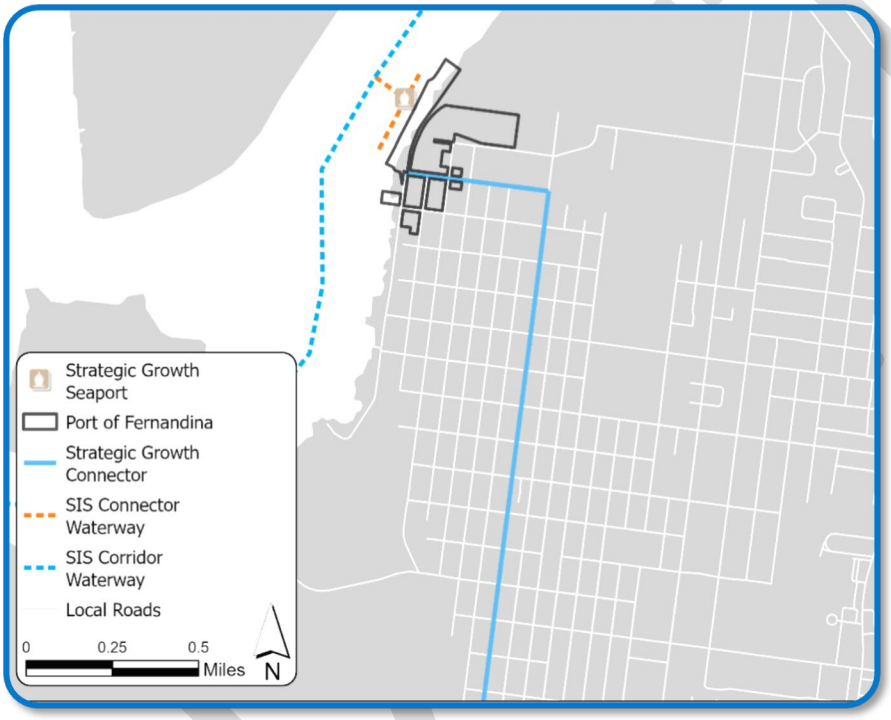
[12] *NOAA National Hurricane Center and Central Pacific Hurricane Center, Storm Surge Overview (noaa.gov)*
[13] *Ibis, Storm Surge Overview (noaa.gov)*

access to roadways, railways, a navigational channel, and other related facilities. The Port is located approximately 26 miles east from exit 373 off I-95, up East State Road 200 which becomes South 8th Street a four-lane divide highway, then a left turn on Dade Street to the OHPA entrance gates. The roadway network in the immediate area consists of major arterial, collector roads, and local residential streets. The I-95 Interstate is designated a Primary Highway Freight System (PHFS) as part of the National Highway Freight network (NHFN).

Strategic Intermodal Systems

The Strategic Intermodal System (SIS) is a network of priority multimodal transportation facilities across Florida. These facilities aim to provide mobility of people and goods at the highest level. SIS facilities are identified as such for the state to prioritize funding and resources on these facilities that prove interregional significance.[14] The objectives of this system are to enhance interregional connectivity, intermodal connectivity, and economic competitiveness. Figure 3 demonstrates the Port of Fernandina's advantageous position in Northeast Florida and its SIS designation and connectivity.

Figure 3 - SIS Roads, Waterways, and Connectors Surrounding the Port of Fernandina, Source: FDOT, Nassau County Property Appraiser



Source: HNTB GIS Map with FDOT SIS Layers

Strategic Growth Seaport

While the Port of Fernandina itself is not a SIS Seaport, it is recognized by FDOT as a Strategic Growth Seaport. Strategic growth facilities are recognized through the 2016 SIS Policy Plan and replace the concept of "Emerging SIS" facilities. SIS Public Seaports must account for:

- Greater than or equal to 1% of Florida's total annual freight volume in tons
- Greater than or equal to 1% of Florida's total annual container volume measured in TEUS.
- Greater than or equal to 250,000 annual home-port cruise ship passengers.[15]

Fernandina does not meet SIS requirements, as its total annual freight volume and container volume do not account for 1% of the State's freight and container volume. However, the Port of Fernandina is integral to Florida's connectivity and economic competitiveness and is a strategic facility in the region.

[14] *FDOT Strategic Intermodal System, SIS one pager briefing*
[15] *FDOT Strategic Intermodal System, SIS-facility-designation-finn.pdf*

SIS Highways and Waterways

The Port of Fernandina is surrounded by SIS-related corridors and facilities, including a Strategic Growth Connector, SIS Connector Waterway, and SIS Corridor Waterway. These modes of transit also allow connectivity between other metropolitan regions, giving the Port regional significance.

Dade St., connecting from North Front Street to North 8th Street is designated as a SIS Highway Strategic Growth Connector. FDOT AADT data shows that this street experiences up to 5,000 cars daily and is one of the busiest streets in the area. Due to its proximity to the Port, the West Rock Paper Mill, NHFN, and the Genesee and Wyoming First Coast Railroad, this Strategic Growth Connector is integral to the area's modal success.

The Port of Fernandina is situated alongside the Amelia River, a SIS Corridor Waterway. The immediate area around the Port is designated as a SIS Connector Waterway, mainly only serving the Port and ensuring its connection to the SIS Connector. The SIS Connector runs parallel with the State's East Coast, reaching all the way from Northeast Florida to the Florida Keys, spanning the entire state. Connection on Florida's east coast relies on this waterway.

Strategic Intermodal System Railway

The Port of Fernandina is strategically located next to a SIS Rail Corridor served by Class III Genesee and Wyoming First Coast Railway[16] which interchanges with the CSX mainline Class I railroad at Yulee, Florida. The Shortline averages more than two trains daily and provides storage for more than 69 rail car spots along its 46 miles of track in Florida. The railway bisects the Port's property, making it heavily involved in Port operations, and connecting the Port to the West Rock Paper Mill.

Source: Photo courtesy of HNTB Staff

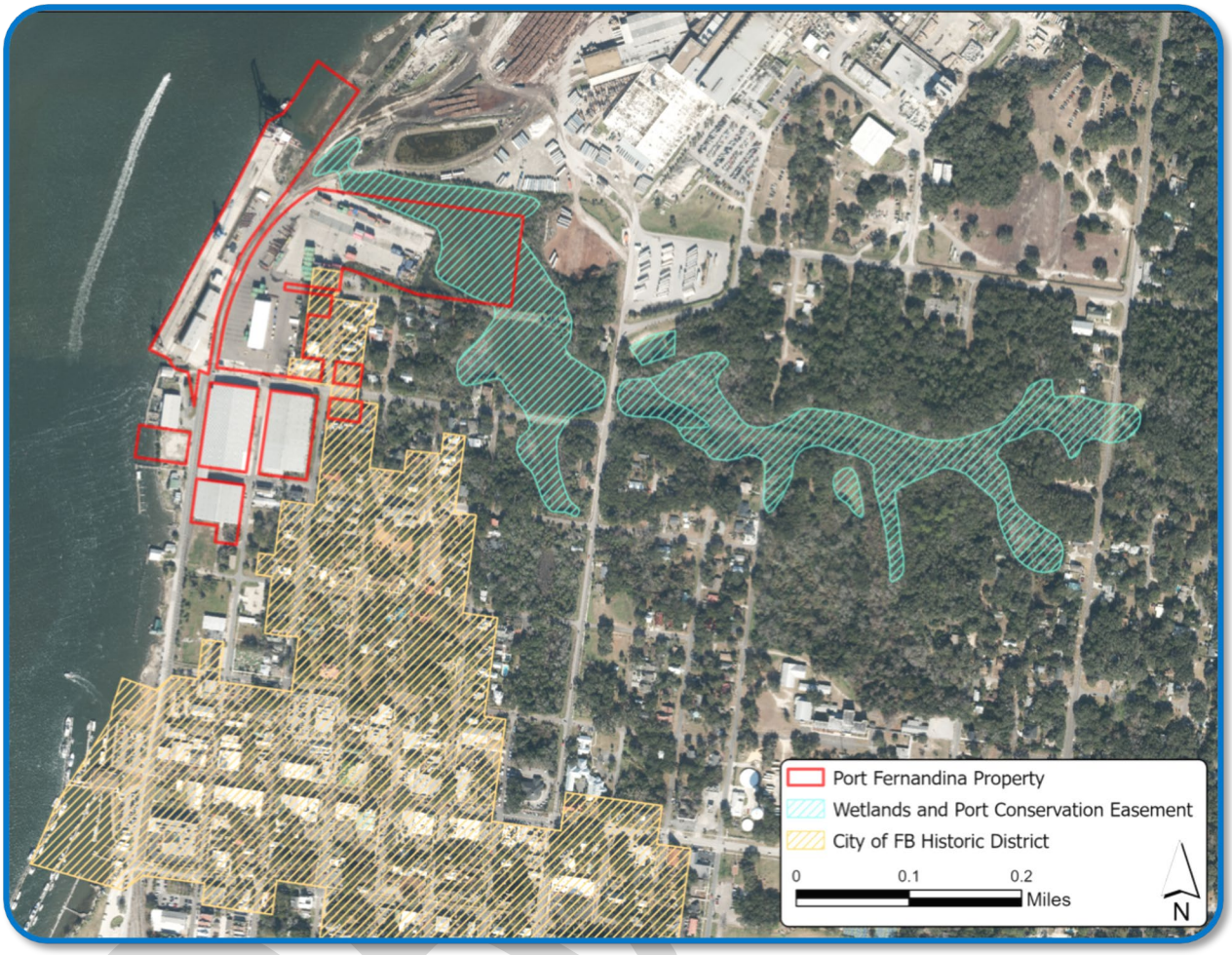
Local Connectivity

8th Street is a designated truck route in Fernandina Beach, with an average annual daily traffic volume of 2,511 trucks. While most of this traffic is at the southern limit of the city, the Port receives an estimated 114 trucks daily accounting for approximately five percent of the truck traffic on 8th street.

The majority of Port's boundary shown in Figure 4 is comprised of industrially zoned property, surrounded by residential, commercial, and other industrial uses. It is important to note that the Port's future land use map designates this area as industrially zoned. The Port is generally located northwest of the City of Fernandina Beach Historic District, west of wetlands and a port conservation easement, and north of the West Rock Paper Mill.

[16] *First Coast Railroad (FCRD), https://www.gwrr.com/fcrd/*

Figure 4 - Map of the Historic District and Wetlands, Surrounding the Port of Fernandina, Source: Nassau County Property Appraiser



Source: HNTB GIS Map

Environmental Conditions

Over four acres of the Port's property has been reserved as a permanent conservation area, as requested by the Florida Department of Environmental Protection (FDEP). This area includes several species of wildlife, including but not limited to:

- Rice Rat
- Otter
- Alligator
- Mink
- Raccoon
- Great Blue Heron
- Great Egret
- Snowy Egret
- Marsh rabbit

A 30-acre wetlands and port conservation easement overlaps the northeast section of the property and continues east of the Port's property. These wetlands are comprised of a saltwater marsh and are part of the Alligator Creek permanent conservation easement. The Port Authority, Ocean Highway, and Port Authority (OHPA) have established a 10-foot-wide marshland environment at the Port facility, in the northeastern-most corner.

Stakeholders

Key stakeholders involved in the Port's operations include, but are not limited to:

- OHPA
- City of Fernandina Beach
- FDOT
- FDEP
- West Rock Paper Mill
- Genesee & Wyoming First Coast Railroad, and
- Savage, OHPA Terminal Operator

The Port of Fernandina is governed by the Ocean Highway Port Authority (OHPA), which leads policymaking, budgeting, master planning, capital improvements, and general oversight for all Port activities. OHPA is guided by the ongoing mission statement of Port:

> **"…to carry out public purposes to benefit the citizens of the County of Nassau and the State of Florida."** *(Ch. 21418, S12. Sp. Acts 1941)*

On July 14, 2022, Transportation Infrastructure Partners, a joint venture between Ridgewood Infrastructure, LLC and Savage Services, acquired Worldwide Terminals Fernandina, LLC, and became the new manager and operator of the Port of Fernandina. Savage is a terminal operator with more than 75 years of experience, moving and managing mission-critical materials. Savage specializes in rail, truck, and marine transportation, logistics, materials handling, and other industrial services across North America.[17]

IMPACTS ANALYSIS

Understanding the impacts that the Port of Fernandina experiences is crucial to determining vulnerabilities of the Port which helps to propose projects that can increase the Port's resiliency to natural and man-made disasters. Data near the Port related to historic tidal data, storm surge data, named storm events, known flooding activity, and historic rainfall events have been crucial in determining impacts related to the Port of Fernandina.

This impacts analysis provides a high-level assessment of impacts to on-Port fixed infrastructure including docks, wharves, aprons, laydown yards and container yards, drainage and detention, warehouses, railways, and roadways to understand and benchmark current impacts. A comprehensive list of on-Port major equipment is documented, including harbor cranes, rubber-tired gantries (RTG), heavy lift cranes, and other port equipment that are semi-fixed or fixed.

GIS-based maps of the impacted port infrastructure are produced and analyzed using publicly available data resources including but not limited to NOAA, USACE, FDEP, St. Johns River Water Management District, North Florida TPO, and Nassau County Planning GIS division. Key components of the maps will include general elevations, topography, locations of key infrastructure, location, and depiction of impacted areas of the port, and conceptual depiction of top mitigation solutions. A GIS mapping data tool has been provided, supplementary to this document to provide a comprehensive visualization and a map story of impacts to the Port and an up-to-date view of existing infrastructure conditions.

A high-level review of the port's storm drain system has been performed by a drainage engineer. To understand existing capacity, current deficiencies, visible damage, and operational constraints.

[17] *Savage Terminal Operator, Nassau Worldwide Terminals Fernandina, LLC., https://savageco.com/services/terminal-transload/*

The analysis concludes with an analysis of impacts created by constrained critical economic activity like cargo movement and direct and indirect related port jobs.

Significant Port Assets, Infrastructure, and Equipment

Figure 5 - Aerial of Port Infrastructure and Equipment, Source: Ocean Highway Port Authority's Terminal Operator, Savage

Source: HNTB GIS Aerial Map

To determine the impacts that hazards can have on The Port of Fernandina, it is important to document the existing infrastructure that lies within the Port's boundary. Figure 5 provides the latest GIS aerial of the port terminal showing key infrastructure like the two rail-mounted ship-to-shore container gantry cranes on the North side or the top right corner. The figure also shows the G&W First Coast Railroad with a large train that is bisecting the port terminal.

Figure 6 is a GIS map produced of the Port with property boundary shown in red, drainage locations in light blue, port roads shown in blue lines, the G &W Railroad shown in black, and its alignment through the Port's property and lists all major existing Port facilities with a numbered legend cross reference.

Figure 6 - Existing Conditions at the Port of Fernandina, Source: HNTB, Nassau County Property Appraiser

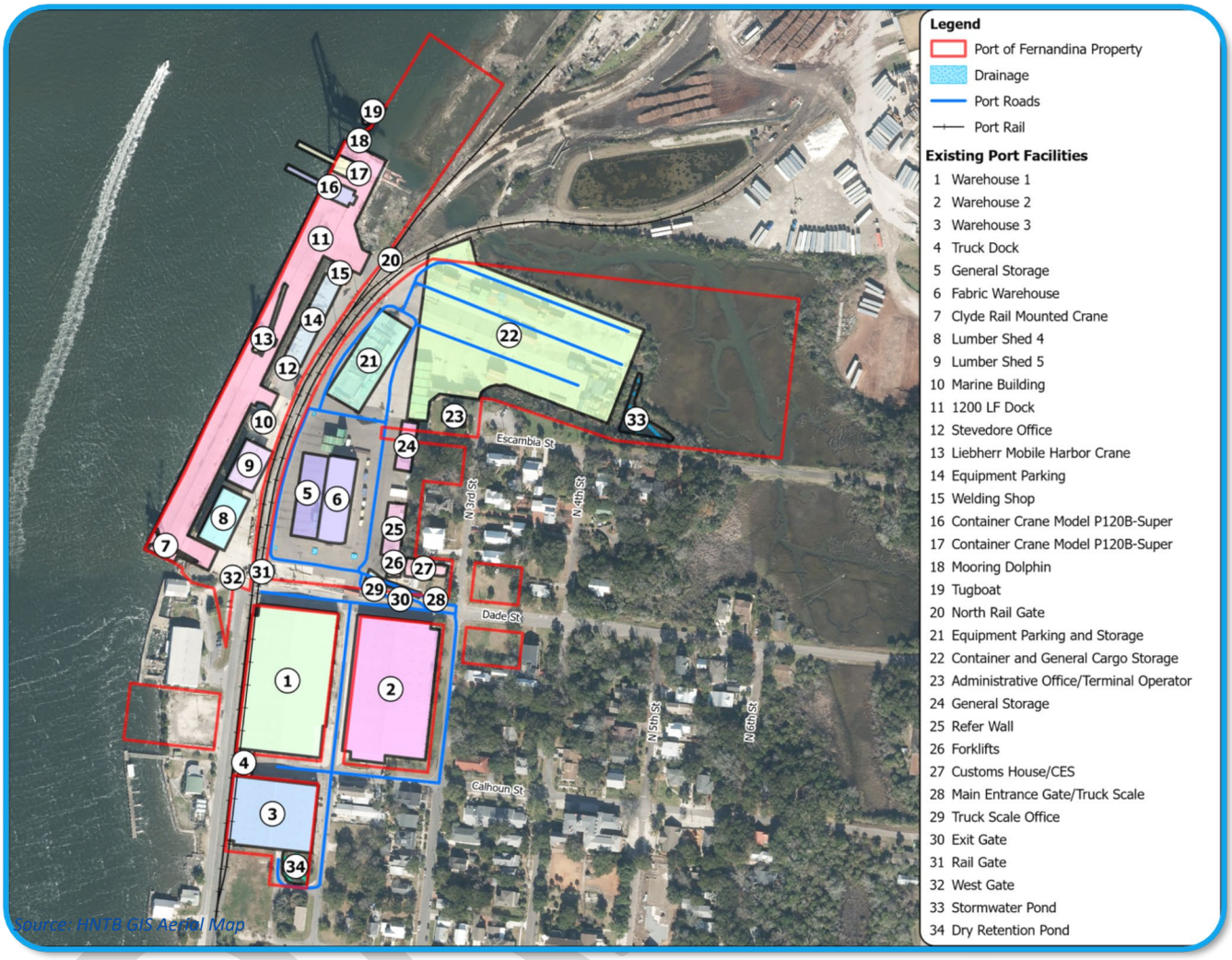


Table 2 - Major Equipment on Port of Fernandina Property, Source: OHPA 2023 Master Plan. It was important to provide the most current documentation of port infrastructure and equipment to directly correlate and document impacts from flooding caused by tidal and tropical cyclone events. The table provides one column listing the building or equipment type and the second column to the right provides the count of equipment or services that is listed.

Table 2 - Major Equipment on Port of Fernandina Property, Source: OHPA 2023 Master Plan

Building/Equipment Type	Amount of Equipment in Service
Transit Shed (Cargo Storage)	3
Transit Shed (Open)	2
Fabric Warehouse	1
Terminal Emergency Generator	1
Port Security Building	1
Marine Building	1
Fort Clinch Tugboat	1
Clyde "Whirley" Crane	1
Liebherr Rail-Mounted Gantry Container Crane	2
Liebherr Mobile Harbor Crane	1
Frontend Bucket Loader	1
Top Loader/ Container Stacker	3
Lift Trucks (varied capacity 3000 to 52000 lbs.)	30
Yard Spotter/ Ottawa Tractor	20
Flatbed Trailer	11
Container Chassis	6
Paper Pusher	4
Maintenance Service Truck	4
Mobile Welding Machine	1
Fuel Truck (3200 gallon)	1
Man-Lift	1
Rail Siding	1,600 ft
In-ground Truck Scale (Dade Street)	2
Bromma Spreader	1
Short Line Rail	Connection to CSX mainline

Source: OHPA Port of Fernandina Strategic Master Plan, reviewed and updated by staff and terminal operator

In addition to the Port's major equipment, Port features and attributes are outlined in Table 3 on the next page. The Port Terminal has many advantages due to its geographical location. The Port itself has a depth of 40 feet and a two-mile channel that has no height restrictions. There is minimal terminal, rail, and road congestion at the Port due to its limited access points. The Terminal also includes manufactured advantages, including three warehouses, totaling 355,000 SF with plans to expand; 1,200 LF of berth space; 2,500 ft of on-dock rail; and 24-hour continuous operations. The Port is also capable of ship-to-shore, direct ship-to-rail, and tandem lift operations.

Table 3. Port Features and Attributes

Port Feature	Attributes
Wharf	▪ Pile and cap concrete ▪ Spans 1,200 ft ▪ Width of 70 ft-115 ft ▪ 12 ft above MLW ▪ Tides within 6 ft
Berthing Space	▪ 2 berths ▪ Berth dredged to 40 ft + 2 ft
Channel Navigation	▪ Federal channel ▪ Depth of -36 ft MLW ▪ Width of 400 ft ▪ Kings Bay Entrance Channel (serves U.S. Navy, -51 ft MLW, 500 ft width) ▪ Intercoastal waterway weaves through the channel (12' depth, width 90'≤150')
Turning Basin Capacity	▪ -36 ft MLW ▪ 1,000 ft length
Vessel Limitation	▪ Vessels that draft less than 36 ft ▪ Below 700 ft ▪ Container ships less than 2,500 TEUS ▪ Cargo ships between 10,000-45,000 DWT dead weight tonnage
Transit Sheds	▪ 3 main sheds, outside of the secured Port area ▪ More than 20,000 gross sqft of weather-sensitive cargo ▪ 2 of the transit sheds = 80,000 sqft ▪ 1 shed = 40,000 sqft ▪ Average height of 22 ft ▪ 4 truck docks for loading and unloading ▪ Other miscellaneous storage sheds, approximately 20,000 sqft ▪ Fire protected
Outdoor Storage	▪ 9 acres total ▪ 4-5 of the 9 acres used for breakbulk and containerized cargo ▪ 3-4 of the 9 acres used for container storage ▪ Pavement strength is 0.5 tons per sqft
Chassis and Chassis Storage	▪ Onsite storage ▪ Could be moved offsite to improve storage capabilities
Rail Storage	▪ Port manages no long-term space ▪ Port generally gets 1-2 trains per/day ▪ Can store 11 rail cars at a time
Stormwater Facilities	▪ 2 stormwater facilities, one south of the property and one on the northeast side

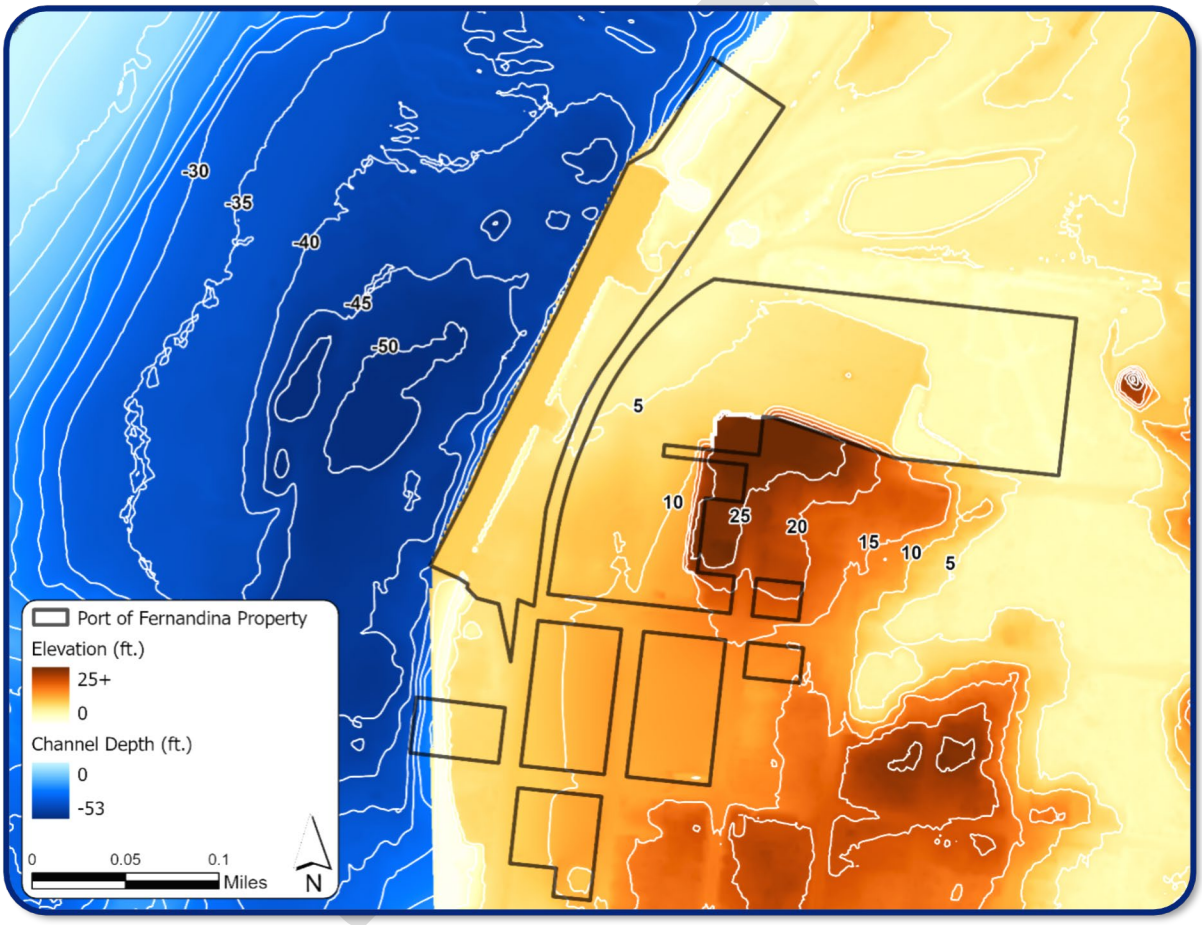
Source: OHPA Port of Fernandina Strategic Master Plan, reviewed and updated by staff and terminal operator

Port-Related Areas of Impact

The Port of Fernandina is mostly susceptible to damage by water or wind and has been impacted by named storm events, storm surges, high tide, rainfall, and flooding. Water impacts typically result from named storm events, or hurricanes. However, above-normal tides, coastal low pressure, and onshore winds have impacted the Port, independent of named storms.

Elevation of the Port's infrastructure and the depth of the Port's channel affect related areas of impact from natural disasters. Figure 7 below illustrates the elevation of the Port's infrastructure and the bathymetry of the channel that connects the Port to the Atlantic Coast waterways. It is crucial to highlight the gray segments in the map picture areas where elevation data is not available.

Figure 7. Elevation and Channel Depth (Bathymetry) of the Port of Fernandina and Surrounding Areas

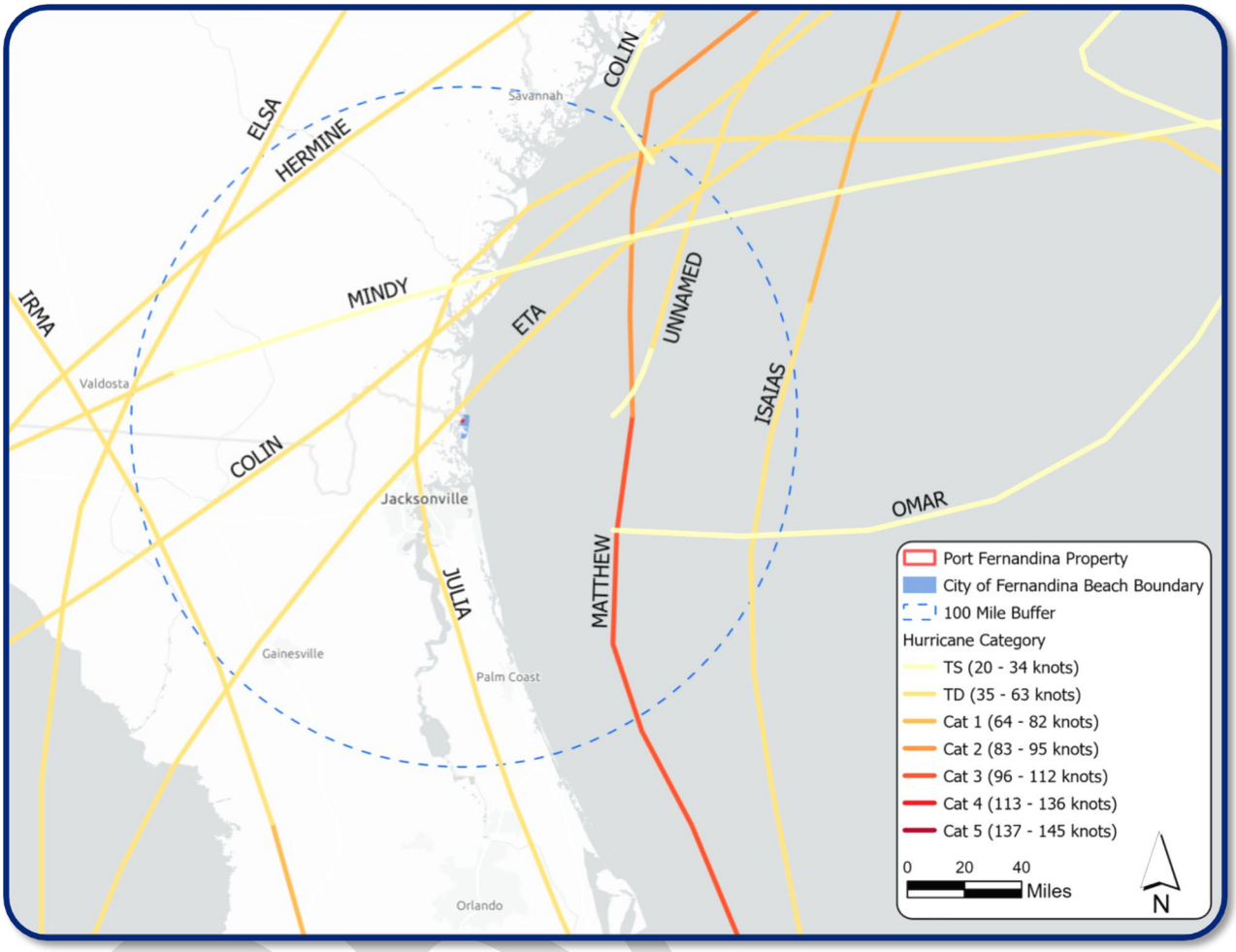


Source: HNTB GIS Map, FDEP, U.S. Army Corps of Engineers

Named Storm Events

Port Fernandina's location creates a heightened need for resilient planning. Natural disasters, most notably hurricanes and tropical storms, significantly affect the Port's operations. Since 2016, 12 named storms have fallen within 100 miles of The City of Fernandina Beach. Of these 12, one storm, Hurricane Eta, hit land within five miles of the City of Fernandina Beach. Figure 8 on the following page illustrates these storms and their relation to the City of Fernandina Beach.

Figure 8. Hurricane Paths within a 100-mile Radius of The City of Fernandina Beach, Florida, Source: NOAA



Source: HNTB GIS Map, NOAA National Hurricane Center

Tropical depressions are the most common named storm events to make landfall within The City of Fernandina Beach, and the Port of Fernandina. However, Hurricane Matthew, a Category 3 hurricane fell within 59 miles of Fernandina Beach, in 2016 but did not make landfall. This is the largest storm to fall within a 100-mile radius of the Port and the City within the past seven years and still had significant impacts on Northeast Florida.

Hurricanes Matthew and Irma have had the largest impacts on The City of Fernandina Beach in the past seven years. Historic impacts of these storms include a historically high storm surge in Nassau County. In the Atlantic Ocean at Fernandina Beach, a storm surge of 6.91 feet was recorded, the highest storm surge that Northeast Florida and South Georgia have seen since 1944. Similarly, Matthew's maximum wind gust was recorded at 60 Miles per Hour, at Fernandina Beach Municipal Airport, the 12th highest in the State.[18]

[18] Florida Climate Center Hurricane Matthew Florida Summary

Storm Surge

Storm surge is one of the greatest threats to property in coastal areas. Storm surge is defined as an abnormal rise of water generated by a storm, over the predicted tide.[19] On the other hand, storm tide is the combination of storm surge and astronomical tide, causing water levels to rise. Rises in these levels can cause severe flooding in coastal areas and impact port operations.

Storm surge and storm tides both generate rapid flows of water and increase hydrologic impacts on infrastructure often designed to withstand normal tidal and wave activity. Increased water levels compound erosion of infrastructure, coastal roads, habitat, and building foundations. Building foundations that are weakened can be more susceptible to tropical cyclone wind damage. It is essential to build resilient infrastructure that can withstand storm surges, and the various impacts that follow it and bring older buildings up to current hurricane and wind shear codes.

Figure 10 and Figure 10 below show storm surge levels at the Port of Fernandina in the case of Category 3 or 5 hurricanes. A category 3 storm will likely impact more than half of the port with some levels of storm surge with areas shown as red experiencing nearly 9 feet of water above normal MLLW or average low tide. A category 5 hurricane would completely cover the entire terminal with water.

Figure 10 - Storm Surge Levels of a Category 3 Hurricane, Source: NHC

Source: HNTB GIS Aerial Maps

Figure 10 - Storm Surge Levels of a Category 5 Hurricane, Source: NHC

Source: HNTB GIS Aerial Maps

[19] NOAA Hurricane Storm Surge Overview (noaa.gov)

Historical Tidal Data

Table 4 - shows the maximum water levels at high tides during the 12 hurricanes that impacted Fernandina Beach during the 2016-2022 hurricane seasons. The table is descending from maximum water levels at high tide. The main purpose is to illustrate the relationship between hurricanes and water levels impacting the Fernandina Beach area. The table also provides a list of actual start and end dates of tropical cyclone events.

Table 4 - Relationship Between Hurricanes and Water Levels in Fernandina Beach, Florida, Source: NOAA

Relationship Between Hurricanes and Water Levels in Fernandina Beach, Florida					
Storm	Year	Max Strength	Max Water Level at High Tide (MHHW, ft)	Start Date	End Date
Matthew	2016	5	4.13	9/28/2016	10/10/2016
Irma	2017	5	3.58	8/30/2017	9/13/2017
Eta	2020	4	1.79	10/31/2020	11/14/2020
Colin	2016	TS	1.74	6/5/2016	6/8/2016
Isaias	2020	1	1.6	7/28/2020	8/5/2020
Julia	2016	TS	1.27	9/13/2016	9/21/2016
Hermine	2016	1	1.15	8/28/2016	9/8/2016
Mindy	2021	TS	1.11	9/8/2021	9/10/2021
Unnamed	2017	TS	0.96	8/27/2017	8/29/2017
Elsa	2021	1	0.48	6/30/2021	7/10/2021
Colin	2022	TS	0.45	7/1/2022	7/2/2022
Omar	2020	TS	0.37	8/30/2020	9/6/2020

Source: NOAA Tides and Currents: Fernandina Beach, FL Buoy # 8720030, accessed June 8, 2023, from https://tidesandcurrents.noaa.gov/

These named events have a direct impact on The City of Fernandina Beach and the Port of Fernandina, as the majority of flood inundation days occur in autumn, during Atlantic hurricane season. Six of the top-10 highest water levels in Fernandina Beach have been recorded in the past 7 years, excluding the 2023 hurricane season. Table 5 below highlights these water levels.

Table 5 - Top-10 Water Levels, Fernandina Beach, Florida

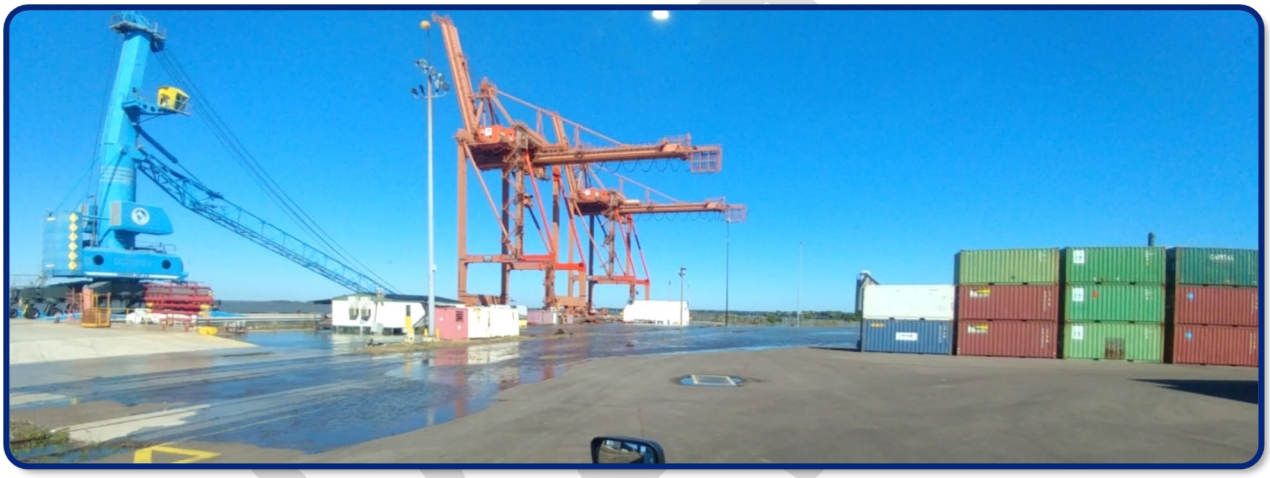
Top-10 Water Levels, Fernandina Beach, Florida				
Date	Height (Ft above MHHW)	Event Category	Event	Source
2-Oct-1898	6.91	Tropical	1898 Georgia Hurricane	High Water Mark
7-Oct-16	4.17	Tropical	Hurricane Matthew	Observed Peak Water Level
10-Sep-64	3.94	Tropical	Hurricane Dora	Observed Peak Water Level
10-Nov-22	3.81	Tropical	Hurricane Nicole	Observed Peak Water Level
19-Oct-44	3.7	Tropical	1944 Cuba Florida Hurricane	Observed Peak Water Level
11-Sep-17	3.61	Tropical	Hurricane Irma	Observed Peak Water Level
29-Sep-22	3.36	Tropical	Hurricane Ian	Observed Peak Water Level

7-Nov-21	2.93	Other	Above Normal Tides & Coastal Low Pressure	Observed Peak Water Level
27-Sep-04	2.78	Tropical	Hurricane Jeanne	Observed Peak Water Level
20-Sep-20	2.77	Other	Above Normal Tides & Onshore Winds	Observed Peak Water Level

Source: NOAA Tides and Currents: Fernandina Beach, FL Buoy # 8720030, accessed June 8, 2023, from https://tidesandcurrents.noaa.gov/

Figure 11 photo provided by the OHPA and Savage provides documentation of the impacts and effects of king tides at the Port of Fernandina. These flood waters inundated the northern port berth area and backlands halting cargo operations, of container cranes, and service by rail lines, and flooded the port service shop and parking areas.

Figure 11 - Flooding due to King Tides at Port of Fernandina



Source: Photo courtesy OHPA Staff

Figure 12 shows the level of water on a king tide blue sky flood event with many areas several feet below water.

Figure 12 - Severe Flooding due to King Tides at Port of Fernandina

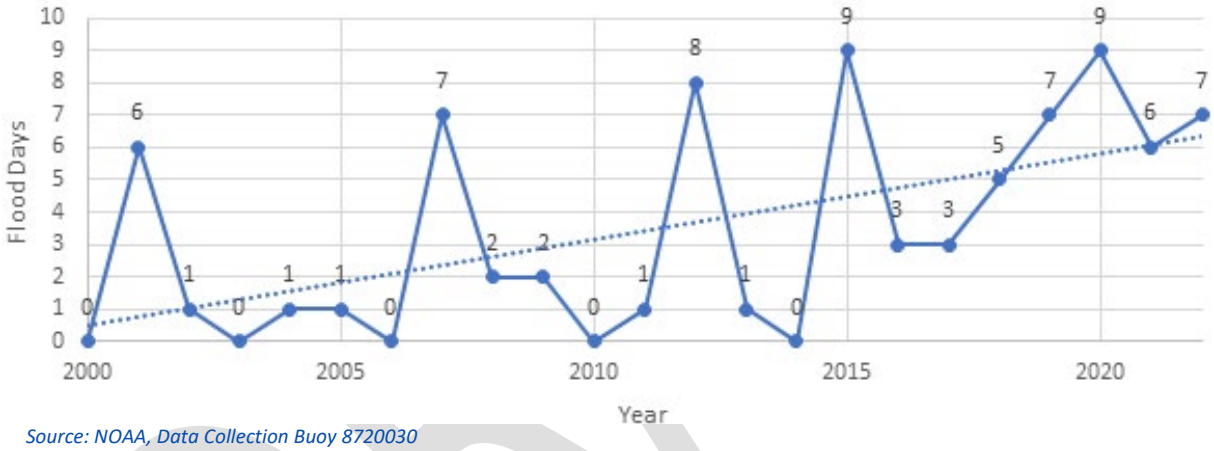
Source: Photo courtesy OHPA Staff

Historic Rainfall Events

According to NOAA data collected at a sea buoy close to the Port and illustrated in Figure 13, flood inundation days are most likely to occur between the months of September and November. Rainfall levels in Fernandina Beach, FL mimic a similar pattern to that of historic MHHW and inundation days and correlate with the dates that the State is affected by hurricane season. The highest average rainfall occurs in September, averaging 7.19 inches of rain during this month. The average annual rainfall in Fernandina Beach is 49.93 inches.

According to data from NOAA, the State of Florida ranks amongst the top five states with the highest precipitation levels, averaging 54.5 inches annually. Fernandina Beach experiences less precipitation than the statewide average in the State of Florida. However, looking at statewide averages of annual precipitation, if The City of Fernandina Beach was a state, it would rank 11th in national rainfall.

Figure 13 - Annual Flood Days in Fernandina Beach, Florida from 2000-2022



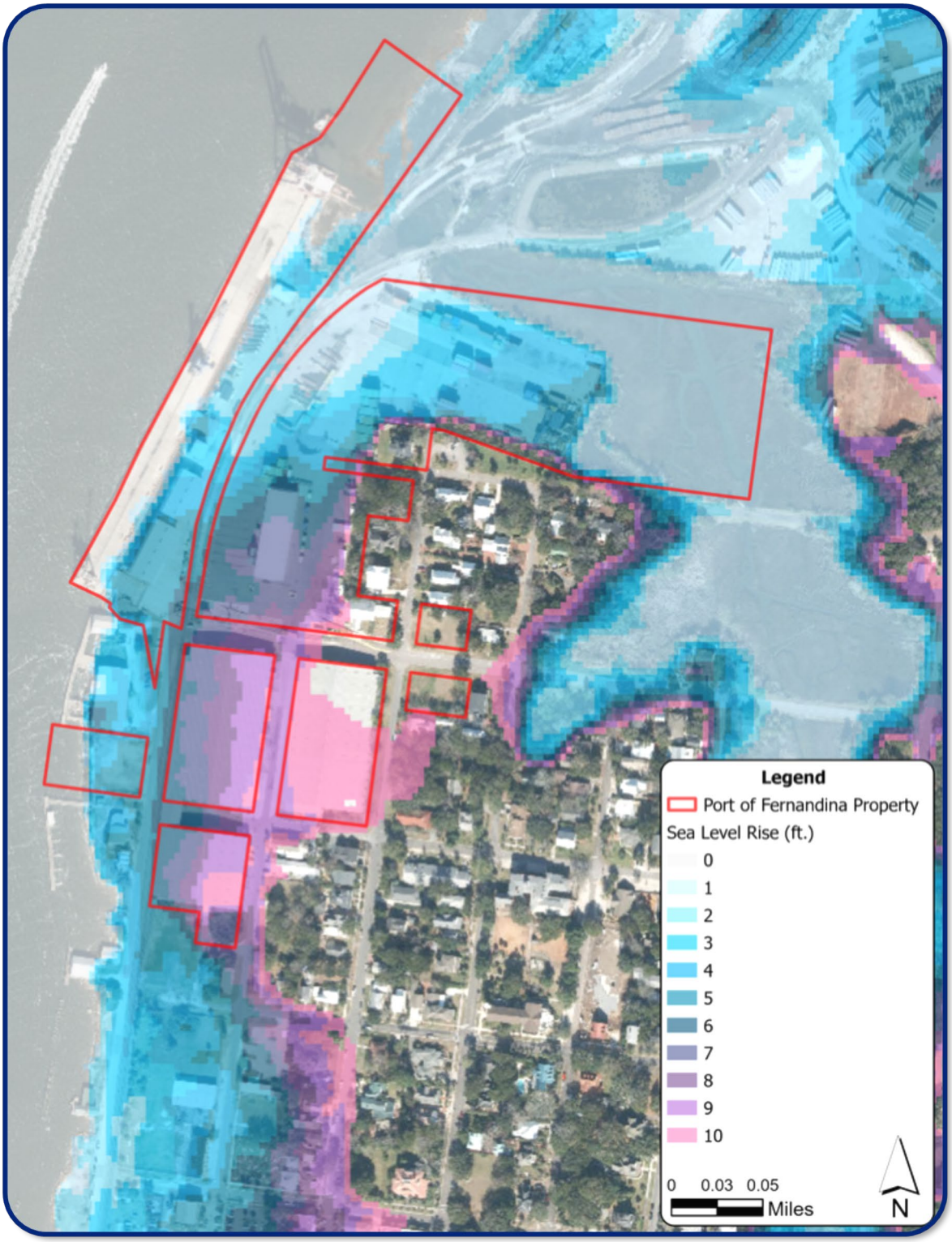
Source: NOAA, Data Collection Buoy 8720030

The largest number of flood days experienced within a year is nine, occurring twice in the past 20 years, in 2015 and 2020. Fernandina Beach has experienced flood days every year since 2015, averaging 6.1 flood days annually. This is a sharp difference from the 3.4-day annual average from 2000-2022, inferring that average annual flood days are increasing.

Impacted Infrastructure

King tides, storm surges, hurricanes and named storm events, flooding activity, and historic rainfall all have historic impacts on the Port of Fernandina and its surrounding areas. Figure 14 below provides a visual model of sea level rise, as it relates to the Port's property boundary to demonstrate how water levels may impact existing infrastructure. Sea level rise mapping can also be used to understand how flooding will affect the Port of Fernandina. Using the MHHW data shown in Table 5 - Top-10 Water Levels, Fernandina Beach, F the highest MHHW water level experienced in Fernandina Beach sits at 6.91 feet. Looking at the graphic below, an inundation level this high leaves the port vulnerable to flooding. The majority of the northern infrastructure would be underwater, as well as infrastructure to the east of the property.

Figure 14 - Sea Level Rise at the Port of Fernandina, Source: NOAA



Similar to sea level rise and flooding, storm surge impacts the Port's existing infrastructure. Figure 10 and Figure 10 show the storm surge for Category 3 and 5 hurricanes (respectively) in relation to Port infrastructure. In the event of either storm, all the existing port infrastructure will be affected by storm surge. Like Figure 14, the northern and eastern areas of the Port have the highest inundation levels.

The 2023 OHPA Port of Fernandina Strategic Master Plan identified flooding issues at the Port terminal that support this impact analysis. The nine acres of cargo laydown and outdoor storage experience significant flooding during a super high (king) tide event. Events like this one create major challenges for the port for several reasons including they are much less predictable than hurricanes or tropical storm events. This reveals areas of the port that can be impacted on a much more regular basis. Equipment, buildings, tools, and cargo were damaged during this event and major areas used for storage were taken out of service due to flooding reducing the effective storage and ability of the port to generate revenue and provide services for its customers.

Storm Impacts

Named storm events, causing storm surge and flooding activity, are the main source of water impacts at the Port of Fernandina. In November of 2022, Hurricane Nicole[20] created major impacts on Northeast Florida coastal communities from storm surge and tidal storm surge flooding impacts as can be seen in Figure 15 and Figure 16. The containers in the foreground were floating around the port and large deposits of seaweed, driftwood, and debris covered the port and filled and blocked drainage systems. Debris being cleared from the G&W rail line by port workers is shown in Figure 15.

Figure 15 - Debris Surrounding Rail Spur following Hurricane Nicole

Source: Photo courtesy OHPA Staff, November 2022

During stakeholder meetings G&W Railroad stated the impacts from flooding the tracks go much deeper than just debris removal alone. Flood waters often undermine the track superstructure which includes rail, rail ties, ballast, sub-ballast, compacted subgrade, and drainage layers. The lines must undergo a thorough inspection and be cleared prior to resuming operations of the railroad. Washed-out or undermined sections of the track could cause a derailment of the train and or some of the cars or equipment cause safety hazards, damage, ecological damage to the environment, and pose higher level risks if HAZMAT chemicals are being pulled. In addition, rail car bearings that flooded must be removed and maintained or replaced on every axle.

Figure 16 - Flooding at the Port of Fernandina due to Hurricane Nicole

Source: Photo courtesy OHPA Staff, November 2022

[20] *National Weather Service, Hurricane Nicole – November 2022 https://www.weather.gov/tbw/HurricaneNicole*

Figure 17 - Flooding at the Port of Fernandina due to Hurricane Nicole

Source: Photo courtesy OHPA Staff, November 2022

Impacts generated by tropical events like Hurricane Nicole, Irma, and Michael can be extensive and drive major costs beyond just what is seen above the surface. Wave action in combination with highwater can very quickly erode concrete and asphalt. The wave deposits debris like sand, seaweed, and other debris from docks and seawalls that are being washed away during the storm. It can take days, weeks, and sometimes months to restore normal operations to a terminal creating major revenue shortfalls and even loss of business in some prolonged situations. Ships can move their business to the next fully operational competing operation near the same market. These are just a few of the reasons reducing impacts is critical to the longevity of a port terminal.

Figure 17 shows the Port operations building located near the general storage area of -mid-port or at the second ramp location that provides -mid-port access to the berths. Directly south is the Fabric storage covered warehouse where lumber, KLB, and paper are stored when loading and off-loading vessels. In the distance are the West Rock paper mill silos and the port equipment parking and storage facility.

During the site visit, several electrical boxes to control security lighting and provide power to warehouses and office buildings were located which appeared to have water damage, rust and were potentially low enough to the ground to be compromised by flooding events such as this.

As shown in Figure 18, the gray shipping container was dislodged from the storage location in the container yard and was pushed by storm surge into the liquid propane tank. This could have caused a major gas explosion creating major risk to areas directly around the port terminal.

Figure 18 - Dislodged Shipping Container impacting Port Features Following Hurricane Nicole

Source: Photo courtesy OHPA Staff, November 2022

Drainage System Review

Onsite Drainage System

The Port drainage system which is illustrated in Figure 21, on the following page, consists of approximately six inlets connected to an underground storm sewer system under the impervious surfaces. The water then flows to six outfalls located along the perimeter of the facility. The south end of the port functions well. The north end with the lower elevations is sufficient under normal conditions. However, under flood conditions, there is not enough capacity in the system to contain the amount of water flowing into it. In addition to capacity, the undersized pipes increase the water velocity and prevent natural sediment transport down the pipe, leading to sediment build-up and ponding upstream and erosion downstream. When the flood water recedes, the sediment left builds up and leads to decreasing capacity in the pipes over time. There is potential that storm surge events create additional back pressure on the system creating hydraulic damning situations. Deposits of seaweed and other debris onto the port aprons and storage areas clog drains causing additional drain impacts during a flooding, high tide, or storm surge event.

Figure 19 - On-site Drainage Blockage

Source: Photo courtesy OHPA Staff

Drainage At Rail Crossing

The drainage pipes under the adjacent rail are undersized for the volume of water flowing into the Port. Even without flood conditions, high tide events pose a problem for this area. The water appears to not flow properly between the wetlands to the south and causes backflow into the port area.

The Port Master Plan discusses in detail the adjacent wetland marshes that create additional flood impacts during rain events potentially due to the undersized drainpipes not allowing the wetlands to properly drain and flush with the intracoastal waterway system.

Figure 20 - Debris Around Drainage by the Port Terminal

Source: Photo courtesy OHPA Staff

Downstream Areas

The primary port access roads to the southeast of the Port, Escambia Street and Dade Street, have insufficient drainage for flood conditions and need larger culverts and cross drains. As the water level rises, the cumulative effects of the flooding in this area create access issues for the Port during heavy

rainfall events. The City of Fernandina Beach has identified these areas as potential projects in Resiliency Plan. Figure 21 provides a general illustration of on port drainage systems' existing layout.

Figure 21 – OHPA Master Plan – Drainage System, Outfalls, and Site Map from Appendix A

Source: OHPA 2023 Master Plan Appendix A – Site Map, https://www.portoffernandina.org

Impacts Created by Constrained Critical Economic Activity

The Port has experienced constrained economic activity concerning service disruptions caused by storms, tropical cyclones, flooding, and extreme high tide events. These impacts, combined with port infrastructure, have significant detrimental impacts on the Port's economic productivity. Decreased productivity of cargo movement and storage negatively impacts economic activity at the port. Historic economic impacts can be used to create a plan for an economically resilient Port. The Genesee and Wyoming First Coast Railroad and the Port's Operator, Savage, are two key stakeholders that experience decreased economic productivity as it relates to the Port's terminal.

Genesee and Wyoming First Coast Railroad

Source: Photo courtesy of HNTB Staff, 2023

The Genesee and Wyoming's (G&W) First Coast Railroad (FCRD)[21], a key stakeholder of this study and short line serving the Port of Fernandina has had significant disruptions from previously described impacts, which also impacts the Port. The Railroad is impacted by water-related events 103 days annually, most commonly through named storm events and king tides. Service disruptions described by the railroad includes derailments, flooding, storm surges, tropical cyclone events, and extreme high tides or king tides. Flooding often does not reach the warehouse and other structures on the terminal but more often affects the rail line that bisects the terminal. These disruptions often cause the railroad to be out of service for several hours to full workdays, affecting the Port's ability to conduct operations. During meetings with the railroad, there was a discussion on a low point in the track through the port and is where the railroad encounters water-related issues. An elevation survey of the rail line could identify specific areas where the rail line is low for future funding applications or final project design work.

As the FCRD runs through the Port of Fernandina's property, it divides the operations of the Port separating the wharf from the Port's storage facilities. When derailments occur, or trains stop on the track, the Port must cease operations due to the placement of the rail and the terminal. According to FCRD, most derailments are minor, like a rail car hopping a track or a turnout, and occur in the rail yard, thus having a limited or indirect impact on the Port. However, the Port and Railroad operations are extremely dependent on one another, and derailments affect the supply chain of seaport operations and freight logistics to the area. There are on average ten derailments annually and approximately 70% of them relate to water and flooding.

[21] *Genesee and Wyoming First Coast Railroad (FCRD https://www.gwrr.com/fcrd/*

Hurricanes can significantly impact Port and Railroad economic activity. 24 hours before hurricanes make landfall, the Railroad must cease operations and evacuate all equipment to the Yulee interchange further inland. The Railroad has evacuated to this interchange six times in the past decade due to hurricane landfall on the Port's property. These evacuations stop all Railroad activity, meaning that all cargo that is received from the Port or the paper mill which will be transported by rail remains stagnant until the resumption of rail operations.

An estimated 1,000 rail carloads per year are lost, which could be decreased through the implementation of resiliency measures. During routine high tide, the railroad typically loses 6 hours of time, or 75% of a full 8-hour workday. Also, the tide brings in a significant amount of debris to the Port and rail terminals, which often is a cause for derailments. It takes 4-6 hours to complete investigations and get equipment and tracks back into operation. This has a significant impact on both the Port and the Railroad's productivity. Associated costs often impact current and future customers by creating economic competitiveness. Ports with more resilient equipment and facilities can use lower operational costs or more in-service days as a marketing pitch.

Port Terminal and Transload Operator, Savage

Source: Image courtesy of Savage Port Terminal Operator, 2023

The terminal operator Savage[22] serves an approximated 42 regional freight and trans-load facilities throughout the United States. During stakeholder meetings the operator described economic challenges specific to Nassau Marine Terminal related to highwater or flood impacts. The disruptions resulted in lost hours of service and the ability to move and store cargo in an efficient, resilient, and robust manor. The operator and OHPA generate revenue from customers when cargo is stored or moved.

Another common impact described by the City of Fernandina Beach and OHPA was flooding on Dade Street, which divides the Port's terminal north-and south property and can be seen in Figure 21. Roadway floods cause significant economic impacts to truck activity to and from the port's waterfront facilities. When Dade Street floods, trucks cannot enter the Port's terminal area, effectively stopping the movement of cargo to and from the terminal to customers inland. Escambia Street has had similar

[22] *Savage Terminal Transload Operator, https://savageco.com/*

impacts from being flooded or underwater. The Wetland crossing also poses an issue in this area, as it relates to flooding and access to port facilities roadways.

Source: United States Coast Guard stock image

Hurricanes cause significant disruptions to the OHPA and Port Operator, as Port's have federal requirements from the United States Coast Guard (USCG)[23] that, based on conditions assessments, require various levels or preparedness or even complete terminal closers, decreasing productivity. On average, hurricanes cease port operations for 36 hours, the equivalent of 4.5 working days. Following out-of-service days, significant post-event inspections are required to clear channels, inspect structures, safety checks on mechanical and electrical services, clear drainage systems, clear tracks and roads of debris, and other critical efforts to resume normal operations impacted by wind, storm surge, and flooding caused by storms or other water-related events. Below is the list of hurricane Port Conditions as defined by the USCG:

- **Whiskey:** Set when gale-force winds are expected to arrive at the port within 72 hours. The port remains open to all commercial traffic, but oceangoing ships and barges must report their intention to remain in port or depart. If they are departing, they must do so within 12 hours of gale-force winds.
- **X-Ray:** Gale force winds are expected within 48 hours. The rules are similar to port condition Whiskey.
- **Yankee:** Gale force winds predicted within 24 hours. Vessels seeking to depart must arrange immediate departure. Cargo operations must cease with 18 kilometer per hour (kph) winds. Transfer hoses must be disconnected with 22 kph winds. Ships seeking to arrive in port should seek an alternate destination.
- **Zulu:** Gale force winds within 12 hours. The port is closed.

When the port experiences significantly detrimental impacts to the terminal, contractors are required to be present at the Port for cleanup and repair, prolonging out-of-service time, decreasing economic productivity, and creating additional costs to the terminal owner and operator.

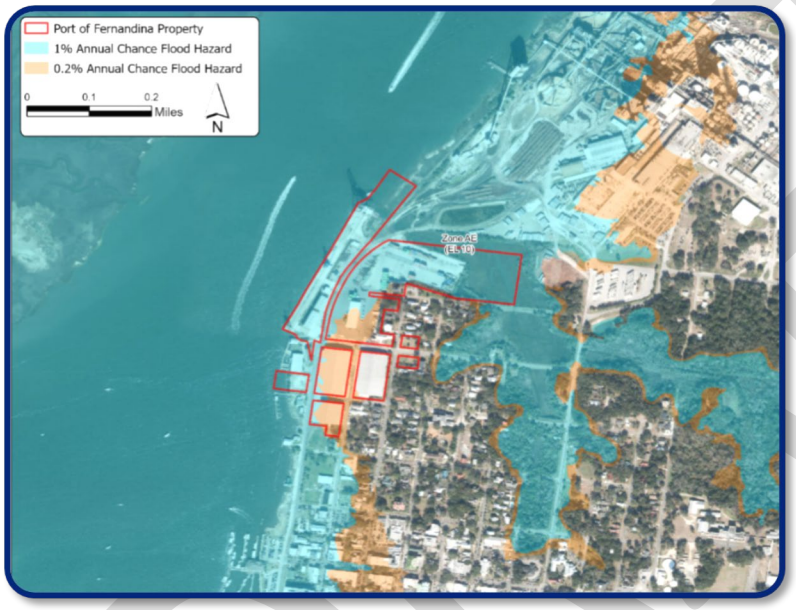
Outside of flooding, the Savage described the lack of high and dry storage facilities and covered or warehouse space as an additional impact or vulnerability. The port storage acreage cannot be maximized due to the threat of a blue sky or king tide flood event, or the excessive operational or logistical moves of particular cargo to mitigate these threats. An increased amount of storage and staging space at the Port terminal would allow for increased economic activity and revenue. Currently, there is insufficient space to fit cargo ships and people at the Port daily. Similarly, when derailments occur, people can be cut off from transiting the terminal from the east to the west side of the rail line. This has the potential to pose a safety issue in case of emergency during a derailment, as there is no way to evacuate this area in case of a train blockage or for emergency first responders to gain access to the wharf and ship loading areas.

[23] *Homeport US Department of Homeland Security, US Coast Guard (USCG), https://homeport.uscg.mil/port-directory/jacksonville*

VULNERABILITY ASSESSMENT

This vulnerability assessment, created in alignment with FDOT's State Highway System Resilience Action Plan, examines vulnerabilities like flooding, storm surge, sea level rise, tidal floods, major storm events, and other outside forces and how they relate to the Port of Fernandina. Building upon the impacts assessment that documents impacts that the Port has experienced, this assessment identifies potential impacts of natural and anthropogenic causes and potential effects to the Port terminal and adjacent industries. The goal of this assessment is to provide data to lay out a foundation for potential infrastructure projects for the implementation of a mitigation strategy for the greatest vulnerabilities to the port's capability to resist or recover from various disasters and resume normal trade activities.

Figure 22 - FEMA Flood Zone Hazard Map



Source: NOAA, Nassau County Property Appraiser

The Port of Fernandina lies within a 100-year floodplain and is shown in Figure 22 as a Flood Hazard Area on Flood Insurance Rate Maps produced by FEMA. The area has a 1% chance of flooding within a year. The tidally influenced canal adjacent to the property is classified as an estuarine and marine wetland. Water flows into this wetland and is believed to not adequately or efficiently flush due to undersized culverts under the FCRD spur tracks.

The Port is also located within a storm surge zone, according to data from FDEM, based on the NOAA Seas, Lakes, and Overland Surges from Hurricanes (SLOSH) model. For a Category 1 storm surge, the north and west areas of the port including the equipment parking and cargo storage are projected to have six to nine feet of storm surge, while the rest of the port is projected at one to six feet. If a Category 3 hurricane were to affect the area, the portion of the port with the three warehouses is projected at three to nine feet of storm surge. The rest of the property is predicted to have at least nine feet of storm surge with a Category 3 hurricane.

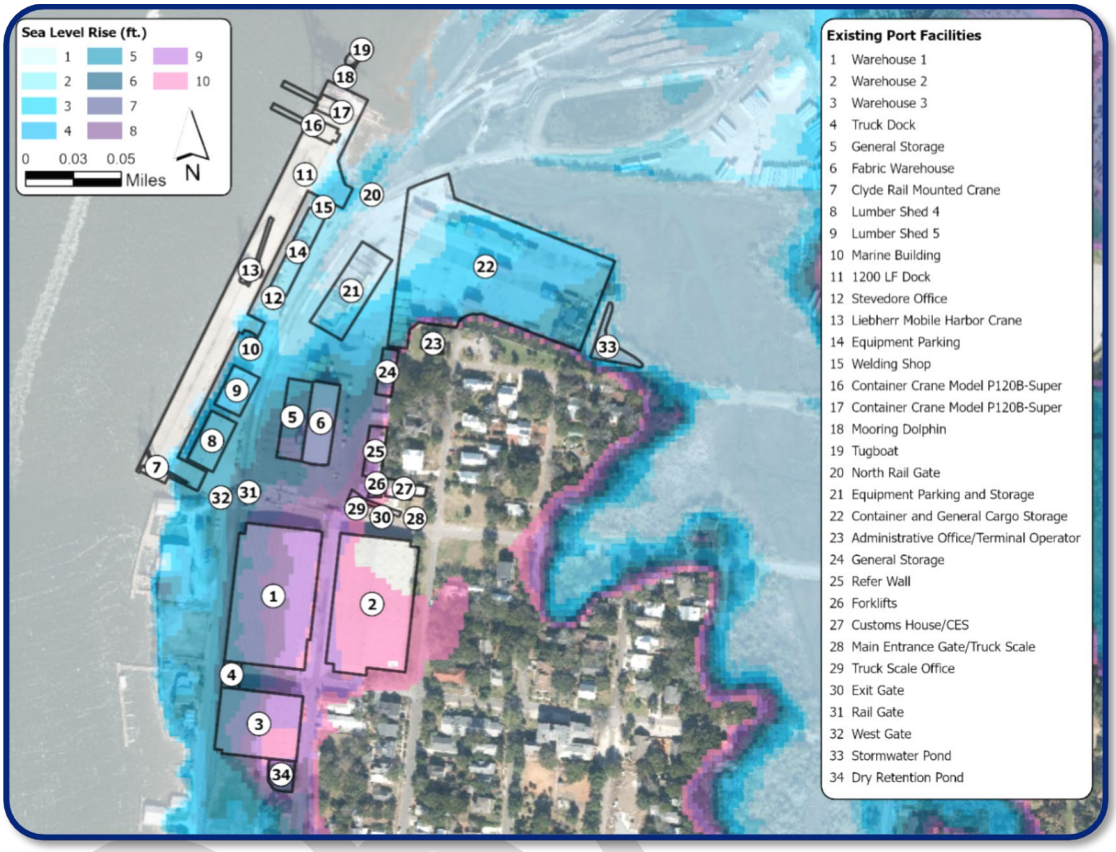
The East coast is projected to be the most affected coast by sea level rise in the entire United States by 2050. NOAA predicts that the East coast is predicted to rise by 14 to 18 inches (1.17 to 1.50 feet) in the next 30 years, or by 2050.[24] This predicted sea level rise can be seen in relation to the Port's existing infrastructure in **Error! Reference source not found.**, below.

The equipment parking and storage, container and general cargo storage, stormwater ponds, marine buildings, and lumber sheds are in an area with a predicted one to six feet of sea level rise. Seven to ten

[24] https://oceanservice.noaa.gov/hazards/sealevelrise/sealevelrise-tech-report.html#:~:text=About%202%20feet%20(0.6%20meters,the%20end%20of%20this%20century.

feet of sea level rise is predicted at the warehouses, forklifts, customs house, truck scale office, and main entrance gate.

Figure 23 - Existing Conditions of Port of Fernandina Infrastructure with Sea-Level-Rise Impacts



Source: NOAA, Nassau County Property Appraiser

Sea level rise combined with local factors causes tidal flooding. Based on the Fernandina Beach, FL Tide Gauge #8720030, the area around the Port had seven days of high tide flooding in 2022. NOAA's intermediate sea level rise projection shows Fernandina Beach to have 24 days of high tide flooding by 2040 and 47 days of high tide flooding by 2050.

Rises in sea level will cause shifts in flooding activity in the next 30 years, affecting tide and storm surge heights. NOAA predicts these heights to increase, and the distances affected to move further inland. By 2050, NOAA predicts that moderate flooding will increase ten times the yearly average.[25] This increase may be exacerbated by other factors such as rainfall, wave impacts, erosion, and existing infrastructure.

Without mitigation strategies, existing infrastructure in coastal communities, such as the Port of Fernandina, will become increasingly vulnerable to water-related impacts. Increased impacts to infrastructure also have the potential to affect environmental impacts concerning the Port.

The geographic area around the Port of Fernandina contains many different species of wildlife, in the surrounding habitat. According to the Florida Natural Areas Inventory (FNAI) GIS database search, two documented species were found occurring near the port area: MacGillivray's Seaside Sparrow and

[25] https://oceanservice.noaa.gov/hazards/sealevelrise/sealevelrise-tech-report.html#:~:text=About%202%20feet%20(0.6%20meters,the%20end%20of%20this%20century.

Worthington's Marsh Wren. The Wood Stork is listed as a likely occurrence. Fourteen species are listed as potentially occurring, including the Atlantic Sturgeon, Loggerhead Sea Turtle, Piping Plover, Green Sea Turtle, Ciliate-leaf Tickseed, Leatherback Sea Turtle, Eastern Indigo Snake, Gopher Tortoise, Southern Hognose Snake, Florida spiny-pod, Atlantic Salt Marsh Mink, Giant Orchid, Small-flowered Meadow beauty, Florida Manatee. The adjacent waterbody, the Amelia River, is a designated critical habitat for the West Indian Manatee. When the port docks, equipment, storage, and cargo get impacted, subsequent runoff from flooding can increase containments into the surrounding ecosystems. This natural

In short, the Port of Fernandina is:

- Located within a 100-year floodplain.
- Nearly inundated (9 feet or above) during a Category 5 Storm.
- Location may experience 1.5 feet of sea level rise by 2050 according to NOAA.

Specific Vulnerability Evaluations:

Seawall and Breakwater Elevation

The northern Port properties surrounding the north rail gate, seawall, and riprap currently in place is not adequate or too low. Sea water intrusion, high water, and extreme high-water events have been documented and previously described in this SEARIP documented. To reduce the highwater intrusion in this area, a sheet pile wall with concrete cap should be designed with back fill recommended and improved or incorporated drainage with back flow prevention for the northern extent of the port's marginal wharf structure adjacent to the existing north property boundary.

Rail Spur Leveling and Elevating

The FCRD rail spur crossings over the adjacent wetland on the north area of the port are at a lower elevation within the overtrackage to the port and mill sites. Where the track crosses over two causeways to the mill site, it also appears to have undersized culverts. When under extreme demand, hydraulic pressure may prevent flood water from flushing properly. A concept design purpose would remove the bottleneck where tide, current, and wetland drainage converge potentially at the causeways with constricted converts. This may be acting more like a dam than a bridge. Elevating the rail spur slightly and/or improving the water flow into and out of the wetland area may mitigate flood impacts to the port. The railroad is a property owner and key stakeholder and was supportive of working with OHPA on a project of this nature.

Drainage and Breakwater Improvement

Drainage structures on the port terminal, specifically under the north port areas out to rail causeways, and the previously mentioned undersized culverts all need consideration for the volume of stormwater flowing off the port or potentially onto the port. The ground surface of the port is mostly impermeable and may require one or two additional drains flowing to the north with black flow prevention which allows for minimal infiltration. Improving the drainage culverts at the northern rail spur terminus and other drainage structures throughout the terminal will allow water to flow into the wetlands to the east and prevent backflow into the port area.

Ramps and Upland Storage

The northern access ramp to the port dock or marginal wharf experiences heavy flood water during storms and high tide events. It is also settling and dropping several inches creating issues for the port operator and equipment transitioning on and off-loading docks. Improving the structural design and elevation of the ramp and surrounding backlands should support the mitigation of flooding impacts and reduce damages from the infrastructure settling.

Extreme Wind Vulnerabilities

The port has extensive infrastructure above the bulkheads including warehouse structures and major equipment like cranes, lifts, and trucks. The Clyde Rail Mounted Crane and two Container Cranes are major examples and during extreme weather events including high winds, the stability of these cranes may be compromised and cause the cranes to move or even topple over. This has been documented at many ports across the globe, including 2 just south at JAXPORT[26]. The salvage was $1.6 million dollars and both crane's replacement cost in today's estimates would be near $30 million. Providing adequate wind instrumentation, crane tie-downs and maintaining brakes and emergency brakes are very important mitigation measures. Funding from the Protect Act and Port Security Grant Program would cover such mitigation efforts if not already in place.

Other resources on property vulnerable to extreme wind include marine fenders from wave activities wind generated. The siding, metal roofing, and steel structure on the port warehouses. Port of Panama City had a brand new 155 mph rate warehouse bent diagonal during hurricane Michael in 2018[27]. While that was the most extreme recent example, the OHPA had damage to several roofs on existing warehouses from a much lower-grade storm. Some of the greatest impacts in Florida are storms not just hurricanes or tropical cyclone events. Florida has gale-force winds or microbursts created from thunderstorms that have documented gusts of winds lasting for miles wide like F3 tornados[28]. Preventative measures should be taken to secure these expensive assets in the event of extreme weather that would include heavy winds and damage to port infrastructure.

Naturally Occurring and Man-Made Fire Related Hazards

Dry conditions, along with high temperatures and thunderstorms, can lead to wildfires. However, humans are the leading cause of wildfires. From January to September 2023, there have been 2,075 wildfires in the state of Florida.[29] The WestRock Paper Mill adjacent to the port is an industrial facility that would pose a risk to the port in the event of a fire. Preventative fire protection and training will prevent the risk of fire and lessen the damage if a fire does occur. In 2014, Port Panama City experienced a major warehouse fire with its biomass cargos distribution. OHPA moves many flammable cargoes including paper products, kraft liner board (KLB), pulp, and lumber to name a few. One failed electrical connection, damaged equipment, or misplaced cigarette could potentially be catastrophic for both customers, operators, infrastructure, and most importantly workers and surrounding communities.

Man Made Disasters (Hazardous Material Spills, Explosions, Transportation Accidents)

The port is considered a small quantity hazardous waste generator by the Florida Department of Environmental Protection (FDEP) and three documented petroleum spills have occurred at the property in 1992, 1999, and 2000. A variety of chemicals are used and transported through the railroad yard

[26] *Jaxport cranes blown down, Aug. 2008, accessed online: https://www.freightwaves.com/news/jacksonville-port-contracts-for-crane-cleanup*
[27] *Port PC Hurricane Michael 2018, accessed online: https://flaports.org/port-panama-city-recovered-resilient-growing/*
[28] *Florida Climate Center Thunderstorms, accessed online: https://climatecenter.fsu.edu/topics/thunderstorms*
[29] *Florida Disasters, Wildfires, accessed online: https://www.floridadisaster.org/hazards/wildfire/*

adjacent to the port. Following the spill prevention procedures included in the port's Spill Prevention, Control, and Countermeasure Plan (SPCC) and training staff in these procedures will limit the risk of hazardous material spills. It is important that ports have regular training and maintain response capabilities with supplies and equipment.

Utility Grid/ Electric

Utilities that supply the port and its power needs are vulnerable to many impacts, often including natural or man-made events. Weather, such as heatwaves, solar flares, lightning, and wind events have the highest everyday probability of impacting the utilities serving the port. However, a growing threat includes manmade causes like damage, poor locating, theft, circuit overloading, high demand, and cyber-attacks foreign and domestic. Measures to minimize and prevent these causes can mitigate utility shutdowns across the port which impact the workforce, equipment, and security.

Cyber Security

Cyberattacks at ports are not only aimed at traditional information technology systems, but operational technology systems, which include cranes, lifts, and the conveyance systems used to load and unload cargo from ships. Keeping the port gates, access points, and security technology optimized will help to prevent cyber breaches, protect systems, reduce cargo theft, and improve the safety of workers on the terminal. Review the coast guard Port Facility Security Plan for vulnerabilities that may still exist and seek funding through the US Coast Guard Area Maritime Security Committee[30] for improvements that may be needed.

Workforce Safety

Highwater and flooding, wind, fire, and man-made vulnerabilities ultimately pose a concern for safety hazards presented to the workforce at the port. Electrical boxes are very low and could be an electrocution hazard if the area around the box floods. Flooding also creates unpredictable work environments where debris can cause accidents with equipment like derailments or damage to parts. During stakeholder interviews, related issues were discussed as well as created challenges and impacts for operators and users of the port terminal. The primary vulnerability is creating potential for insurance claims, higher costs, injured workers, liabilities, and reduced productivity.

Terminal Security

Seaports are prime targets for potential unlawful entrance, sabotage activities, terrorist threats, cargo theft, and smuggling. Since ports serve as a key point of entry into the nation, cargo in bulk like a container full of technology or tools becomes a high-value target for criminals. One of the challenges facing ports is ship hijacking, whether it happens physically or through IT system hacking. Ports can be challenging to completely secure, especially with multiple points of entry, and high traffic levels. Crime can be committed more easily and unnoticed as a result. Theft of cargo is one of the most frequent crimes committed at ports and large, unsecured containers are a common target. Port surveillance must be continual and comprehensive to prevent theft and criminal activity. OHPA should work closely with its AMSC[30] to evaluate any security gaps and mitigation strategies they can potentially support with federal funding programs like the Port Security Grant Program (PSGP) previously mentioned.

[30] *Area Maritime Security Committee (AMSC), accessed online: https://www.dco.uscg.mil/Our-Organization/Assistant-Commandant-for-Prevention-Policy-CG-5P/Inspections-Compliance-CG-5PC-/Office-of-Port-Facility-Compliance/Domestic-Ports-Division/amsc/*

INTERGOVERNMENTAL COORDINATION

When preparing an effective plan to improve policy, enhance infrastructure, improve operations, provide a safer environment, establish more sustainable solutions, and create the foundation for funding programs and applications is best when aligned and integrated with local, state, and federal plans and policies. A key goal of the resiliency plan is to align with nationwide resiliency efforts, which has been done through extensive intergovernmental opportunities at Federal, State, and Local levels. This Resiliency Plan uses the OHPA Port of Fernandina Strategic Master Plan and the State of Florida's Resiliency Action Plan as guiding documents for baseline coordination efforts. Alignment with other actors and stakeholders emerged from a review of these documents. Table 6 below shows a matrix that describes the intergovernmental coordination efforts that took place during the SEARIP.

Table 6 - Intergovernmental Coordination Matrix

Intergovernmental Coordination Matrix			
Date	**Meeting Title**	**Stakeholders**	**Notes**
7-Mar	Project Kickoff Meeting	City of Fernandina Beach, OHPA, Savage	The meeting involved presentation of the project scope and expectations and open discussion and remarks related to port resiliency and known impacts.
14-Jun	Key Stakeholders Meeting	City of Fernandina Beach, OHPA, Savage, Westrock Paper Mill, First Coast Railroad (FCRD)	Meeting with key stakeholders to discuss specific site impacts, impacts to adjacent, and through port infrastructure, and future coordination efforts and needs.
12-Jul	Port Resiliency Action Plan Workshop	Fernandina Beach City Commission, OHPA	Presentation of HNTB impacts and findings at the Port of Fernandina
20-Jul	FDOT OPP Resiliency Plans	FDOT Office of Policy Planning (OPP), FDOT Seaport Office	Presentation of outline and status of Port plan, discussion on OPP RAP and RIP, and how to comply with the SEARIP.
28-Jul	Resiliency Plan Coordination	Halff Engineering, City of Fernandina Beach Resiliency Plan consultant	City coordination, on behalf of Halff; discussion on FDEP grant program; vulnerability assessments, and interconnectivity of major projects.
3-Aug	FHWA Funding Webinar	Resilience Improvement Plans: Best Practices and Requirements	Webinar discussing DOT funding opportunities regarding RIP
18-Sep	City of Fernandina Beach Vulnerability Assessment Public Meeting	Halff Engineering, City of Fernandina Beach	Attendance at Half Engineering's public stakeholder meeting to gain addition information and support for SEARIP

Source: HNTB Staff and OHPA Director, 2023

STATE

- FDOT – Office of Policy Planning (OPP)
- FDOT Resiliency Action Plan (RAP)
- Florida Department of Environmental Protection (DEP)

The Florida Department of Transportation (FDOT) is a key stakeholder in the development of resiliency efforts, supporting this Plan as a part of FDOT's Resiliency Planning Program.

This plan is consistent with FDOT Office of Policy Planning Resiliency of State Transportation Infrastructure Policy Topic No. 000-525-053, supporting the State's port transportation system to improve safety, mobility, quality of life, and economic prosperity throughout Florida.[31]

In addition, the Florida Department of Environmental Protection (FDEP) has a program for resiliency that includes project funding. This plan provides coordination meetings and document review with key areas of responsibility at FDEP. Efforts to align the OHPA Port Resiliency Plan are being made to ensure the port is ready for all forms of funding as mitigation projects are developed.

Local

- The City of Fernandina Beach
- The Ocean Highway and Port Authority (OHPA)

The City of Fernandina Beach is an integral key-stakeholder in the creation of this plan. Development recommendations for the Port will remain in conjunction with developments that will benefit the City-wide resiliency efforts, as well as the State of Florida's. Data has been shared and collected on behalf of the City, which is developing a Resilience Vulnerability Assessment for Fernandina Beach. This data has been shared to ensure coordination and consistency amongst stakeholders.

The OHPA Port of Fernandina Strategic Master Plan[32] recommended a detailed resiliency study to be conducted in and around the Port. Resiliency considerations outlined in the Plan are included in this report as key features of the Resiliency Action Plan. These features include terminal area evaluation, rail placement evaluation, existing and anticipated areas of flooding, nearby wetlands and waterbodies, and seawall improvements in coordination with the city's planned seawall improvement project.

Federal

- Federal Highway Administration (FHWA)

In 2021, the Bipartisan Infrastructure Law established the Promoting Resilient Operations for Transformative, Efficient, and Cost-saving Transportation (PROTECT) Program. This program allots $8.7 billion in funding to improve highway, transit, intercity rail, and port facilities, as they relate to resiliency, climate change, and natural disasters. This funding is dispersed through FY 2022-2026, increasing slightly each year.

The Federal Highway Administration (FHWA) is the federal agency responsible for this funding. Both formula and discretionary funding are available under the program. These funds shall be used to make surface transportation more resilient to climate change, sea level rise, flooding, extreme weather events, and other natural hazards. Planning activities, resilience improvements, community resilience and evacuation routes, and at-risk coastal infrastructure are all activities supported by this funding program.

[31] *FDOT Resilience Action Plan, accessed online: https://fdotwww.blob.core.windows.net/sitefinity/docs/default-source/planning/policy/resilience/report_fdot_resilienceactionplan_final-main.pdf?sfvrsn=3a61b390_2*
[32] *OHPA Master Plan, access online: https://www.portoffernandina.org/_files/ugd/e5fb15_021eee73a5e742c6aee09ecf25bd2584.pdf*

Key policy guidance available now states that the following goals are supported by FHWA and are recommended to be used in the prioritization of formula and allocated funding:

- Improving the condition, resilience, and safety of road and bridge assets consistent with asset management plans (including investing in preservation of those assets) [23 U.S.C 119];
- Promoting and improving safety for all road users, particularly vulnerable users, and supporting major actions and goals consistent with the U.S. Department of Transportation's January 2022 National Roadway Safety Strategy for safer people, safer roads, safer vehicles, safer speeds, and enhanced post-crash care [23 U.S.C. 148];
- Supporting accelerated project delivery and an efficient environmental review process through the One Federal Decision framework and by continuing to coordinate with other Federal partners to ensure that the benefits of projects are realized as soon as possible [23 USC 139]; Making streets and other transportation facilities accessible to all users and compliant with the Americans with Disabilities Act [49 CFR 37];
- Addressing environmental impacts ranging from stormwater runoff to greenhouse gas emissions [23 U.S.C. 175, 23 USC 176];
- Prioritizing infrastructure that is less vulnerable and more resilient to a changing climate [23 USC 101, 23 USC 119, 23 USC 176, 23 USC 520];
- Future-proofing our transportation infrastructure by accommodating new and emerging technologies like electric vehicle charging stations, renewable energy generation, and broadband deployment in transportation rights-of-way [sec. 11401 of BIL, 23 CFR 645]; and
- Reconnecting communities and reflecting the inclusion of disadvantaged and under-represented groups in the planning, project selection, and design process [sec. 11509 of BIL].[33]

To maximize funding opportunities, the SEARIP was created considering national resiliency efforts. The U.S. Department of Transportation Federal Highway Administration (FHWA) hosted a webinar on August 3, 2023, discussing Resilience Improvement Plan (RIP) benefits. This webinar was attended to maintain consistency with FHWA and Statewide RIP requirements. These risk-based assessments of vulnerable transportation assets include Port operations, as Ports are critical infrastructure assets that are particularly vulnerable to impacts such as storm surge, tidal flooding, wind speed, and sea-level rise. This resiliency plan aims to approach surface transportation infrastructure improvements, as they relate to Port development, with consistency to the anticipated State of Florida RIP.

Table 7- Matrix of Compliance with Federal, Local, and State Actors

Compliance Matrix		
Federal	State	Local
Federal Highway Administration (FHWA)	FDOT Resiliency Action Plan (RAP)	City of Fernandina Beach Resiliency Plan, Halff Engineering
US DOT Maritime Administration (MARAD)	Florida Department of Environmental Protection (DEP)	OHPA Port of Fernandina Strategic Master Plan
	FDOT Policy Planning (OPP) and Seaport Offices	

Source: HNTB Staff, 2023

[33] Bipartisan Infrastructure Law - Building a Better America – Policy Framework | Federal Highway Administration (dot.gov)

INFRASTRUCTURE MITIGATION PLAN

The infrastructure mitigation plan identifies the Port of Fernandina's critical infrastructure and equipment needs that align with concerns outlined in OHPA 2023 Master Plan; the public engagement efforts and specific goals and objectives that concentrate on impacts to the port, port operator, tenants, and stakeholders. The identification and description of the Port's infrastructure and equipment needs, opportunities, and strategies justifies and prioritizes a comprehensive project and opportunities list. The list is centered around improvements that aim to create more resilient and impact-hardened infrastructure at the Port. A review of and research on past impacts at the Port, meetings with and input from Port staff, the Port operator, and top Port stakeholders allowed for the generation of this list. The OHPA 2023 Master Plan[34] and the 5-year Capital Improvement Plan (CIP) were reviewed to confirm alignment with the improvements outlined in the mitigation plan within the five-year planning horizon.

The improvements outlined are in accordance with criteria established by Federal and State funding programs dedicated to enhancing infrastructure and equipment in order to create a more resilient transportation system and Port terminal. These programs include, but are not limited to, the PROTECT Act, Florida formula funding, and competitive grant funding opportunities and support.

Like the OHPA Port of Fernandina 2023 Master Plan, this infrastructure mitigation plan began with identifying key stakeholders involved in the Port's operations, which include:

- Ocean and Highway Port Authority (OHPA)
- Savage, port terminal operator
- City of Fernandina Beach
- FDOT Office of Policy Planning (OPP)
- FDOT Seaports Office
- West Rock Paper Mill
- Genesee and Wyoming First Coast Railroad (FCRD)
- Federal Highway Administration (FHWA)
- National Oceanic and Atmospheric Administration (NOAA)

Throughout the engagement process for OHPA's 2023 Master Plan, vulnerability concerns related to storm surge, flooding, and sea level rise were identified as a key concern by the local community in a public open house at the Fernandina Beach City Hall. These vulnerability concerns directly align with the impacts and vulnerabilities analyzed in this document and serve as the core vulnerabilities used to propose resilient infrastructure projects outlined in this plan.

Goals and objectives from the OHPA Master Plan are outlined below, as they relate to this plan, resiliency, and infrastructure vulnerability. Highlighting these components of the OHPA Master Plan, this plan, aims to cover critical resilience response initiatives that comply with OHPA adopted objectives. Aligning projects with the OHPA Master Plan to mitigate the impact on affected resources, infrastructure, equipment, and commerce is essential. Furthermore, this alignment ensures that the Port is fulfilling its core planning objectives, which are interconnected with a range of funding and policy initiatives involving port advocates and transportation partners.

Goal #1: To ensure that Port and OHPA operations are conducted in the safest manner possible.

- Objective 1.2. Adopt a goal of zero accidents on the terminal.

[34] *OHPA Port of Fernandina 10-Year Strategic Master Plan Update, access online https://be6ca9d8-cd90-42c4-ae20-c74a5f62a93f.filesusr.com/ugd/e5fb15_9c8e4cf731634577a990e3b79477668e.pdf*

Safety enhancements are key components of infrastructure projects proposed in this section. This plan addresses vulnerabilities that include safety concerns at the Port, directly related to the hardening of equipment, mechanical elements, and operations and infrastructure aiming to reduce accidents on the terminal. Project addresses safety and security to improve operations or reduce impacts.

Goal #2: To restore the Port of Fernandina's cargo volume (as measured in short tons) to 2010-2011 level throughput within 5 years.

- Objective 2.1. Reach 600,000 tons of overall cargo by 2025.

Economic vulnerability is a key issue facing the Port of Fernandina. The ability for infrastructure to have the capacity to hold adequate cargo volumes is integral to the Port's operations. This plan proposes projects that help to mitigate economic vulnerabilities and increase resiliency, by providing enhancements to existing infrastructure and improving access to cargo. It also seeks to mitigate for loss of revenue and tonnage from out-of-service days on and around the terminal for port-related business, port users, and the operator to support the restoration of volume to previous peaks and beyond.

Goal #4: To improve the level of communication and cooperation between OHPA and the City of Fernandina Beach, including its businesses and residents.

- Objective 4.1. Meet regularly with City staff and elected officials.
- Objective 4.3. Look for opportunities to partner with the City of Fernandina Beach on initiatives that create a stronger economic base, improve resiliency, and enhance the quality of life in Fernandina Beach.

The creation of this plan required regular communication between the City of Fernandina Beach, OHPA, Savage, West Rock Paper Mill, G&W Railroad, FDOT, and other stakeholders. Meetings between stakeholders are documented in the Intergovernmental Coordination section of this plan.
During these stakeholder meetings, partnership initiatives were explored and projects that benefit the Port and its stakeholders were discussed. These initiatives aimed to create a stronger economic base, improve resiliency, and enhance the quality of life surrounding the Port. Similarly, the City of Fernandina Beach was consulted during the creation of its citywide vulnerabilities assessment. The goal of this partnership is to ensure consistency, share information and data, and ensure that future funding opportunities are maximized.

Goal #5: To take necessary steps to ensure the resilience of its port infrastructure and improve the sustainability of its facilities and operations.

- Objective 5.1. Conduct a resiliency and sustainability study for the terminal and surrounding areas.

This plan serves as fulfillment of this goal and objective by serving as a resiliency study for the terminal and its surrounding areas to ensure the resilience of the Port's infrastructure. Combined with the City of Fernandina Beach Plan provides the required documentation of impacts, vulnerability, and mitigation needs to apply for state and federal funds related to resiliency. Ultimately, funding to create final designs and cost estimates for infrastructure that provides a more resilient Port and waterfront.

Goal #8: To seek opportunities to leverage its activities and powers to assist the City of Fernandina Beach, Towns of Hilliard and Callahan, and Nassau County to achieve their quality-of-life and resiliency goals and objectives.

- Objective 8.1. Maintain regular communication with all local and regional governmental entities and offer OHPA assistance where appropriate.

The creation of this infrastructure mitigation plan actively sought opportunities to assist the City of Fernandina Beach in achieving its resiliency goals and objectives. Regular communication with local entities helped to provide key input in relation to these goals and objectives. The City of Fernandina, The West Rock Paper Mill, the FCRD, and OHPA were all stakeholders engaged in the creation of infrastructure projects addressing resiliency. These projects not only benefit the Port, but the City of Fernandina Beach as an entity, as these stakeholders rely on each other for day-to-day operations.

Goal #12) To support sustainable and resilient waterfront redevelopment and a working waterfront in the area along Front Street just south of the terminal.

- Objective 12.2. Support or pursue appropriate grant opportunities to improve the resiliency of the Fernandina waterfront and port infrastructure.

This plan aims to support resilient waterfront redevelopment on Front St. by pursuing grant opportunities to improve the resiliency of waterfront and port infrastructure (Objective 12.2). The projects outlined in this infrastructure mitigation plan directly support waterfront redevelopment at the Port, addressing resiliency and aligning with the requirements of state and federal funding programs.

Impacted Assets, Infrastructure, and Equipment

To determine if an area of the port, fixed infrastructure, or equipment was particularly vulnerable to an impact Table 8 was developed as a matrix that lists the vulnerabilities across the column headings and provides a list of infrastructure and equipment in rows top to bottom. Each item was cross-referenced to the locations from Figure 6 provided in the Impacts Assessment at the beginning of the Plan. The assessment was created based on the likely impacts from flooding, storm surge, or wind damage and based upon conversations with the Port director and the terminal operator.

Table 8 –Infrastructure and Equipment Vulnerability based on Location and Impacts Assessment

Building/Equipment Type	Location Port Map *(Figure 6)*	Qty in Service	Flooding from Rain or Rising Sea levels	Storm Surge Category 1-3	Storm Surge Category 3-5	Wind Damage 75-155 MPH
Probable Level of Impact on listed Infrastructure and Equipment (Low, Medium, High)						
Warehouse Storage	1, 2, 3	3	Low	Low	Med	Med-High
Truck Dock	4	1	Low	Low	Med	Med
General Storage Fabric Warehouses	5, 6	2	Med-High	Med-High	High	High
Clyde “Whirley” Crane	7	1	Low	Low	Med-High	Med-High
Transit Shed (Open Storage)	8, 9	2	Low-Med	Low	Med	Med-High
Marine Building	10	1	Med	Low-Med	Med-High	Med-High
1,200 LF Dock Marginal Wharf	11	1	Low	Med	Med-High	Low-Med
Stevedore Office	12	1	Med	Med	Med-High	Med-High
Liebherr Mobile Harbor Crane	13	1	Low	Low	Med	High
Equipment Parking and Shop	14, 15	1	Med	Med	Med-High	Med-High
Rail-Mounted Gantry Cranes	16, 17	2	Low	Low	High	Med-High

Mooring Dolphins	18	2	Low	Med	Med-High	Low-Med
Fort Clinch Tugboat	19	1	Low	Med-High	Med-High	Med-High
North Rail Gate	20	1	Med-High	High	High	Med-High
Equipment Parking & Storage	21	1	Med-High	High	High	High
Container and Cargo Storage	22	1	Med	Med-High	High	Med-High
Terminal Administrative Offices	23	1	Low	Low	Low	Med-High
General Storage	24	1	Low	Low-Med	Med	Med
Refer Wall	25	1	low	low	Low-Med	Low-Med
Forklift/Container Stacker	26	3	Low	Low	Low	Low-Med
Port Security Building	27	1	Low	Low	Med-High	Med-High
Frontend Bucket Loader	Mobile	1	Low	Low	Med-High	Low-Med
Lift Trucks (3000 to 52000 lbs.)	Mobile	30	Low	Low	Med-High	Low-Med
Yard Spotter/ Ottawa Tractor	Mobile	20	Low	Low	Med-High	Low-Med
Flatbed Trailer	Mobile	11	Low	Low	Med-High	Low-Med
Container Chassis	Mobile	6	Low	Low	Med-High	Low-Med
Paper Pusher	Mobile	4	Low	Low	Med-High	Med-High
Maintenance Service Truck	Mobile	4	Low	Low	Med-High	Med-High
Mobile Welding Machine	Mobile	1	Low	Low	Med-High	Med-High
Fuel Truck (3200 gallon)	Mobile	1	Low	Low	Med-High	Med-High
Man-Lift	Mobile	1	Low	Low	Med-High	Med-High
Rail Siding		1,600 ft	Low-Med	Med	High	Med-High
Main Port Gate	28	1	Low	Low	Med-High	Med-High
Truck Scale and House	29	2	Low	Low	Med-High	Med-High
West Gates (truck and rail)	30, 31, 32	3	Low	Low	Med-High	Med-High

Source: HNTB Staff and OHPA Staff 2023

Opportunities for Infrastructure Mitigation Improvements

A list of critical infrastructure and equipment needs based on the OHPA 2023 Master Plan, 5-year CIP, and key stakeholder proposals are identified below.

- Flood Protection Bulkhead
- Access Ramp Slope Repair
- Backland Storage and Intermodal Cargo Enhancement
- Warehouse Windstorm Improvements
- Enhanced Lighting for Security and Safety
- Drainage System Improvements
- Rail Access and Safety Improvements
- City Seawall Coordination Project

Funding and Programming

Opportunities to fund proposed projects at the Port of Fernandina can be achieved through applying for both Federal and State funding programs. These recommended funding programs include:

- Promoting Resilient Operations for Transformative, Efficient, and Cost-Saving Transportation (PROTECT) Act
- FEMA Port Security Grant Program (PSGP)
- FSTED (Florida Seaport Transportation Economic Development Council)
- Florida Seaport Security Fund (FPSF)
- Florida Department of Environmental Protection (FDEP) Resilient Florida Program

These programs and their relationship to infrastructure-related areas of opportunity for the Port of Fernandina are outlined in Table 9 below.

Table 9 - Opportunities for Infrastructure Mitigation Improvements and Funding Programs

Mitigation Improvements	Protect Act	PSGP	FSTED	FPSF	FDEP	Local*
*Note: *includes matching requirement on Federal or State programs or Public Private Partnerships (P3)*						
Flood Protection Bulkhead	x		x			x
Access Ramp Slope Repair	x		x			x
Backland Storage and Intermodal Cargo Enhancement	x		x			x
Warehouse Windstorm Improvements	x		x			x
Enhanced Lighting for Security and Safety		x		x		x
Drainage System Improvements	x					x
Rail Access and Safety Improvements	x					x
City Seawall Coordination Project	x				x	x

Source: HNTB Staff and OHPA Staff 2023

PLAN IMPLEMENTATION

Based on an evaluation of the impacts and vulnerabilities that the Port of Fernandina experiences, a detailed project list is provided below. This project list addresses impacted infrastructure and proposed mitigation solutions to Port vulnerabilities. Intergovernmental coordination, most notably with OHPA, was integral to the development of this list. This plan aims to align with the requirements of the State and Federal funding programs discussed in the previous section to maximize funding opportunities for Port projects.

1. North Port Flood Protection Bulkhead:

Figure 24 - North Port Flood Protection Bulkheads

Source: HNTB Staff and OHPA Staff 2023

Description:

The primary purpose of North Port Flood Protection and Bulkhead would consider, design, permit, and construct a sheet pile wall, a concrete cap bulkhead, and riprap for hardening the northeastern corner of the port's marginal wharf structure adjoining the existing north property boundary. This project will be designed to mitigate the impacts of high-water intrusion which affects operations, cargo transfer and storage, employee safety, and reliability. Drainage elements from projects No.06 and No.07 should be planned and incorporated or the three projects could be combined to better prepare the port for storm-surge and sea-level flooding impacts. Because there was no actual survey data provided for elevation when projects are selected for funding requests and implementation. It was determined from one visual site inspection that the property could potentially be improved to the south of the option 2 flood protection bulkhead to create additional cargo backlands storage as depicted in project No.03.

2. North Dock Access Ramp Slope Repair:

Figure 25 - North Dock Access Ramp Structural Repair and Drainage

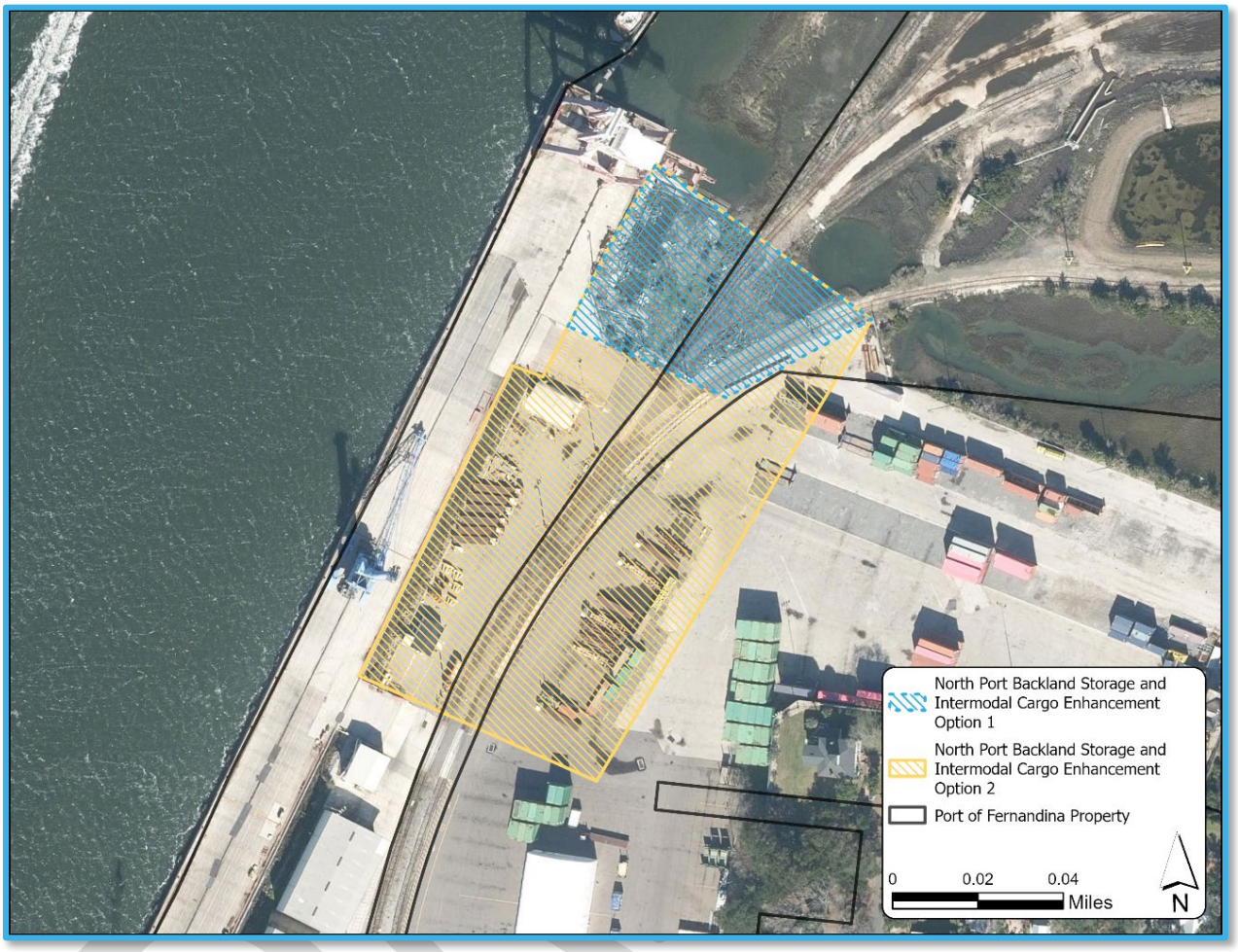
Source: HNTB Staff and OHPA Staff 2023

Description:

The OHPA's northern marginal wharf access ramp as illustrated in Figure 25 has experienced structural undermining which has caused it to sink several inches below the surround pavement. This ramp experiences impacts from flood waters during extreme high tides, stormwater events, storm surges, rain, and extreme tidal fluctuations. This project would repair the structural integrity of the access ramp. Repair scenarios may include combining other projects like project No.03 to improve the elevation of the ramp and surrounding backlands. The primary goal is to mitigate flooding impacts and repair current damage from settling or undermining ramp infrastructure again in the future. The project would improve freight trans-load operations by maintaining critical access points to the original wharf structure. Cost estimates would require structure evaluations to determine if replacing pilings, structural cross ties, or other types of subgrade superstructural repairs are needed.

3. North Port Backland Storage and Intermodal Cargo Enhancement:

Figure 26 - North Port Backland Storage and Intermodal Cargo Enhancement



Source: HNTB Staff and OHPA Staff 2023

Description:

Develop concept designs and construction plans to improve backland storage adjacent to the 1,200 LF marginal wharf and rail line bisecting Port property. This would provide scenarios, or a phased approach, determined by prior projects completed or the availability of funds. The enhancement would include improvements to a minimum of one (1) acre with the potential to improve approximately (4) acres. These improvements include raising the overall grade, drainage system, structural reinforcement, backfill and compaction, paving to mitigate flood and sea level rise, safety and efficiency improvements, and an increase in cargo storage and interchange for the port.

The westernmost extent of the options currently adjoins the marginal wharf, and one concept would elevate backland storage to the level of the marginal wharf which has not been impacted by flood waters. This would provide better access to the dock loading zones and provide additional resilient temporary storage, cargo transfer areas, and locations for track crossing. Rail spur improvements are proposed in project No:07 but if combined into one project would be raised to meet levels of new grade.

4. Warehouse Windstorm Improvements:

Figure 27 - Warehouse Windstorm and Hazard Mitigation Improvements

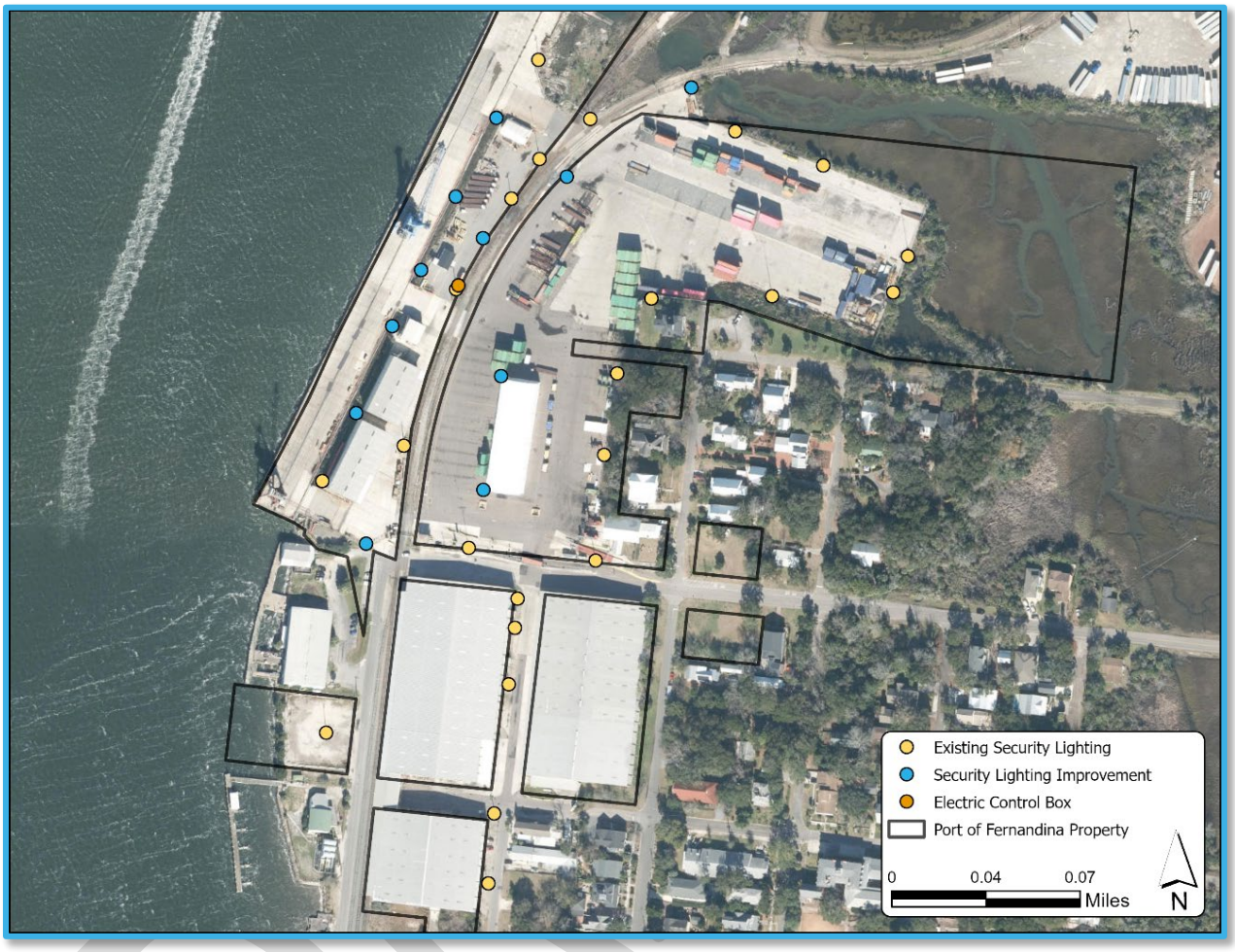
Source: HNTB Staff and OHPA Staff 2023

Description:

The warehouse windstorm hardening project would repair metal roofing and wall panels, improve corner securement, and install fasteners to enhance structures and siding for extreme weather and heavy wind impacts. Solar panels will also be installed. In addition, the OHPA and the port operator are considering additional covered storage on the northeast property boundary. All future additions or expansions of storage should be designed at the highest windstorm ratings possible to provide more resilient operations and be capable of withstanding extreme weather events. The connector loading dock that provides covered overhangs for truck and rail workers during storm events to provide the ability to load cargo in all-weather scenarios was damaged in a previous event and the port would like to provide funding for the hardening project to make all repairs while hardening all three facilities.

5. Port Enhanced Lighting for Security and Safety:

Figure 28 - Port Enhanced Lighting for Security and Safety



Source: HNTB Staff and OHPA Staff 2023

Description:

Repair, improve, and expand the Port's high mast lighting. This project will improve wiring and conduit, to include energy certified, LED lighting, a high mast for high lumens and disbursement, and high wind mitigation to improve safety and security. This project is eligible for FEMA – Port Security Grant Funding (PSGP) and Protect Act funding. The primary goal is to make certain that the safety of workforce is enhanced, by doing port-wide inspections of electrical control boxes to make sure they are out of or above current floodwater situations. By improving light to high efficiency LED can provide a more sustainable solution for the port and community while providing a safer working environment. Current locations were determined from a site visual inspection and from aerial imagery and would need a more detailed survey and lighting study performed to understand the full extent of repairs and improvements necessary for this mitigation project.

6. Drainage System Improvements:

Figure 29 - Improved Drainage and Water Management System

Source: HNTB Staff and OHPA Staff 2023

Description:

Improve drainage on the terminal and at the northern port terminus below the rail causeways. This project would study, plan, and design improved water flushing both in and out of the salt marsh and wetlands to the north and east of the port's property, enhance the port's flood protection, and improve existing drainage systems. The drainage plan would consider necessary maintenance, repair, improvement, and/or expansion of the current port water run-off and reclamation system. The primary purpose is to examine functionality and capacity during, major rainfall, extreme high tides, tropical cyclone weather, storms, and sea-level rise incidents to reduce and ultimately avoid sustained flooding scenarios ongoing and into the future. It was determined during this plan that the culverts under the FCRD from visual inspection greatly undersized for the flushing and water flow to and from the salt marshes and off the ports' existing pavement storage areas. It is also possible and even likely that water could be backflowing through the existing stormwater systems contributing to additional flooding in the north port areas.

7. Rail Access and Safety Improvements:

Figure 30 - Railroad Access and Safety Improvements

Source: HNTB Staff and OHPA Staff 2023

Description:
In coordination with the Genesee and Wyoming First Coast Rail Line (FCRD) and West Rock Paper Mill, this project will improve the rail line that bisects the port's terminal from the southern access point, through the port's terminal areas, including the northeastern mainline and the western spur tracks. FCRD and West Rock Paper Mill may have improvements for proper grade alignments for approach and departure on or near the port terminal areas. This project supports the safe movement of cargo to and through the port terminal and will contribute to reducing rail car derailments and more efficient and resilient freight flow. The goals would be to elevate the spur in its primary low areas through the port terminal, to meet and improve crossings and grade with other port-related resiliency projects, and to improve functions of causeway bridges in combination with culvert and drainage improvement project No.06. During stakeholder meetings the FCRD was supportive of this project and would be open to more detailed discussions for design, permitting and funding described improvements.

8. City of Fernandina Beach Seawall Coordination Project with OHPA:

Figure 31 - Fernandina Beach City and OHPA Seawall Coordination Project

Source: HNTB Staff and OHPA Staff 2023

Description:

Work with the City of Fernandina Beach to improve Fernandina Beach Seawall North and discover opportunities to have the project extended north to port property or the wharf to further improve the flood mitigation component of Fernandina Beach waterfront infrastructure.

The Florida State Senate released a "Water Projects List" in April 2023, outlining the 2023-2024 Fiscal Year Water Projects Bump List. The Fernandina Beach Historic Downtown Resiliency Seawall Construction Project is one of 95 projects on the list and was awarded $1,000,000.00 to protect the City's historic district. One goal would be to work with OHPA and other funding sources like the Protect Act and FSTED to complete the seawall through the port properties providing a seamless structure to resist flood waters, high tides, and other sea-level impacts from finding another point of intrusion.