

TAYLOR ENGINEERING, INC.

Lessons Learned for Using FDEP's Sea Level Rise Impact Projection (SLIP) Tool



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Overview

- When is a SLIP Study Required?
- Defining the Terms
- What is a SLIP Study?
- SLIP Website Overview
- Review of a SLIP Report
- Recent Website Enhancements



When is a SLIP Study Required?

- Before a **state-financed constructor** builds a **major structure** or **nonhabitable major structure** within the **Coastal Building Zone**
- SLIP studies to be published on DEP website before construction starts and DEP must maintain copies for 10 years after receipt



Definition: State Financed Constructor

- 161.551(d) "**State-financed constructor**" means a **public entity** that commissions or manages a construction project using funds appropriated from the state.
- 161.551(b) "**Public entity**" means the state or any of its political subdivisions, or any municipality, county, agency, special district, authority, or other public body corporate of the state which is demonstrated to perform a public function or to serve a governmental purpose that could properly be performed or served by an appropriate governmental unit.
- **Examples that would fall under "state financed constructors":**
 - Line item appropriations
 - Legislative projects
 - FDOT new construction
 - State Park facilities
 - Ports facilities
- **Examples that would not fall under "state financed constructors":**
 - Federal funds administered by the state
 - State Revolving Funds (SRF)

Definition: Coastal Structure

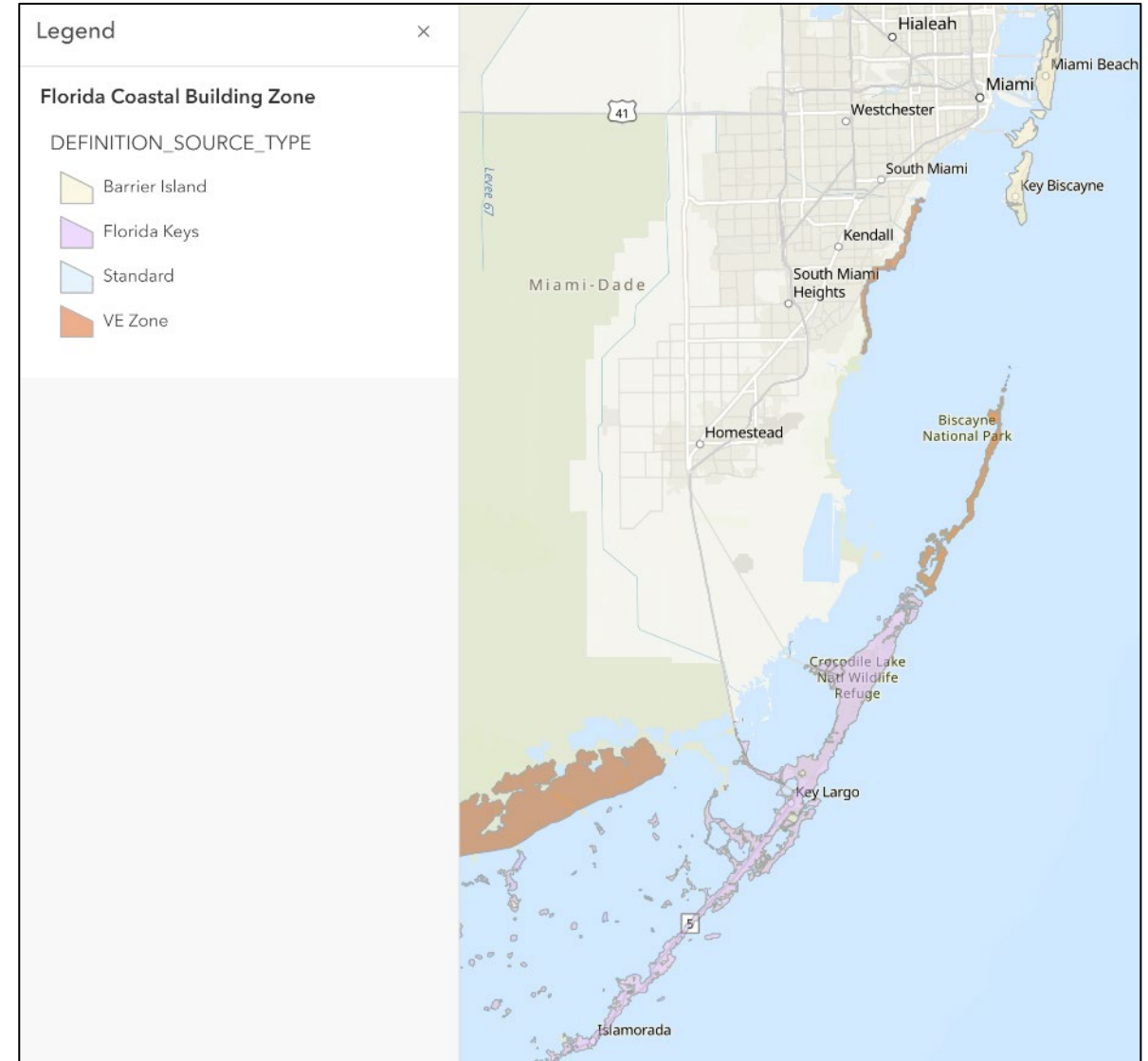
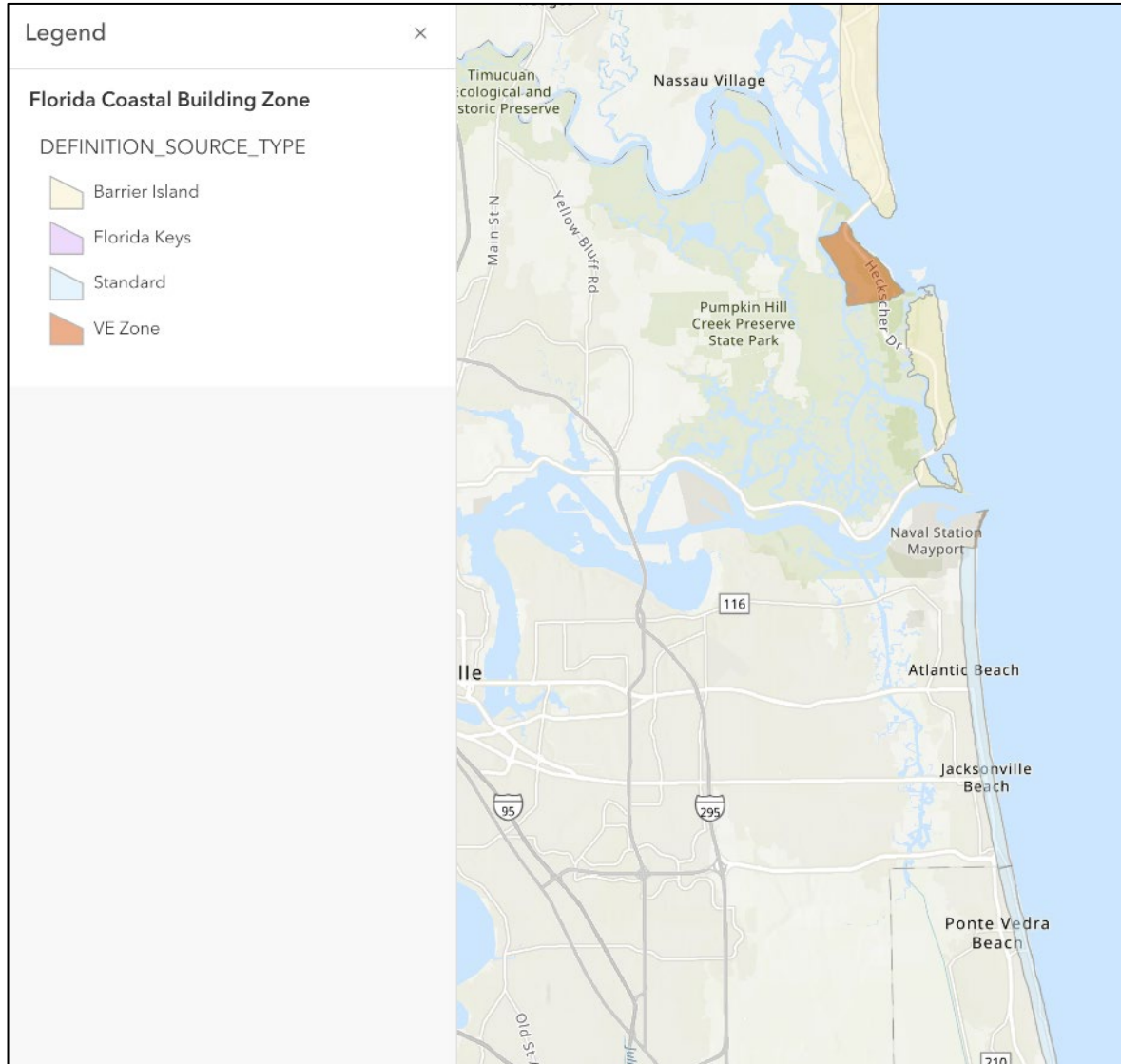
- 161.551(a) “Coastal structure” means a major structure or nonhabitable major structure within the coastal building zone.
- 161.54(6)(a) “Major structure” means houses, mobile homes, apartment buildings, condominiums, motels, hotels, restaurants, towers, other types of residential, commercial, or public buildings, and other construction having the potential for substantial impact on coastal zones.
- (c) “Nonhabitable major structure” means swimming pools; parking garages; pipelines; piers; canals, lakes, ditches, drainage structures, and other water retention structures; water and sewage treatment plants; electrical power plants, and all related structures or facilities, transmission lines, distribution lines, transformer pads, vaults, and substations; roads, bridges, streets, and highways; and underground storage tanks.

Definition: Not Defined as a Coastal Structure as per 161.551

- 161.54(6)(b) “**Minor structure**” means pile-supported, elevated dune and beach walkover structures; beach access ramps and walkways; stairways; pile-supported, elevated viewing platforms, gazebos, and boardwalks; lifeguard support stands; public and private bathhouses; sidewalks, driveways, parking areas, shuffleboard courts, tennis courts, handball courts, racquetball courts, and other uncovered paved areas; earth retaining walls; and sand fences, privacy fences, ornamental walls, ornamental garden structures, aviaries, and other ornamental construction. It shall be a characteristic of minor structures that they are considered to be expendable under design wind, wave, and storm forces.
- (d) “**Coastal or shore protection structure**” means shore-hardening structures, such as seawalls, bulkheads, revetments, rubble mound structures, groins, breakwaters, and aggregates of materials other than beach sand used for shoreline protection; beach and dune restoration; and other structures which are intended to prevent erosion or protect other structures from wave and hydrodynamic forces.

Definition: Coastal Building Zone

- Defined in previous statutes: 161.54(1) and 161.55(4)



Definition: Coastal Building Zone - Standard

- 161.54(1) “Coastal building zone” means the land area from the **seasonal high-water line landward to a line 1,500 feet landward from the coastal construction control line** as established pursuant to s. 161.053,

Coastline without a CCCL:

- ...and, for those coastal areas fronting on the Gulf of Mexico, Atlantic Ocean, Florida Bay, or Straits of Florida and not included under s. 161.053, the land area **seaward of the most landward velocity zone (V-zone) line** as established by the Federal Emergency Management Agency and shown on flood insurance rate maps.

Definition: Coastal Building Zone- Barrier Island

- 161.55(4) ... The coastal building zone on coastal barrier islands shall be the land area from the **seasonal high-water line to a line 5,000 feet landward from the coastal construction control line** established pursuant to s. 161.053, or the entire island, whichever is less....

Coastline without a CCCL:

- For coastal barrier islands on which a coastal construction control line has not been established pursuant to s. 161.053, the coastal building zone shall be the land area **seaward of the most landward velocity zone (V-zone) boundary line** fronting upon the Gulf of Mexico, Atlantic Ocean, Florida Bay, or Straits of Florida. ...
- **All land area in the Florida Keys located within Monroe County** shall be included in the coastal building zone.

Definition: Coastal Building Zone

- FDEP GIS Layer of CBZ can be viewed on SLIP Tool Map

The screenshot displays the SLIP Tool Map interface. On the left, a dark blue sidebar contains a 'Welcome' message and a list of 'Coastal Layers'. The 'Coastal Building Zone' layer is selected and highlighted in grey. The main map area shows a map of Florida with a thick black outline representing the Coastal Building Zone. Major cities and highways are labeled, and the Gulf of Mexico and Straits of Florida are also visible.

Use the tools below to view base map and coastal flooding spatial data.

Welcome

The purpose of the Sea Level Impact Projection (SLIP) Study Tool is to facilitate the conduction of SLIP studies for state-funded construction within the coastal building zone in accordance with Section 161.551, F.S.

Click on the layers to the left to show the data in the map.

Required SLIP Study Areas

- Coastal Building Zone

Coastal Layers

- Sea Level Rise
- NOAA Regional Scenarios
- Flood Zones
- High Tide Flooding
- Wind Zones
- Terrain
- Wildlife Index
- None / Clear Layers

What is a SLIP Study?

- Use a **systematic, interdisciplinary, and scientifically accepted approach** in the natural sciences and construction design in conducting the SLIP study
- Assess the **flooding, inundation, and wave action damage risks** relating to the coastal structure over its expected life or 50 years, whichever is less
- Provide **alternatives for the coastal structure's design and siting**, and how such alternatives would impact certain public safety and environmental risks as well as the risk and cost associated with maintaining, repairing, and constructing the coastal structure



Data Sources in SLIP Tool

- NOAA Sea Level Rise viewer
- NOAA Regional SLR Scenarios
- NOAA High Tide Flooding Estimates
- FEMA Storm Surge Flood Depths (1% annual chance to 10% annual chance)
- FEMA Special Flood Hazard Zones
- NFWF Wildlife Index
- FL Building Codes - Maximum Winds
- USACE Depth Damage Functions
- NOAA/EPA Adaptation Measures

The screenshot displays the Data.gov website interface. At the top, there is a search bar with the text "Search Data.Gov" and a magnifying glass icon. Below the search bar, the Data.gov logo is visible, along with navigation links for "DATA", "TOPICS", "RESOURCES", "STRATEGY", "DEVELOPERS", and "CONTACT". The main header area includes "DATA CATALOG" and "Organizations". A search bar on the left contains the text "sea level rise" and a magnifying glass icon. To the right of the search bar, there is a dropdown menu for "Order by:" set to "Relevance". Below the search bar, a message states "You are searching in the list of datasets. Show results in entire Data.gov site." The main content area displays "26,002 datasets found for 'sea level rise'". Three dataset entries are visible, each with a location filter icon: "Sea-Level Rise Viewer" (State), "Projected Sea Level Rise" (City), and "Sediment Data from the Continental Rise (ZIMMERMAN72 shapefile)" (Federal). Each entry includes a brief description and a list of available formats (HTML, ZIP, REST API).

FDEP's Goals for SLIP

- #1 – User-friendly
- Mapping tool for viewing by general public
 - Illustrates risks using credible data
 - Informative in nature
- SLIP Report Creation
 - Secure sign-in for public entities
 - Minimal inputs needed by user
 - Quick generation of SLIP Report





Sea Level Impact Projection Study Tool

Determining risk for Florida coastline construction projects

The purpose of the Sea Level Impact Projection (SLIP) Study Tool is to facilitate the conduction of SLIP studies for state-funded construction within the coastal building zone in accordance with Section 161.551, F.S.



SLIP Studies

Learn how to create a SLIP study report using this website and see published reports.

[Continue](#)



Section 161.551, F.S.

Learn more about the Florida statute that mandates SLIP studies.

[Continue](#)



Adaptation

Learn about adaptation strategies for your construction projects.

[Continue](#)

Public View: NOAA SLR Viewer

Florida Department of Environmental Protection

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SLIP Map

Use the tools below to view base map and coastal flooding spatial data.

Required SLIP Study Areas

Coastal Building Zone

Coastal Layers

- Sea Level Rise
- NOAA Regional Scenarios
- Flood Zones
- High Tide Flooding
- Wind Zones
- Terrain
- Wildlife Index
- None / Clear Layers

Sea Level Rise

Use the vertical slider to simulate water level rise, the resulting inundation footprint, and relative depth.

Water Depth

Low-lying inland areas prone to flood at selected sea level rise scenario

Water levels are relative to local Mean Higher High Water Datum. Areas that are hydrologically connected to the ocean are shown in shades of blue (darker blue = greater depth).

-10
-9
-8
-7
-6
-5
-4
-3
-2
-1
MHHW

Water Level (feet)

Search by Address

-86.34155 W, 30.31591 N

Leaflet | Powered by Esri | Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community, EDEP, FEMA, R...

Public View: Regional SLR Scenarios (localized)



Use the tools below to view base map and coastal flooding spatial data.

Required SLIP Study Areas

- Coastal Building Zone ⓘ

Coastal Layers

- Sea Level Rise ⓘ
- NOAA Regional Scenarios ⓘ**
- Flood Zones ⓘ
- High Tide Flooding ⓘ
- Wind Zones ⓘ
- Terrain ⓘ
- Wildlife Index ⓘ
- None / Clear Layers

NOAA Regional Scenarios

Click a location on the map to see the interpolated regional sea level rise for the selected scenario. Elevations are in NAVD88 (ft).

Intermediate High ▾

Trident Pier, FL
Daytona Beach, FL

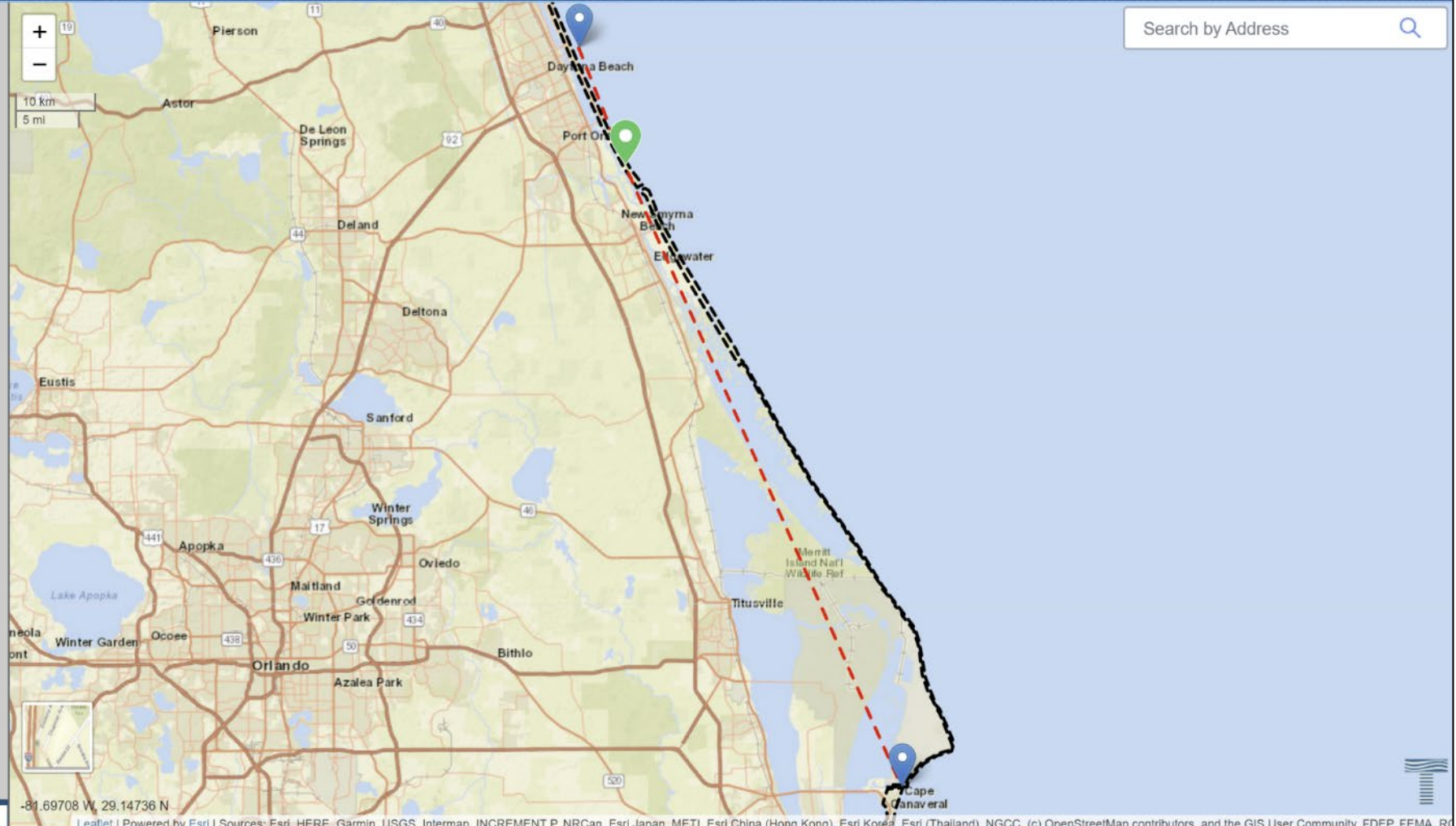
2100 : 5.13 ft

2080 : 3.23 ft

2060 : 1.71 ft

2040 : 0.59 ft

2020 : -0.23 ft



-81.69708 W, 29.14736 N

Public View: FEMA Flood Hazard Layer

Florida Department of Environmental Protection

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SLIP Map

Use the tools below to view base map and coastal flooding spatial data.

Required SLIP Study Areas

--- Coastal Building Zone ⓘ

Coastal Layers

Sea Level Rise ⓘ

NOAA Regional Scenarios ⓘ

Flood Zones ⓘ

High Tide Flooding ⓘ

Wind Zones ⓘ

Terrain ⓘ

Wildlife Index ⓘ

None / Clear Layers

FEMA Flood Hazards

- 1% Annual Chance Flood Hazard
- Regulatory Floodway
- Area of Undetermined Flood Hazard
- 0.2% Annual Chance Flood Hazard
- Future Conditions 1% Annual Chance Flood Hazard
- Area With Reduced Risk Due to Levee

Effective regulatory flood hazard information is available as Geographic Information Systems (GIS) data in the form of the National Flood Hazard Layer (NFHL). The NFHL provides users with the ability to determine the flood zone, base flood elevation and floodway status for a particular geographic location.

Map showing FEMA Flood Hazard Layer with various zones (AE, VE) and elevations (EL 4, EL 5, EL 6, EL 9, EL 10, EL 11, EL 12). Includes a search bar 'Search by Address' and a scale bar (300m, 1000ft).

80.89034 W, 28.97637 N

Leaflet | Powered by Esri | Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community, EDEP, FEMA, RC

Public View: NOAA High Tide Flooding

Florida Department of Environmental Protection

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SLIP Map

Use the tools below to view base map and coastal flooding spatial data.

Required SLIP Study Areas

--- Coastal Building Zone ⓘ

Coastal Layers

Sea Level Rise ⓘ

NOAA Regional Scenarios ⓘ

Flood Zones ⓘ

High Tide Flooding ⓘ

Wind Zones ⓘ

Terrain ⓘ

Wildlife Index ⓘ

None / Clear Layers

High Tide Flooding

● High Tide Flooding

Annual occurrences of tidal flooding—exceeding local thresholds for minor impacts to infrastructure—have increased 5- to 10-fold since the 1960s in several U.S. coastal cities. The changes in high tide flooding over time are greatest where elevation is lower, local RSL rise is higher, or extreme variability is less.

In a sense, today's flood will become tomorrow's high tide, as sea level rise will cause flooding to occur more frequently and last for longer durations of time.

The red layer in the map represents areas currently subject to tidal flooding, often called "recurrent or nuisance flooding."

-80.88970 W, 28.99106 N

Leaflet | Powered by Esri | Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community, FDEP, FEMA, F...

Public View: Terrain Elevation

The screenshot displays the Florida Department of Environmental Protection's SLIP Map interface. The top navigation bar includes the department logo, the name "Florida Department of Environmental Protection", and links for "Home", "Learn", "Contact", and "SLIP Map". A search bar labeled "Search by Address" is located in the top right corner.

On the left side, there is a sidebar with the following sections:

- Required SLIP Study Areas:** Coastal Building Zone (indicated by a dashed line icon).
- Coastal Layers:** Sea Level Rise, NOAA Regional Scenarios, Flood Zones, High Tide Flooding, Wind Zones, **Terrain** (highlighted in grey), and Wildlife Index.
- None / Clear Layers:** A button to clear the map layers.

The main map area shows a terrain elevation map of the Clearwater and Largo regions. A dashed line outlines the Coastal Building Zone. A tooltip titled "Terrain Elevation" is active over a point on the map, displaying "4.42 ft (NAVD88)". The map includes zoom controls (+, -) and a scale bar (1 km, 1 mi) in the top left. An inset map in the bottom left shows the current location within a larger regional context. The coordinates "-82.93957 W, 27.95650 N" are visible at the bottom of the map area.

Terrain

This dataset represents ground elevation.

Elevation (NAVD88)

0 100

Click on the map inside the Coastal Building Zone to identify the elevation.

The ground elevation is used to help determine flood risk to new and existing structures. Darker areas represent lower ground elevations which put structures at a higher risk of damage during storm events.

Terrain Elevation
4.42 ft (NAVD88)

Search by Address

Home Learn Contact SLIP Map

Use the tools below to view base map and coastal flooding spatial data.

Required SLIP Study Areas

Coastal Building Zone

Coastal Layers

Sea Level Rise

NOAA Regional Scenarios

Flood Zones

High Tide Flooding

Wind Zones

Terrain

Wildlife Index

None / Clear Layers

1 km 1 mi

-82.93957 W, 27.95650 N

Signed-in User: Account Functions



Account

[Profile](#)

[Projects](#)

[Reports](#)

[Notifications](#)

[Change Password](#)

[**Create New Account](#)

[**View Accounts](#)

Change Password

*Denotes required values

*Current Password

*New Password

*Confirm Password

[Save Changes](#)

Signed-in User: Add Project



Account

1

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[Notifications](#)

[Change Password](#)

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Projects

[Add Project...](#)

Show entries

Search:

Project	Organization	Construction Start Year	Expected Design Life
Bonsteel Park Viewing Platform	Taylor Engineering, Inc.	2021	40
Lifeguard Headquarters & Admin Bldg	Taylor Engineering, Inc.	2023	30
Mexico Beach FS	Taylor Engineering, Inc.	2025	50
Shired Creek	Taylor Engineering, Inc.	2025	75
Tarpon Center Drive Nature-Based Flood Mitigation Pilot	Taylor Engineering, Inc.	2024	25
Test Project	Taylor Engineering, Inc.	2022	20
Test Project 2	Taylor Engineering, Inc.	2023	40
Test Project 3	Taylor Engineering, Inc.	2050	30

Showing 1 to 8 of 8 entries

Previous

Next

2

Signed-in User: Add Project



Add Project

*Denotes required values

*Project Name:

Lifeguard Headquarters & Admin Bldg



*County:

Duval County



*Category:

Vertical (building)



*Risk category:

Risk Category II



Critical Elevation (ft NAVD88):

12



Construction Start Year:

2023



Expected Life (years):

30



Estimated Construction Cost (\$):

200000



Save Project

Signed-in User: Add Project



Add Project

*Denotes required values

*Project Name:

Lifeguard Headquarters & Admin Bldg

*County:

Duval County

*Project Name:

Lifeguard Headquarters & Admin Bldg

*County:

Duval County

*Category:

Vertical (building)

*Risk category:

Risk Category II

Critical Elevation (ft NAVD88):

12

Critical Elevation (ft NAVD88):

12

Construction Start Year:

2023

Construction Start Year:

2023

Expected Life (years):

30

Expected Life (years):

30

Estimated Construction Cost (\$):

200000

Estimated Construction Cost (\$):

200000

*Category:

Vertical (building)

*Risk category:

Risk Category I

Save Project

Signed-in User: Create SLIP Report

The screenshot displays the Florida Department of Environmental Protection's SLIP Map application. The interface includes a top navigation bar with links for Home, Learn, Contact, and SLIP Map. A search bar on the right allows users to search by address. The main map area shows a street grid with a dashed line indicating the Coastal Building Zone. A central dialog box titled "Create SLIP Study Report" provides instructions and requirements for creating a report.

Florida Department of Environmental Protection

Home Learn Contact SLIP Map

Use the tools below to view base map and coastal flooding spatial data.

SLIP Study Tool

Cancel Report

Required SLIP Study Areas

- Coastal Building Zone

Coastal Layers

- Sea Level Rise
- NOAA Regional Scenarios
- Flood Zones
- High Tide Flooding
- Wind Zones
- Terrain
- Wildlife Index
- None / Clear Layers

Create Report

You have activated the "Create Report" tool. In order to create a new SLIP Study report use the map pane to the right to zoom into your exact project location. Click on the desired project area on the map and the "Create Report" form will pop up. Enter the required information and click "Create Report".

If you would like to cancel the "Create Report" process, click "Cancel Report" on the left side of this page.

Create SLIP Study Report

You have activated the "Create SLIP Study Report" tool. To create a report, click on your project location in the map.

- The project's location is defined as the centroid of the project location or the location of the lowest known elevation in the project's area.
- The project location **MUST** be within the Coastal Building Zone.

OK

100 m 300 ft


3rd Ave N, 2nd Ave N, 1st Ave N, 3rd Ave S, 2nd Ave S, 1st Ave S, 4th Ave S, 5th Ave S, 6th St N, 5th St N, 4th St N, 3rd St N, 2nd St N, 1st St N, 6th St S, 5th St S, 4th St S, 3rd St S, 2nd St S, 1st St S, Lincoln Ct, Shelter, Saint Pauls School, A1A, 242, 91 39768 W, 30.28467 N

Signed-in User: Create SLIP Report

The screenshot displays the Florida Department of Environmental Protection's SLIP Map interface. At the top, the department's logo and name are visible on the left, and navigation links for Home, Learn, Contact, and SLIP Map are on the right. A search bar labeled "Search by Address" is located in the top right corner. The main content area is divided into three sections:

- Left Panel:** Contains a "SLIP Study Tool" section with a "Cancel Report" button. Below it is a "Required SLIP Study Areas" section with a radio button for "Coastal Building Zone". The "Coastal Layers" section lists various map layers: Sea Level Rise, NOAA Regional Scenarios, Flood Zones, High Tide Flooding, Wind Zones, Terrain, Wildlife Index, and a "None / Clear Layers" option.
- Center Panel:** Titled "Create Report", it provides instructions: "You have activated the 'Create Report' tool. In order to create a new SLIP Study report use the map pane to the right to zoom into your exact project location. Click on the desired project area on the map and the 'Create Report' form will pop up. Enter the required information and click 'Create Report'." It also includes a note: "If you would like to cancel the 'Create Report' process, click 'Cancel Report' on the left side of this page."
- Right Panel:** Shows an aerial satellite map of a coastal area with buildings and a beach. A dashed line indicates a project boundary. A pop-up dialog box titled "Create SLIP Study Report" is overlaid on the map, containing the text: "You have chosen to create a Sea Level Impact Projection (SLIP) Study Report for the location specified below. If you wish to continue, you will be directed to a new page to input important parameters to be considered for the report." The dialog box has two buttons: "Create Report" and "Close".

Signed-in User: Create SLIP Report

 Florida Department of Environmental Protection

Home Learn Contact [SLIP Map](#)

Create SLIP Study Report

*Denotes required values

*Project Name:

Lifeguard Headquarters & Admin Bldg

Bonsteel Park Viewing Platform

Test Project

Mexico Beach FS

Test Project 2

Tarpon Center Drive Nature-Based Flood Mitigation Pilot

Shired Creek

Test Project 3

Lifeguard Headquarters & Admin Bldg

*Construction type:

Risk Category II

*Critical Elevation (ft NAVD88):

12

*Construction Start Year:

2023

*Expected Life (years):

30

*Estimated Construction Cost (\$):

200000

Create Report Cancel

Signed-in User: Waiting for the SLIP Report

Please wait while we pull data for the report...



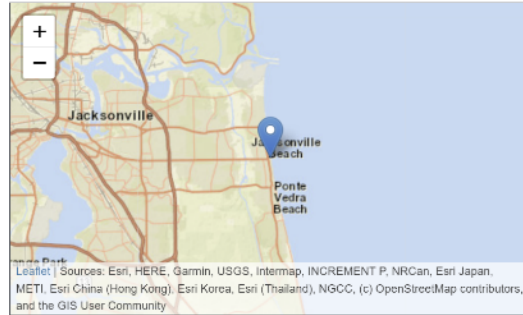
Getting stillwater information...

Signed-in User: SLIP Report

[Back to Map](#)
[Save Report](#)
[Export/Print](#)

Sea Level Impact Projection (SLIP) Study Report

Project name	Lifeguard Headquarters
County	Duval County
Coordinates	-81.38903 W, 30.28876 N
Project category	Vertical
Risk category	Risk Category II
Construction start year	2023
Expected life (years)	30
Estimated Construction Cost (\$)	\$200,000
Critical elevation (ft NAVD88)	12
Organization	Taylor Engineering, Inc.
Report Date	10/30/2022, 9:11:06 PM



Results

Average Annual Chance of Substantial Flood Damage: N/A*

Metric	Value
FEMA Flood Hazard Zone	X
Base Flood Elevation (ft)	Not Applicable
Terrain Elevation (ft NAVD88)	10.69
Int-High Sea Level Rise (year 2050) (ft NAVD88)	1.49
Wind Zone (mph)	120-130

Average Annual Chance of Substantial Flood Damage (AACSF) is calculated using NOAA sea level projections, FEMA coastal storm surge events, and associated wave heights. This flood risk probability does not include high-tide flooding, precipitation (stormwater), or riverine flooding.

* Average Annual Chance of Substantial Flood Damage (AACSF) value of N/A does not imply that the project is not at risk of flooding. N/A means that AACSF is unable to be automatically calculated due to missing data required by the SLIP Tool and needs further analysis. The metrics presented in the SLIP Report can be used to assess the project's flood risk, such as comparing the project's critical elevation to the Terrain, Base Flood Elevation, and NOAA Intermediate-High SLR scenario. This information can be found in the top two sections of this report.

Potential Beneficial Adaptation Strategies

Based on the results of the SLIP Study, the following adaptation strategies may be beneficial to consider in the construction design. These are not recommendations, merely standard strategies used to mitigate risk.



Build on Partially Elevated Areas

Sea level varies based on the rate of sea level rise relative to land elevation in a particular location. It amplifies near-term vulnerability to storm surge and increases long-term flood and inundation risks. Building on partially elevated areas can mitigate and reduce these risks.

Solution Timeline	Long Term
Scale	Micro
Adaptation Infrastructure	Hybrid
Degree of Protection	Medium
Relative Cost (\$, \$\$, \$\$\$)	\$\$



Check Valve / Non-Return Valves

A check valve or non-return valve can be installed in pipes that are vulnerable to backflow during various flood conditions. The valve will work by blocking the flow of water if it is entering in the wrong direction. This will help with flooding control, standing water control, and water quality issues. Different size and shape valves can be used, as needed.

Solution Timeline	Intermediate
Scale	Macro
Adaptation Infrastructure	Gray
Degree of Protection	Medium
Relative Cost (\$, \$\$, \$\$\$)	\$\$\$

Projects:

[R1928 - St. Augustine Stormwater Outfall Resiliency Retrofit](#)



Elevated Flood Wall / Flood Gate

A flood wall can be constructed to protect individual buildings or facilities against flooding. Flood walls can either be permanent or dismantlable depending on short or long-term goals. Sometimes flood gates are built in a flood wall to create space for roads. These gates are only closed during a flood event.

Solution Timeline	Long Term
Scale	Macro
Adaptation Infrastructure	Gray
Degree of Protection	High
Relative Cost (\$, \$\$, \$\$\$)	\$\$\$

Resources:

[FEMA - Floodwall with Passive Floodgates Signals Commitment](#)



Flood Barriers (Passive or Active)

Flood barriers are used around a building or its utility components to protect from flooding. Flood barriers can be categorized as either passive or active devices. Passive flood barriers operate automatically during a flood or storm event and do not require any human intervention or power source. An example of a passive flood barrier is a floodwall or levee. Active flood barriers require warnings in advance to deploy during a flood or storm event. This strategy is of limited value when flash floods are frequent. FEMA recommends passive flood barrier devices when planning and building.

Solution Timeline	Intermediate
Scale	Micro
Adaptation Infrastructure	Gray
Degree of Protection	Medium
Relative Cost (\$, \$\$, \$\$\$)	\$\$

Signed-in User: SLIP Report

Potential Public Safety and Environmental Impacts

Based on the results of the SLIP Study, consider the following potential public safety and environmental impacts:

Flood Risk

When factoring in the flood zone, base flood elevation, terrain, and sea level rise trends for the project location, a moderate flood risk is present.

Wind Risk

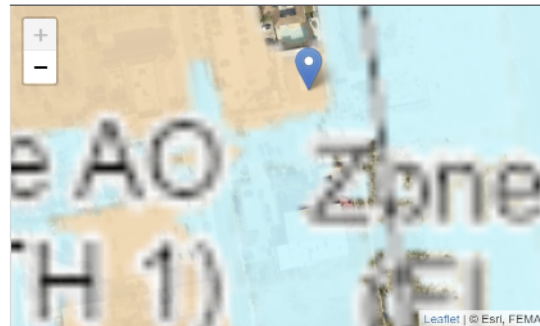
The project location was found to be located in an area of moderate wind risk with a maximum wind speed of 120-130 mph. There is potential risk from flying debris.

Explosion Risk

The high wind risk in this project location may contribute to a higher risk of explosion due to potential downed powerlines.

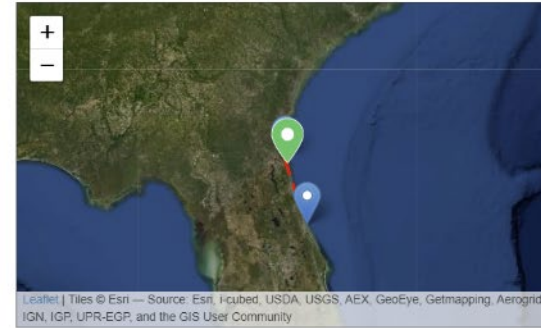
FEMA Flood Hazard Information

Flood Zone X
 Zone subtype 0.2 PCT ANNUAL CHANCE FLOOD HAZARD IN COASTAL ZONE
 Static BFE (ft) Not Applicable
 Vertical Datum



The base flood elevation (BFE) is provided in for VE, AE, and AH special flood hazard zones.

Regional Sea Level Rise Scenarios

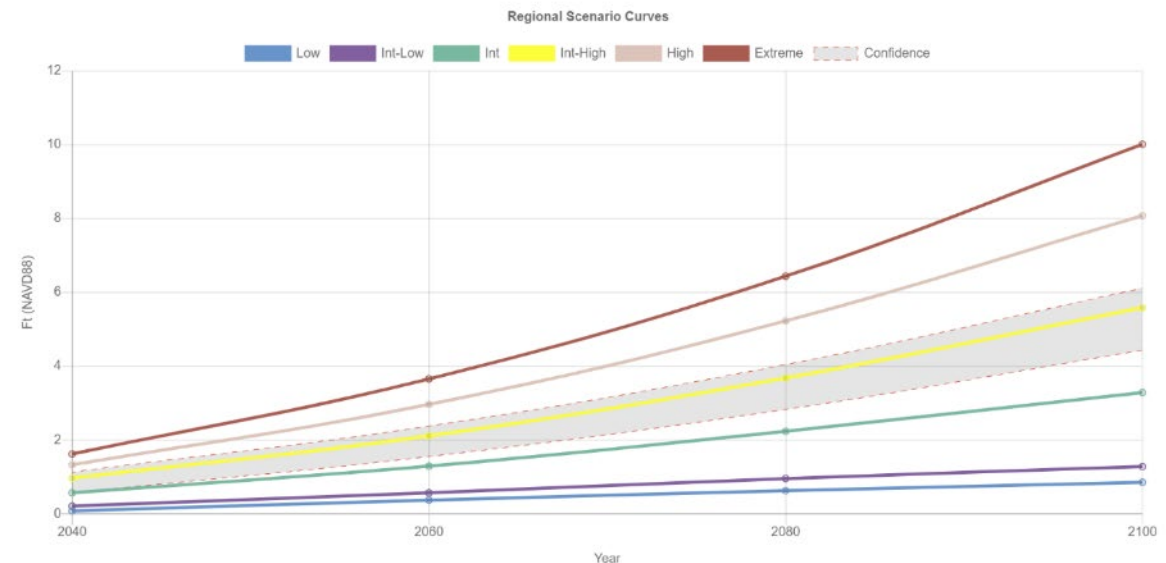


NOAA Regional Scenarios (ft NAVD88)

Scenario	2040	2060	2080	2100
Low	0.08	0.37	0.63	0.86
Intermediate Low	0.21	0.57	0.96	1.28
Intermediate	0.57	1.29	2.24	3.29
Intermediate High	0.97	2.12	3.68	5.59
High	1.33	2.97	5.23	8.08
Extreme	1.62	3.66	6.44	10.01

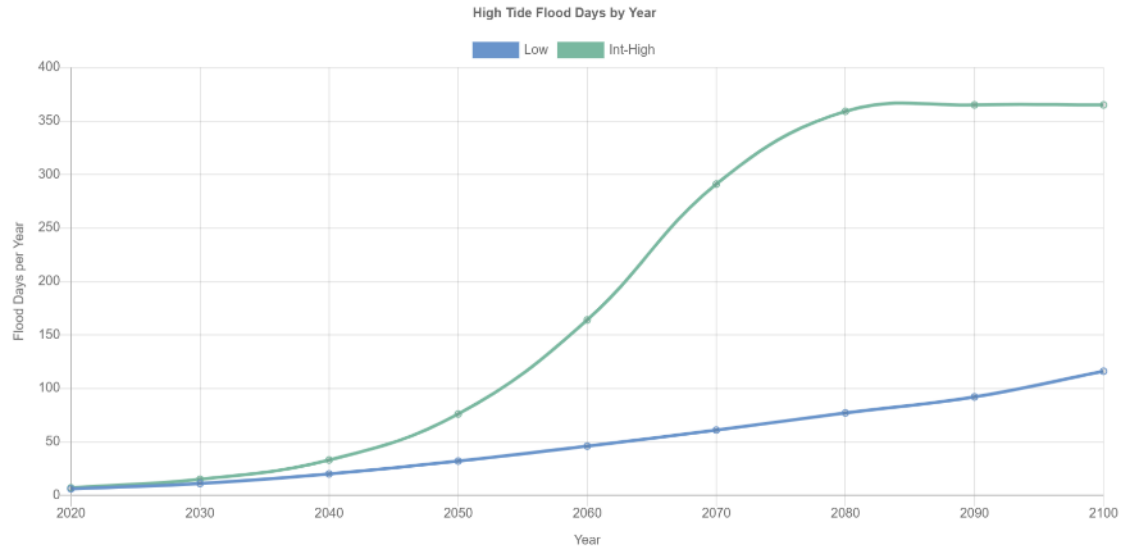
The five relative sea level rise (RSL) scenarios shown in this report are derived from NOAA Technical Report NOS CO-OPS 083 "Global and regional sea level rise scenarios for the United States" using the same methods as the USACE Sea Level Rise Calculator. These new scenarios were developed by the Sea Level Rise and Coastal Flood Hazard Scenarios and Tools Interagency Task Force, jointly convened by the U.S. Global Change Research Program (USGCRP) and the National Ocean Council as input to the USGCRP Sustained Assessment process and 4th National Climate Assessment. These RSL scenarios provide a revision to the (Parris et. al, 2012) global scenarios which were developed as input to the 3rd National Climate Assessment.

These RSL scenarios begin in year 2020 and take into account global mean sea level rise (GMSL), regional changes in ocean circulation, changes in Earth's gravity field due to ice melt redistribution, and local vertical land motion.



Signed-in User: SLIP Report

NOAA High Tide Flooding Information



High Tide Flood Days by Year

Year	Low	Int-High
2040	20	33
2070	61	291

Annual occurrences of tidal flooding—exceeding local thresholds for minor impacts to infrastructure—have increased 5- to 10-fold since the 1960s in several U.S. coastal cities. The changes in high tide flooding over time are greatest where elevation is lower, local RSL rise is higher, or extreme variability is less.

In a sense, today's flood will become tomorrow's high tide, as sea level rise will cause flooding to occur more frequently and last for longer durations of time.

Wind Zones

Metric	Value
Maximum Wind Speed	120-130mph



Terrain



Metric	Value
Elevation (ft)	10.69
Vertical Datum	NAVD 88

This terrain elevation is derived from the latest compilation of terrain data from NOAA. This dataset contains the best publicly available terrain data in a 3m resolution.

Design Alternatives

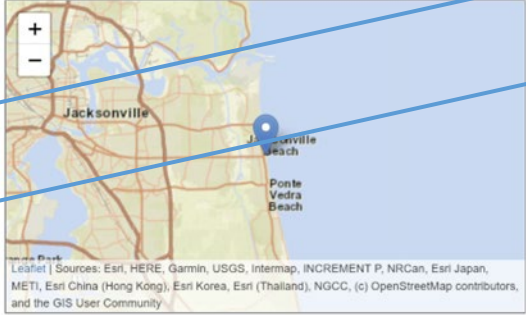
The selection of a construction project location involves a considerable number of factors, including but not limited to regulatory issues, engineering, and logical decisions. The SLIP Study Tool may be run multiple times with different project locations and critical elevations, to achieve a desired result. Please use the SLIP Map along with the Coastal Hazard layers to assist you in selecting the optimal location. Review this report and assess the risks which may be mitigated by changing the design parameters, then run the SLIP Study Tool again.

Potential Pitfalls

Back to Map Save Report Export/Print

Sea Level Impact Projection (SLIP) Study Report

Project name	Lifeguard Headquarters
County	Duval County
Coordinates	-81.38903 W, 30.28876 N
Project category	Vertical
Risk category	Risk Category II
Construction start year	2023
Expected life (years)	30
Estimated Construction Cost (\$)	\$200,000
Critical elevation (ft NAVD88)	12
Organization	Taylor Engineering, Inc.
Report Date	10/30/2022, 9:11:06 PM



Results

Average Annual Chance of Substantial Flood Damage: N/A*

Metric	Value
FEMA Flood Hazard Zone	X
Base Flood Elevation (ft)	Not Applicable
Terrain Elevation (ft NAVD88)	10.69
Int-High Sea Level Rise (year 2050) (ft NAVD88)	1.49
Wind Zone (mph)	120-130

Average Annual Chance of Substantial Flood Damage (AACSF) is calculated using NOAA sea level projections, FEMA coastal storm surge events, and associated wave heights. This flood risk probability does not include high-tide flooding, precipitation (stormwater), or riverine flooding.

* Average Annual Chance of Substantial Flood Damage (AACSF) value of N/A does not imply that the project is not at risk of flooding. N/A means that AACSF is unable to be automatically calculated due to missing data required by the SLIP Tool and needs further analysis. The metrics presented in the SLIP Report can be used to assess the project's flood risk, such as comparing the project's critical elevation to the Terrain, Base Flood Elevation, and NOAA Intermediate-High SLR scenario. This information can be found in the top two sections of this report.

Items to pay special attention to:

- Risk Category
- Critical Elevation
- FEMA Special Flood Hazard Zone
- Base Flood Elevation (BFE)

Do these pass the “sniff test?”

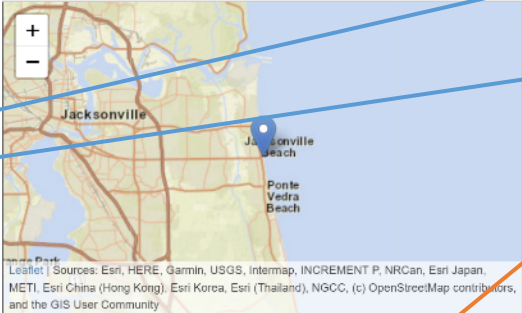
- A critical facility (Risk Cat IV) should not have a critical elevation BELOW BFE, and should not be located in a VE zone!

Potential Pitfalls

Back to Map Save Report Export/Print

Sea Level Impact Projection (SLIP) Study Report

Project name	Lifeguard Headquarters
County	Duval County
Coordinates	-81.38903 W, 30.28876 N
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Items to pay special attention to:

- Construction Start Year
- Expected Life
- Avg Annual Chance of Substantial Flood Damage (AACSF)

Does this make sense?

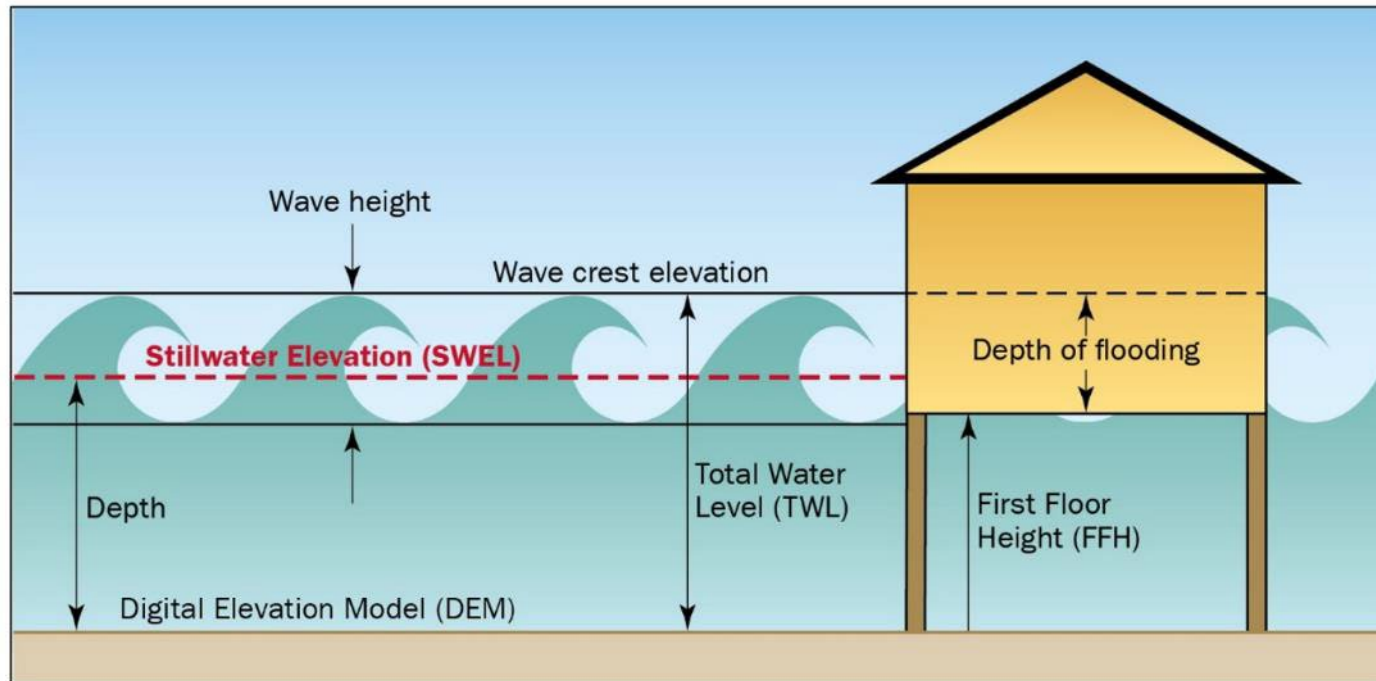
- Is the construction start year and the expected life reasonable?
- Does the AACSF seem appropriate?

Average Annual Chance of Substantial Flood Damage

- Substantial Flood Damage = damages of $\geq 25\%$ of market value of structure
- Only calculated for Vertical Construction (not for roads, parking lots, etc)
- Uses the following data in the calculation:
 - Critical elevation
 - Terrain elevation
 - FEMA data: Base Flood Elevation, storm surge flooding at 10% to 0.2% AEPs
 - Sea Level Rise (NOAA 2017 Intermediate-High) at Design Life

Average Annual Chance of Substantial Flood Damage

- Calculates Total Water Level = SLR + storm surge SWEL + wave height
- Compares TWL to critical elevation associated with substantial damage using Depth-Damage Function
- Interpolate AEP associated with depth of flood



FEMA depth of flooding diagram

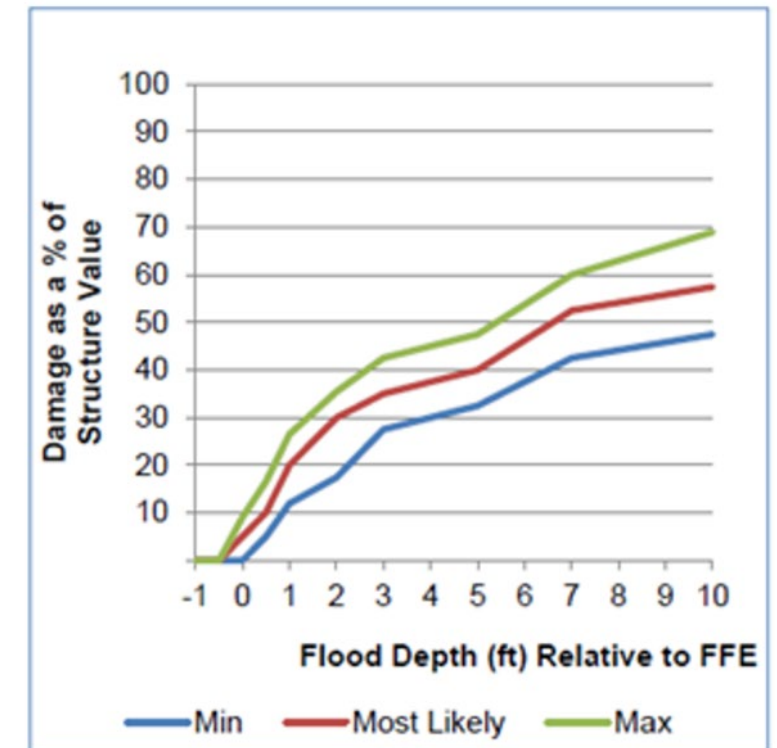


Figure 49. Prototype 2: Commercial Engineered, Inundation Damage – Structure

USACE depth-damage function (NACCS)

Recent Website Enhancements

- We heard you!
- Updates recently made to SLIP Tool
- Added a map to help users to view SLIP Study Reports

The screenshot displays the Florida Department of Environmental Protection website. At the top, there is a navigation bar with the department's logo, the name "Florida Department of Environmental Protection", and links for "Home", "Learn", "Contact", and "SLIP Map". Below the navigation bar, the page title is "Published SLIP Studies". A text block states: "Here is a list of currently published SLIP Study Reports:". Below this text are two buttons: "Map" (highlighted in blue) and "List". The main content area features a map of Florida with numerous green checkmark icons indicating the locations of published SLIP Study Reports. To the right of the map is a search and filter panel. It includes a note: "*Public users will only show Published reports. Sign in to see your organization's unpublished reports on the map." Below the note is a "Keyword search:" input field, a "County:" dropdown menu with the text "Select a county...", and two buttons: "Update" and "Reset Filter". At the bottom of the map area, there is a small inset map and a copyright notice: "Leaflet | Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community".

Recent Website Enhancements

- List of Published SLIP Studies is still available

Published SLIP Studies

Here is a list of currently published SLIP Study Reports:

[Map](#) [List](#)

Report	Project	Publish Date
View Report	Wakulla County Coastal Lift Stations Flood Mitigation - 2278 Surf Road Panacea FL LS#2	9/8/2022 10:00:48 AM
View Report	MacArthur Boulevard Resilience Project	9/2/2022 6:53:26 AM
View Report	Crystal Lakes Impoundment Breakwater and Living Shoreline Project	8/24/2022 5:24:18 AM
View Report	Bahia Honda Concession Area ADA Access	8/23/2022 5:21:08 AM
View Report	Big Carlos Pass Bridge Replacement	8/16/2022 9:44:57 AM
View Report	Mizell Johnson Seawall Improvements	6/17/2022 8:12:31 AM
View Report	William J Rish Park - ADA Improvements	5/27/2022 8:01:14 AM
View Report	St Joe Sand Placement	5/27/2022 8:01:02 AM
View Report	Mizell Johnson Wood Pedestrian Bridges	5/27/2022 8:00:45 AM
View Report	Mizell Johnson Restroom Replacements	5/27/2022 8:00:33 AM
View Report	Mizell Johnson Repair Pier	5/27/2022 8:00:23 AM
View Report	Honeymoon Island Septic to Sewer	5/27/2022 8:00:08 AM
View Report	George Crady Bridge Install Safety Railings	5/27/2022 7:59:56 AM

Recent Website Enhancements

- New map layer on the main page
- Can be filtered by County or keyword

The screenshot displays the Florida Department of Environmental Protection's SLIP Map website. The header includes the department's logo, name, and navigation links for Home, Learn, Contact, and SLIP Map. A search bar is positioned at the top right of the map area.

Left Panel:

- Required SLIP Study Areas:** Coastal Building Zone, SLIP Study Reports.
- Coastal Layers:** Sea Level Rise, NOAA Regional Scenarios, Flood Zones, High Tide Flooding, Wind Zones, Terrain, Wildlife Index, and a 'None / Clear Layers' button.

Center Panel:

- Welcome:** A text block explaining the purpose of the Sea Level Impact Projection (SLIP) Study Tool and providing instructions on how to use the layers.

Map: A map of Florida showing various coastal areas. Green checkmarks are placed on the map to indicate specific locations or data points.

Right Panel:

- SLIP Report Filter:** A section for filtering reports, including a 'Keyword search' field, a 'County' dropdown menu, and a 'Published' checkbox.
- Buttons:** 'Update' and 'Reset Filter' buttons.
- Disclaimer:** A note stating that public users will only see published reports and that signing in is required to view unpublished reports.

Recent Website Enhancements

- Signed-in users can view your org's unpublished SLIP reports
- Public can only view published reports

The screenshot displays the Florida Department of Environmental Protection's SLIP Map website. The header includes the department's logo, name, and navigation links for Home, Learn, and Contact, along with a SLIP Map button and a user profile icon. The main content area is divided into several sections:

- SLIP Study Tool:** A section with a "Create Report" button and instructions: "Use the tools below to view base map and coastal flooding spatial data."
- Required SLIP Study Areas:** A list of required areas including "Coastal Building Zone" and "SLIP Study Reports", each with an information icon.
- Coastal Layers:** A list of layers for the map, including "Sea Level Rise", "NOAA Regional Scenarios", "Flood Zones", "High Tide Flooding", "Wind Zones", "Terrain", "Wildlife Index", and "None / Clear Layers", each with an information icon.
- Welcome Message:** A central text block stating: "The purpose of the Sea Level Impact Projection (SLIP) Study Tool is to facilitate the conduction of SLIP studies for state-funded construction within the coastal building zone in accordance with Section 161.551, F.S." Below this, it says: "Click on the layers to the left to show the data in the map."
- Map:** A map of Florida showing various coastal areas. A search bar at the top right of the map area is labeled "Search by Address". The map includes a scale bar (100 km / 50 mi) and a coordinate display at the bottom: "-83.33130 W, 25.35395 N".
- SLIP Report Filter:** A section on the right side of the map area with the following elements:
 - Instructions: "Select options below to filter SLIP Reports shown on the map."
 - SLIP Report Filter section with a "Keyword search:" input field.
 - County selection: "County:" with a dropdown menu labeled "Select a county..."
 - Filter checkboxes: "Published" (checked), "Submitted" (checked), and "Not Submitted" (checked).
 - Buttons: "Update" and "Reset Filter".
 - Footnote: "*Public users will only see Published reports. Sign in to see your organization's unpublished reports."

Recent Website Enhancements

- Select a report icon for a snapshot overview

Florida Department of Environmental Protection

Home Learn Contact SLIP Map

Use the tools below to view base map and coastal flooding spatial data.

Welcome

The purpose of the Sea Level Impact Projection (SLIP) Study Tool is to facilitate the conduction of SLIP studies for state-funded construction within the coastal building zone in accordance with Section 161.551, F.S.

Click on the layers to the left to show the data in the map.

SLIP Study Tool

Create Report

Required SLIP Study Areas

- Coastal Building Zone
- SLIP Study Reports

Coastal Layers

- Sea Level Rise
- NOAA Regional Scenarios
- Flood Zones
- High Tide Flooding
- Wind Zones
- Terrain
- Wildlife Index
- None / Clear Layers

Fort Pierce Inlet State Park, Restroom Replacement Project #61384C

Report Date: 5/24/2022 9:16:13 AM
Organization: Florida DEP
Status: Published
Hyperlink: [View Report](#)

Project:
Construction Start Year: 2022
Expected Design Life: 20 years
Construction Category: Vertical
Risk Type: Risk Category II
Estimated Construction Cost: \$550000
Critical Elevation (ft NAVD88): 11.75
Project Page: [View Project](#)

Results:
Average Annual Chance of Substantial Flood Damage: N/A

SLIP Report Filter

Select options below to filter SLIP Reports shown on the map.

Keyword search:

County: Select a county...

Published
 Submitted
 Not Submitted

Update Reset Filter

*Public users will only see Published reports. Sign in to see your organization's unpublished reports.

Recent Website Enhancements

- Added a reCAPTCHA to reduce email spam received by FDEP

Florida Department of Environmental Protection

Home Learn Contact SLIP Map

Contact Us

*Denotes required values

*Select the nature of your message to help us direct it properly

Select a reason

*Name

Organization Name

*Email address

*Message

I'm not a robot

reCAPTCHA
Privacy - Terms

Send Message

Summary

- FDEP's Sea Level Impact Projection Tool simplifies mandatory reports
 - Minimal inputs required
 - Quick and easy to perform SLIP study
 - Provides overview of risks and coastal flooding hazards
 - Shows adaptation options
 - Published SLIP reports available to the public
- SLIP Tool has room for growth
 - Legislation may change the SLIP requirements
 - More refined analysis may be requested
 - Integrate with Florida Statewide Vulnerability Assessment



THANK YOU

Questions?



Angela Schedel, aschedel@taylorengineering.com, 904-731-7040

Public View: Adaptation Matrix

CATEGORY	HORIZONTAL (Construction other than a Building)						VERTICAL (Building)				This columns overrides all others	To address the added wave hazard, more stringent building practices are required in Zone VE, such as elevating a home on pilings so that waves can pass beneath it, or a prohibition to building on fill, which can be easily washed away by waves. https://www.fema.gov/flood-maps/coastal/insurance-rate-maps
SUB-CATEGORY	Road (Evacuation Route)	Road (Non-Evacuation)	Parking Lot	Bridge	Utilities (Below Grade)	Utilities (Elevated)	I	II	III	IV		
DESCRIPTOR							Low Hazard to Human Life in the Event of Failure	Structures not in Categories I, III, or IV	Substantial Hazard to Human Life in the Event of Failure	Essential Facilities	Location: if on the open coast (within the VE zone)	
Build on Partially Elevated Areas	X	X	X	X	X			X	X	X	Not an option	
Check Valve / Non-Return Valves					X			X	X	X		
Elevated Flood Wall / Flood Gate	X							X	X	X		
Flood Barriers (Passive or Active)	X						X	X	X	X		
Flood Damage-Resistant Materials	X	X	X	X	X		X	X	X	X		
Living Shoreline											X	
Raising Land	X		X	X		X		X	X	X	Not an option	
Reduced Paved Surfaces			X					X	X	X		
Utility Elevation					X			X	X	X		
Foundation Flood Vents							X	X				
Elevate Finished First Floor								X	X	X		
Relocate Structure											X	
Dune Restoration / Beach Nourishment											X	
Wetland Restoration / Retention Pond	X								X	X		
Floodable Park / Water Square		X	X					X	X			
Increase Plantings	X		X				X	X	X	X	X	