TAYLOR ENGINEERING, INC.

Industry SLIP Study Roundtable

Angela Schedel, Ph.D., P.E.

November 10, 2020

Objectives

- Inform attendees about Section 161.551, Florida Statutes and define the terms used in the new law.
- Discuss the needed elements of a Sea Level Impact Projection (SLIP) Study.
- Identify website mapping tools which provide user interaction with relevant data for SLIP Study.
- Analyze factors for consideration when choosing which data to present in SLIP Study.
- Illustrate the mock-up web application mapping tool which is under development to assist with performing SLIP studies.
- Seek input and feedback from attendees on mock-up web application.

SLIP Study Team

DEP

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Agenda

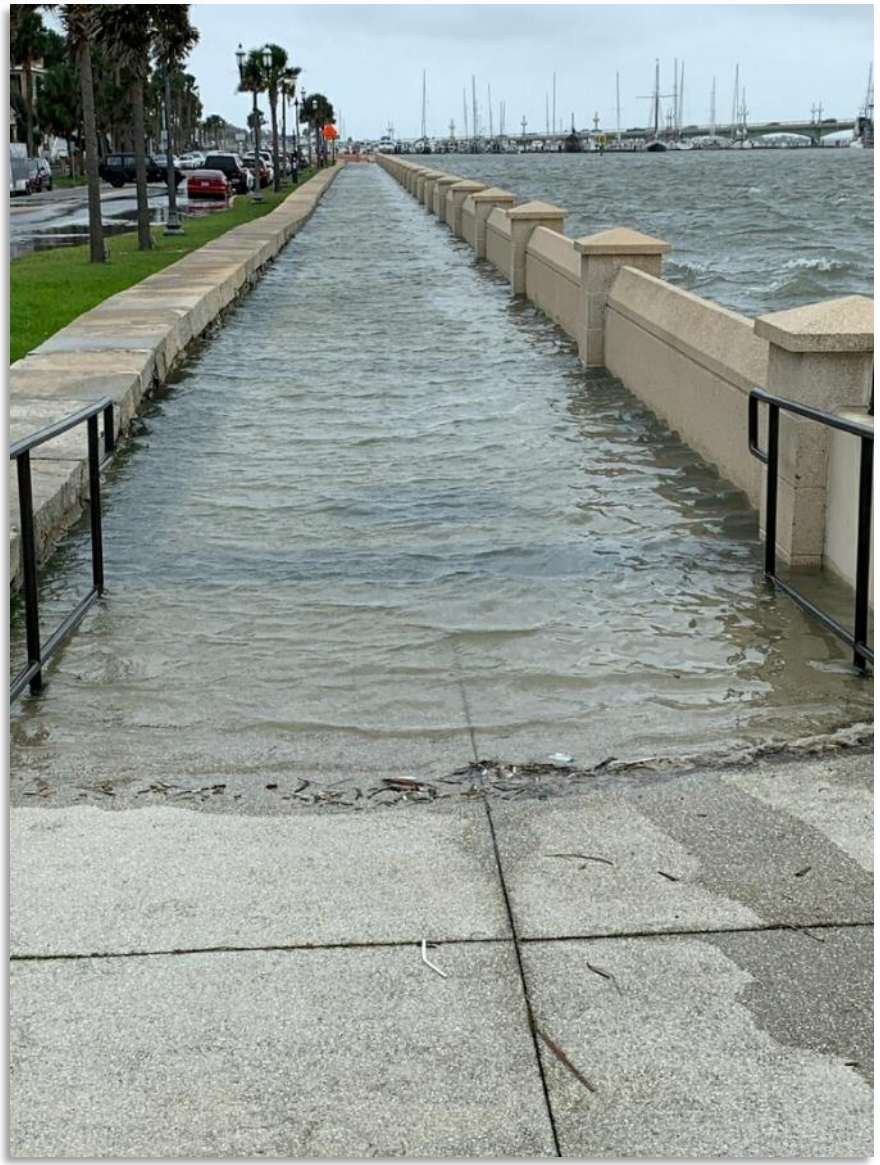
2:00 p.m.	Welcome, Introductions, and Roundtable Objectives
2:10 p.m.	s. 161.551, F.S. Summary and Definition of SLIP Study Terms
2:20 p.m.	Group Discussion – s. 161.551, F.S. Requirements & Terms
2:30 p.m.	Overview of Existing Website Mapping Tools
2:50 p.m.	Demonstration of Mock-up Web Application
3:05 p.m.	Group Discussion – SLIP Study Web Application Components
3:20 p.m.	Summary of Workshop Outcomes
3:30 p.m.	Wrap-Up and Adjourn

Section 161.551, Florida Statutes Overview

- SB178 introduced by Senator Rodriguez, co-sponsored by Senator Berman
- Signed by Governor DeSantis on June 29, 2020
- Effective July 1, 2021 as Section 161.551, Florida Statutes
- Applies to state-financed construction in the Coastal Building Zone
- Requires DEP to develop a standard for a sea level impact projection (SLIP) study

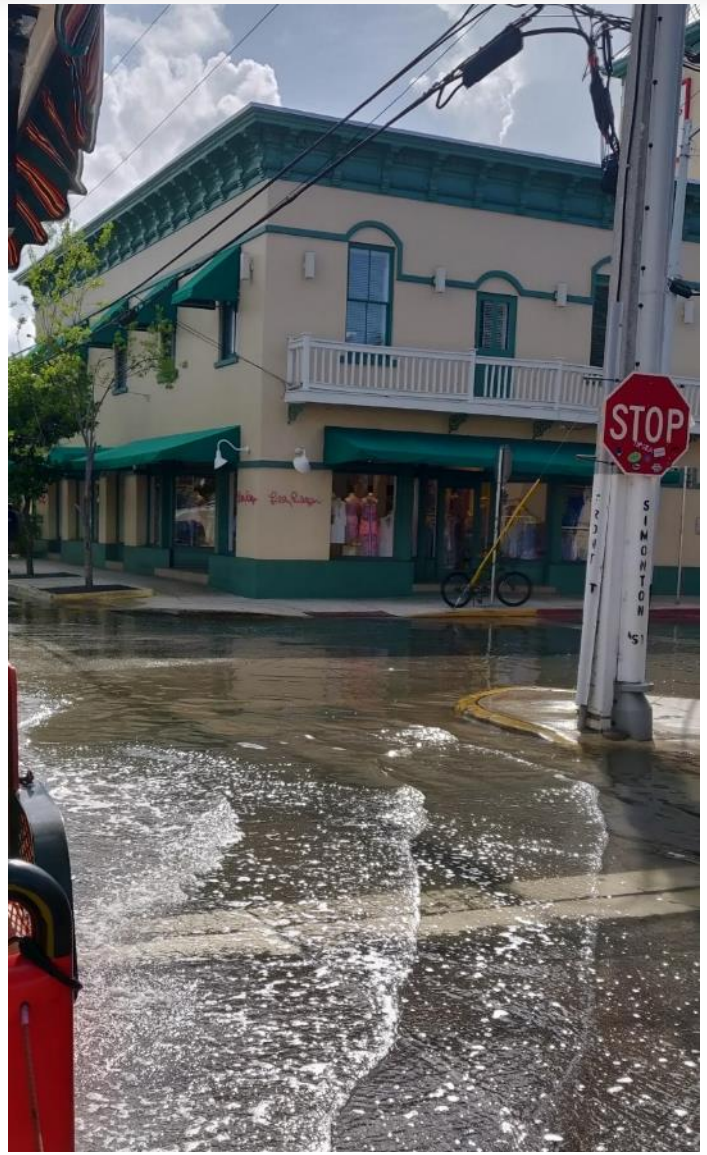
SLIP Study Overview (161.551, F.S.)

- Assess **flooding, inundation, and wave action damage risks**
  - Calculate average annual chance of substantial flood damage for a coastal structure
  - Over its expected life or 50 years, whichever is less
  - Use a systematic, interdisciplinary, and scientifically accepted approach
  - Consider potential relative local sea level rise and increased storm risk
  - Account for the contribution of sea level rise versus land subsidence



SLIP Study Overview (161.551, F.S.)

- Provide **alternatives for the coastal structure's design and siting**
  - Describe how such alternatives would impact certain public safety and environmental risks
  - Assess the risk and cost associated with maintaining, repairing, and constructing the coastal structure
  - Provide methods used to mitigate, adapt to, or reduce the risk to the coastal structure
  - Use and consider available scientific research and generally accepted industry practices



SLIP Study Overview (161.551, F.S.)

- Analyze **potential public safety and environmental impacts** resulting from damage to the coastal structure, including leakage of pollutants, electrocution and explosion hazards, and hazards resulting from floating or flying structural debris
- SLIP Studies to be publicly available for 10 years

Section 161.551, Florida Statutes Terms

- **"Coastal structure"** – a major structure or nonhabitable major structure within the coastal building zone (s. 161.551 (1)(a), F.S.)
- **"Public entity"** – the state or any of its political subdivisions, or any municipality, county, agency, special district, authority, or other public body corporate of the state that 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 (s. 161.551 (1)(b), F.S.)
- **"State-financed constructor"** – a public entity that commissions or manages a construction project using funds appropriated from the state (s. 161.551 (1)(d), F. S.)
- **"Substantial flood damage"** – flood, inundation, or wave action damage resulting from a single event, such as a flood or tropical weather system, where such damage exceeds 25 percent of the market value of the coastal structure at the time of the event (s. 161.551 (1)(e), F.S.)

Section 161.551, Florida Statutes Terms

"Structure" is the composite result of putting together or building related components in an ordered scheme. Enumeration of types of structures in this rule subsection shall not be construed as excluding from the application of this rule chapter any other structure which by usage, design, dimensions, or structural configuration meets the general definition herein provided and requires engineering considerations similar to the following:

(a) "Rigid Coastal Structures" are characterized by their solid or highly impermeable design or construction. Typically included within this category are groins, breakwaters, mound structures, jetties, weirs, seawalls, bulkheads, and revetments.
(b) "Minor Structures" are designed to be expendable, and to minimize resistance to forces associated with high frequency storms and to break away when subjected to such forces, and which are of such size or design as to have a minor impact on the beach and dune system.

(c) **"Major Structures"** which, as a result of design, location, or size could cause an adverse impact to the beach and dune system. Major structures include:

1. **"Nonhabitable Major Structures"** which are designed primarily for uses other than human occupancy. Typically included within this category are roads, bridges, storm water outfalls, bathhouses, cabanas, swimming pools, and garages.
2. **"Habitable Major Structures"** which are designed primarily for human occupancy and are potential locations for shelter from storms. Typically included within this category are residences, hotels, and restaurants.

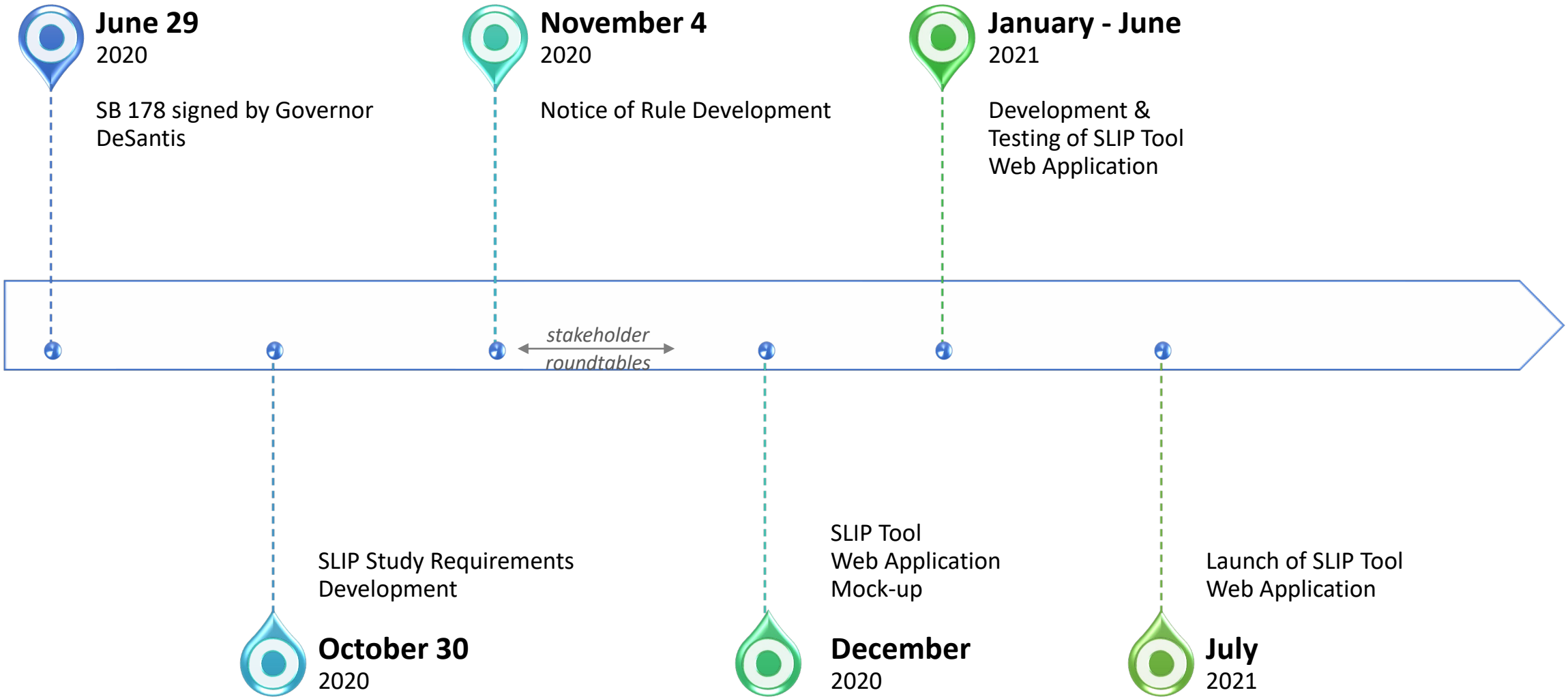
62B-33.002(55), F.A.C.

Section 161.551, Florida Statutes Terms

- **"Coastal Building Zone"** - 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, 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 (s. 161.54 (1), F.S.)

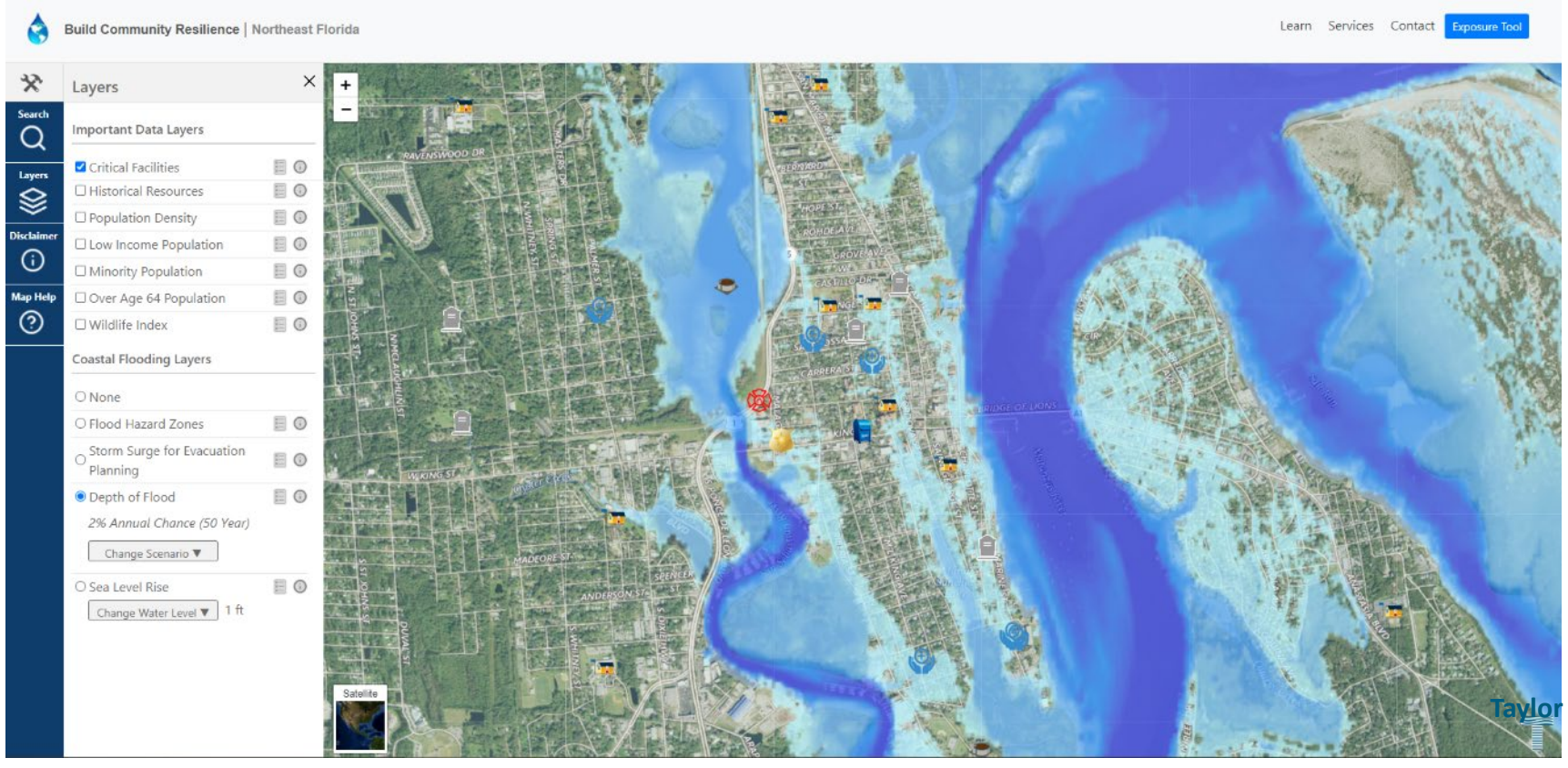
- **"Coastal Building Zone"** on coastal barrier islands shall be the land area from the seasonal high-water line to a line 5,000 feet landward from the coastal construction control line established pursuant to s. 161.053, or the entire island, whichever is less. All land area in the Florida Keys located within Monroe County shall be included in the coastal building zone. The coastal building zone on any coastal barrier island between Sebastian Inlet and Fort Pierce Inlet may be reduced in size upon approval of the Land and Water Adjudicatory Commission, if it determines that the local government with jurisdiction has provided adequate protection for the barrier island. In no case, however, shall the coastal building zone be reduced to an area less than a line 2,500 feet landward of the coastal construction control line. The Land and Water Adjudicatory Commission shall withdraw its approval for a reduced coastal building zone if it determines that 6 months after a local government comprehensive plan is due for submission to the state land planning agency pursuant to s. 163.3167 the local government with jurisdiction has not adopted a coastal management element which is in compliance with s. 163.3178. (s. 161.55(4), F.S.)

SLIP Tool Timeline



Ideas for SLIP Study Implementation

- SLIP Study is **unique and novel**
- Leverage publicly **available scientific research and data**
- **Standardization** of SLIP Study data used and reports
- **No financial burden** for the state-financed contractor

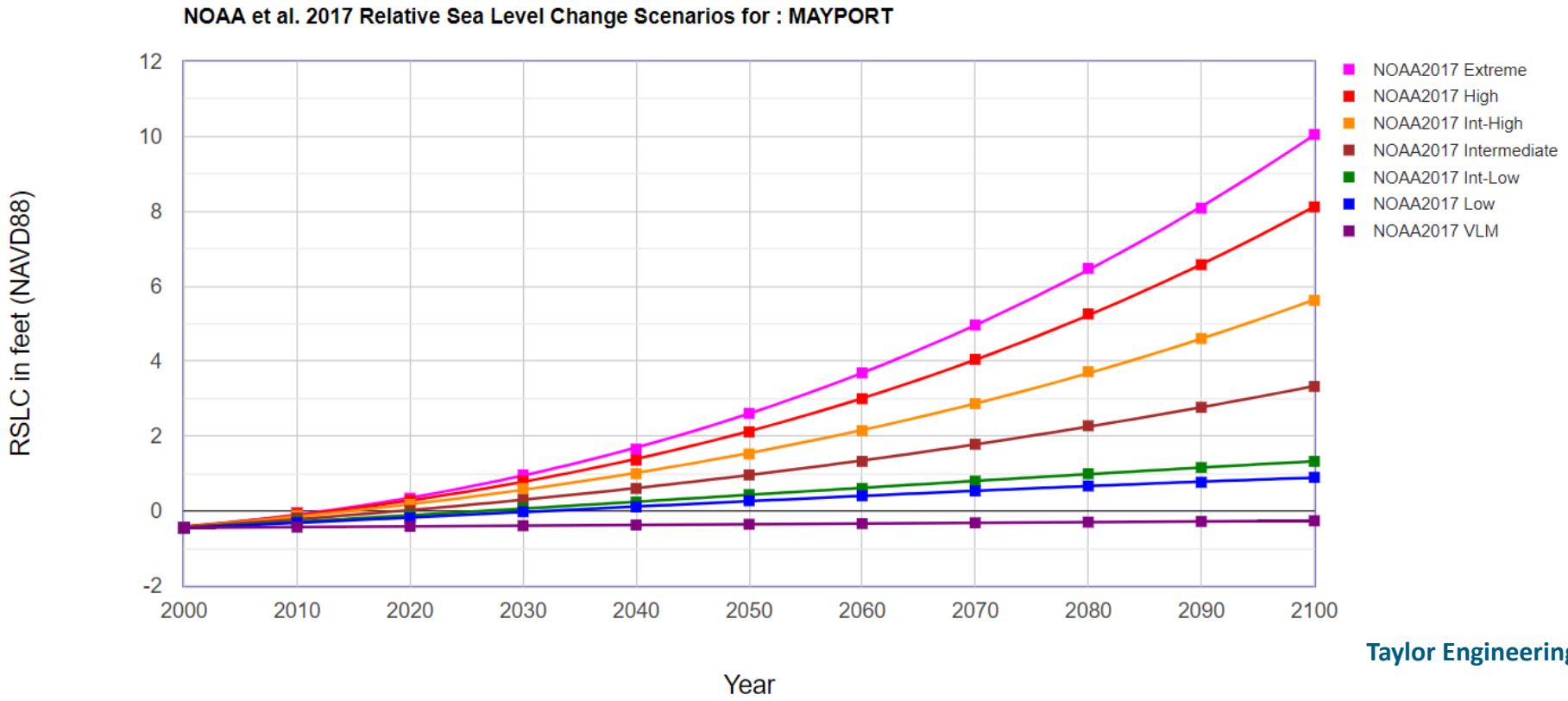


Proposed SLIP Mapping Tool

- #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 constructors
  - Inputs needed for SLIP Report
    - Project Name
    - Choose location on map
    - Construction Year
    - Design Life
    - Critical Elevation of Structure (FFE or other)
    - Estimated Construction Cost

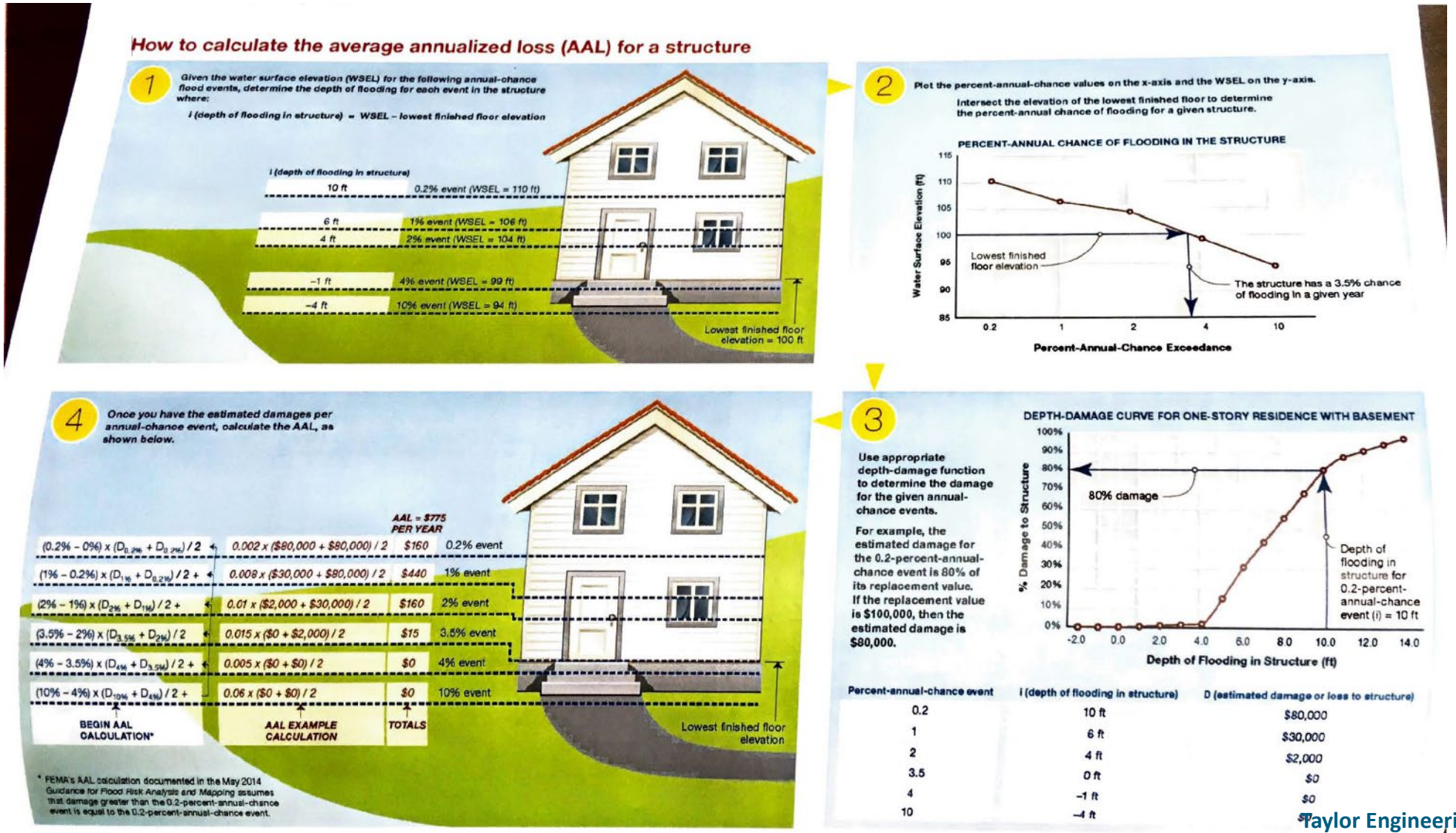
Proposed SLIP Tool Functions and Data Sources

- NOAA Regional SLR Scenarios
- FEMA Storm Surge Flood Depths (1% annual chance to 10% annual chance)
- FEMA Special Flood Hazard Zones
- FL Building Codes - Maximum Winds



Proposed SLIP Tool Functions

- USACE Depth-Damage Curves & FEMA Average Annualized Loss Equation



Proposed SLIP Tool Functions

“Encyclopedia” of Adaptation Options

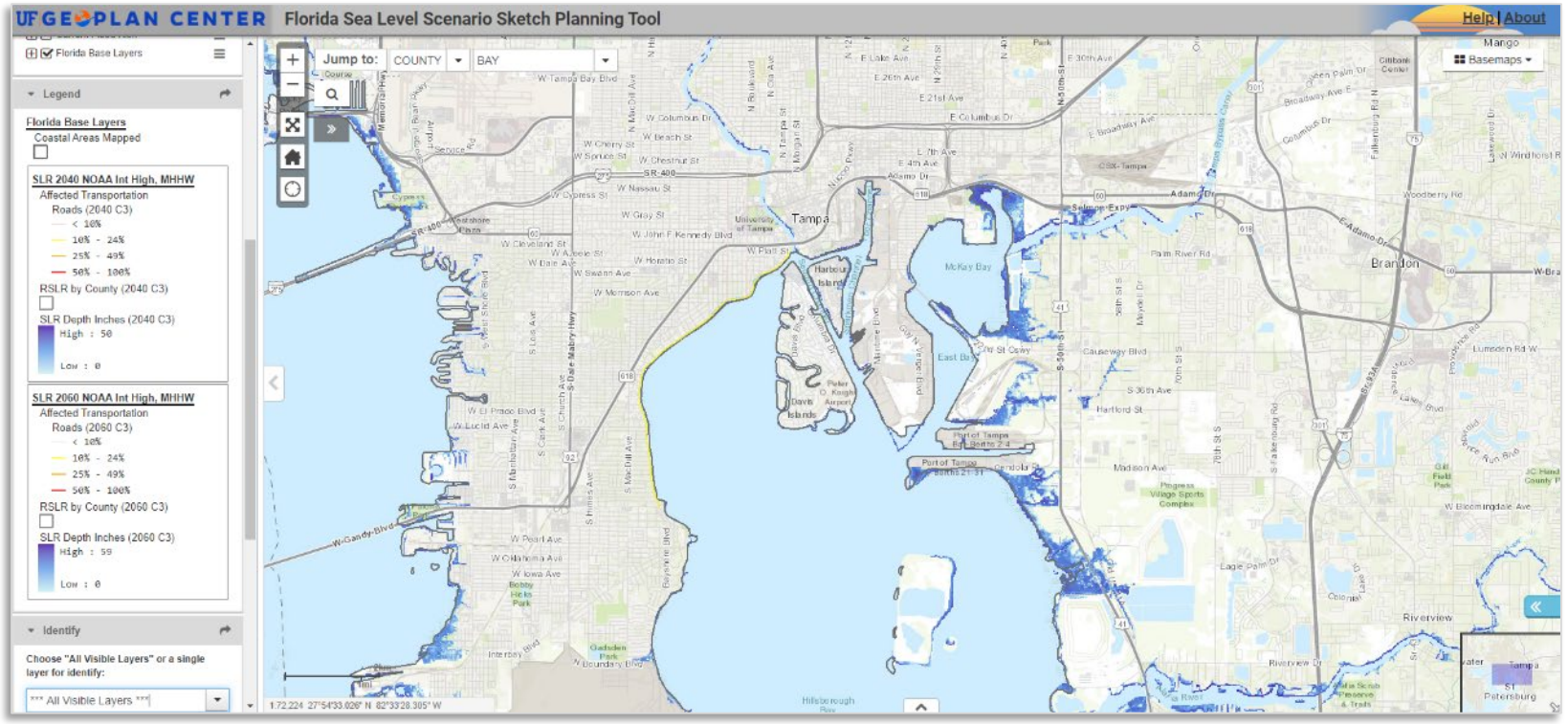
ADAPTATION TYPE	ADAPTATION TITLE	DESCRIPTION	SHORT, INTERMEDIATE, OR LONG TERM	MICRO / MACRO	GRAY, GREEN, OR HYBRID	DEGREE OF PROTECTION (LOW, MED, HIGH)	COST ($,$$,$$$)
Infrastructure Management	Increased Storage or Discharge Capacity of Surface Water	Increasing the size of a channel or pond, the discharge and storage capacity of surface water can be improved. The discharge of a river can be improved by, removing obstacles and lowering groins. Excavating floodplains, increasing the area of the water body or depoldering large areas along the river, improves the storage capacity of the water bodies. Both measures have the ability to reduce flood risk and improve the ability to manage the water.	INTERMEDIATE	MACRO	GREEN	MEDIUM	$$
Infrastructure Management	Pumping Stations	A pumping station is used to discharge water out of an area. It can be used to transport sewer water in pressure mains. Another option is use in polder systems to pump water from a low lying area into a main water body like a river or a lake. It is always applied when no natural flow of water is possible.	SHORT	MICRO	GRAY	LOW	$$
Infrastructure Management	Raised Curbs / Hollow Roads	Raised curbs and hollow roads are used to increase the storage and transport capacity of a road. In extreme rainfall events excess water is stored in between the curbs instead of flowing into buildings directly.	INTERMEDIATE	MACRO	GRAY	MEDIUM	$$
Infrastructure Management	Storage / Settling Tank and Storage Basins	Storage/settling tanks are designed to store excess runoff in urban drainage systems during wet periods, primarily if runoff exceeds the discharge capacity of the urban drainage system some. The settling tank is designed to prevent polluted runoff to be discharge in surface water.	INTERMEDIATE	MACRO	GRAY	MEDIUM	$$
Infrastructure Management	Increased Capacity of Sewer System	Increasing the capacity of the sewer system increases the ability of the system to drain excess surface water during heavy rains and prevent flooding.	INTERMEDIATE	MACRO	GRAY	MEDIUM	$$
Infrastructure Management	Reconstruct Combined Sewer Systems to Separate Sewer Systems	Old sewer systems were often constructed as combined sewers systems, collecting rainwater and waste water in one system. A separate sewer system is designed to collect sanitary and storm water runoff separately. Rainwater can be stored and/or treated, therewith creating an additional water resource. The sanitary water is in a separate sewer system is more concentrated and waste water runoff is more steady.	INTERMEDIATE	MACRO	GRAY	MEDIUM	$$
Infrastructure Management	Smart-Drain (Ground Water)	A smart drain is used to control groundwater levels. The drain operation is based on the actual groundwater levels. If the groundwater level is too high, more water is drained. If the groundwater level is too low, drainage is limited.	INTERMEDIATE	MACRO	GRAY	MEDIUM	$$
Infrastructure Management	Infiltration and Transport Sewer	An infiltration and transport-sewer (IT) can function as a underground storage and infiltration mechanism, or a storm water drain. The IT sewer is a permeable pipeline which buffers the water until it is able to infiltrates back into the soil. During heavy rain, when soils are fully saturated and water can no longer infiltrate, the IT sewer functions as a storm water drain. excess water is diverted to the ends of the pipeline where it is discharged into another water body. With this buffering capacity the IT sewer is able to reduce flooding and improve water availability during periods of droughts.	INTERMEDIATE	MACRO	HYBRID	MEDIUM	$$

Group Discussion

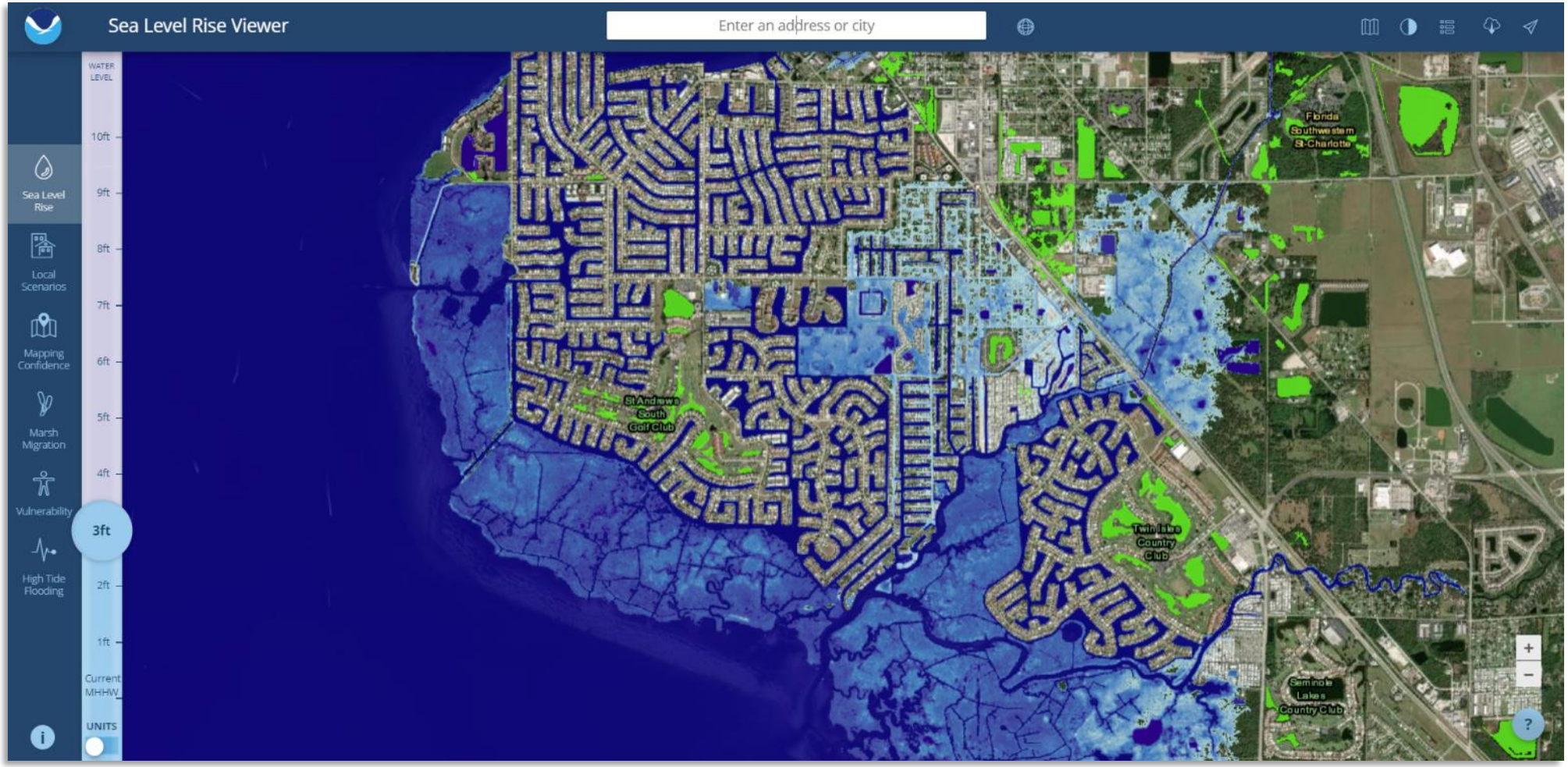
Please type your questions in the Chat

Overview of Existing Web Mapping Tools

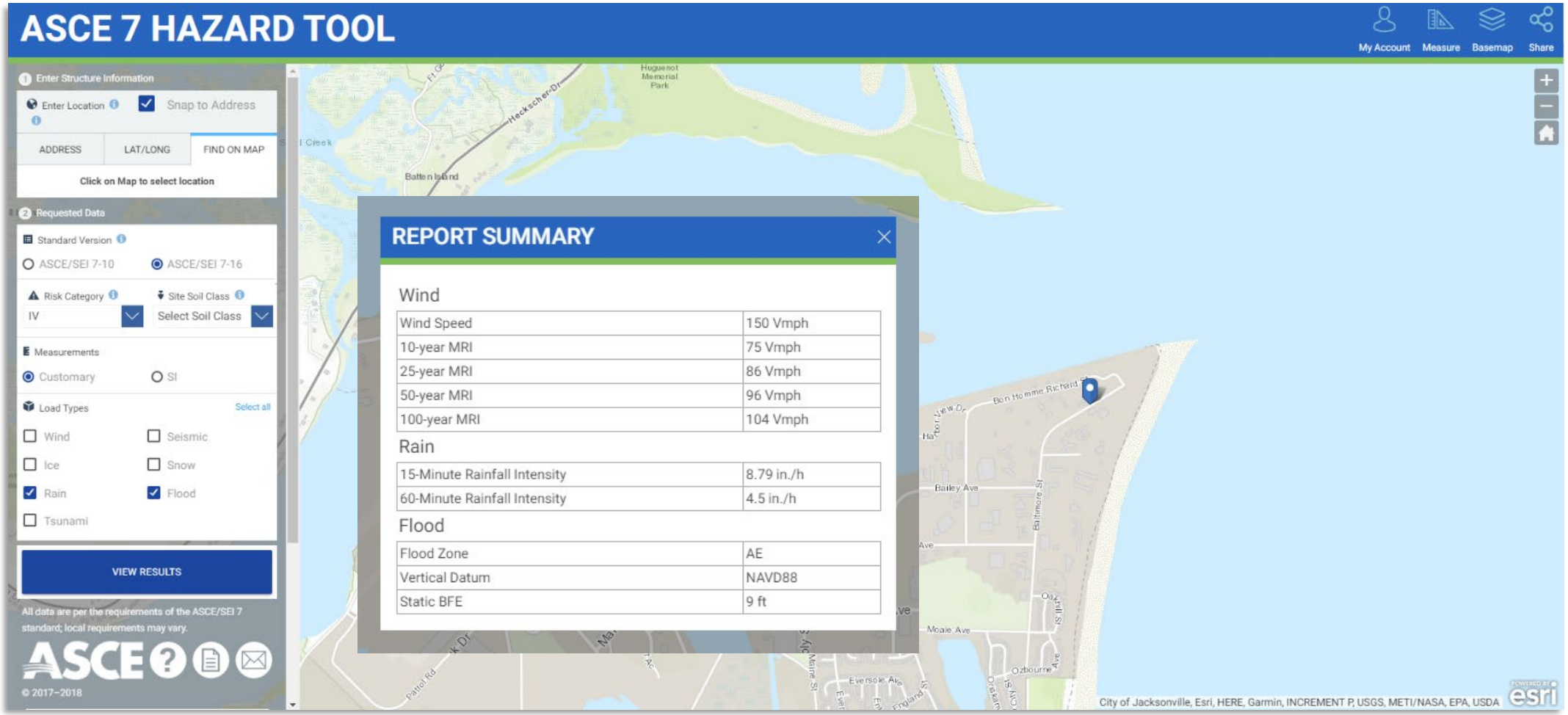
- Researched state, national and international websites
- Analyzed for **credible data** sources
- Assessed for **ease of use**
- Looked for **key features** that we could use or improve upon



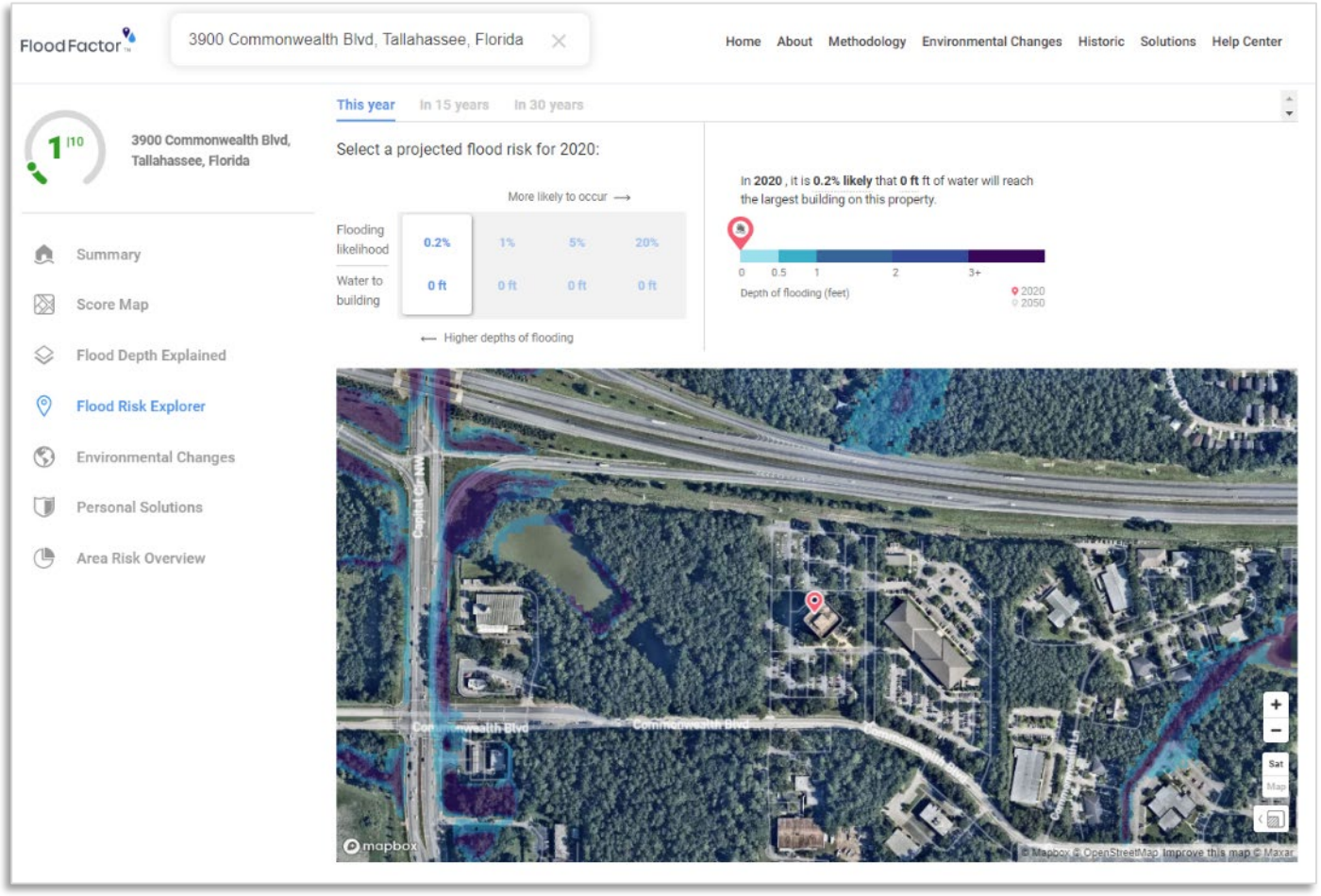
NOAA Sea Level Rise Viewer: National

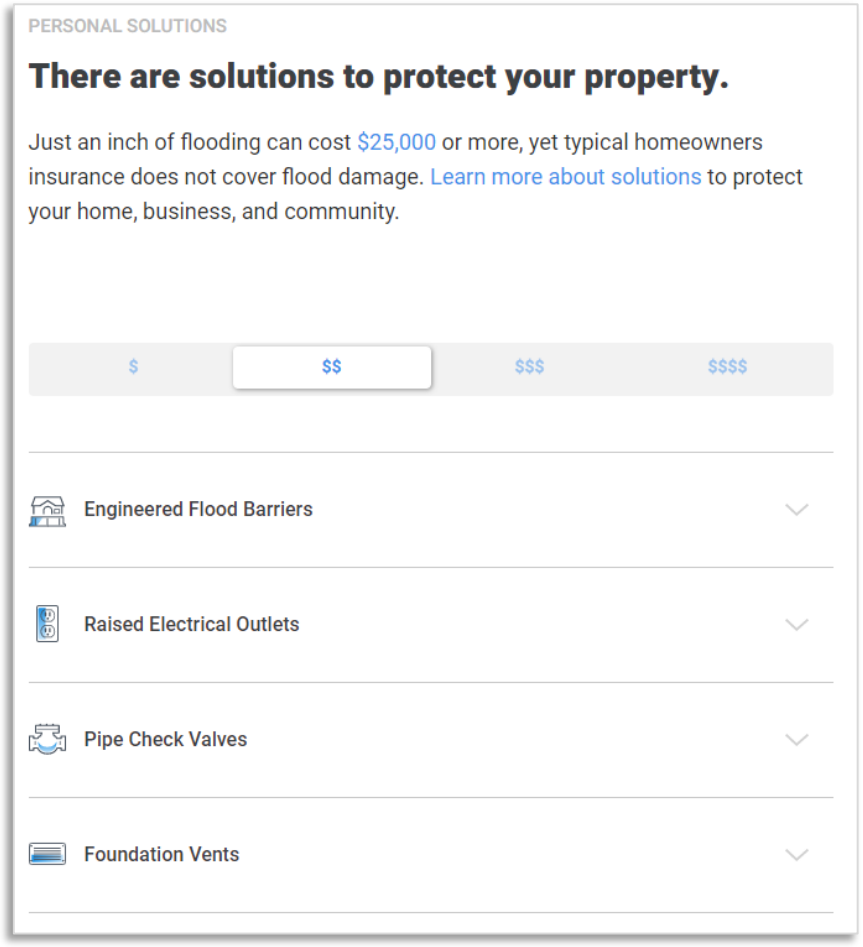


American Society of Civil Engineers (ASCE) 7 Hazard Tool: National



FloodFactor: National



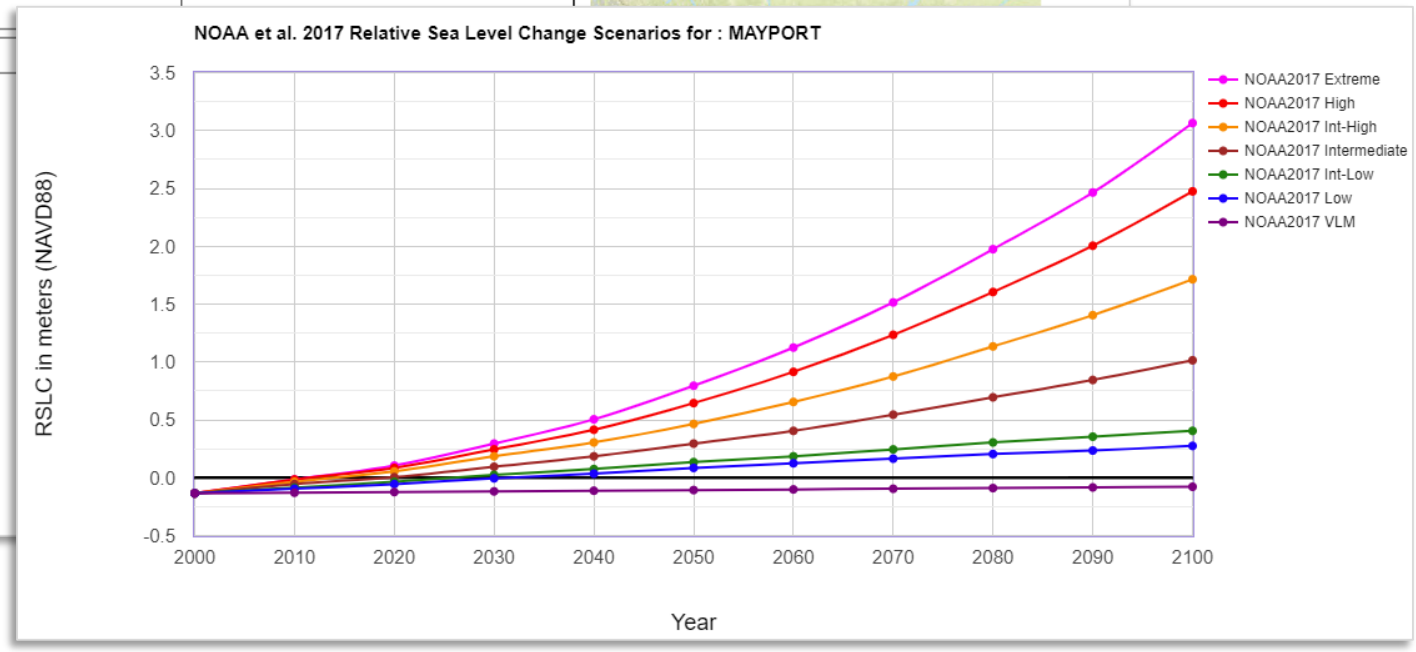


USACE Sea Level Change Curve Calculator: National

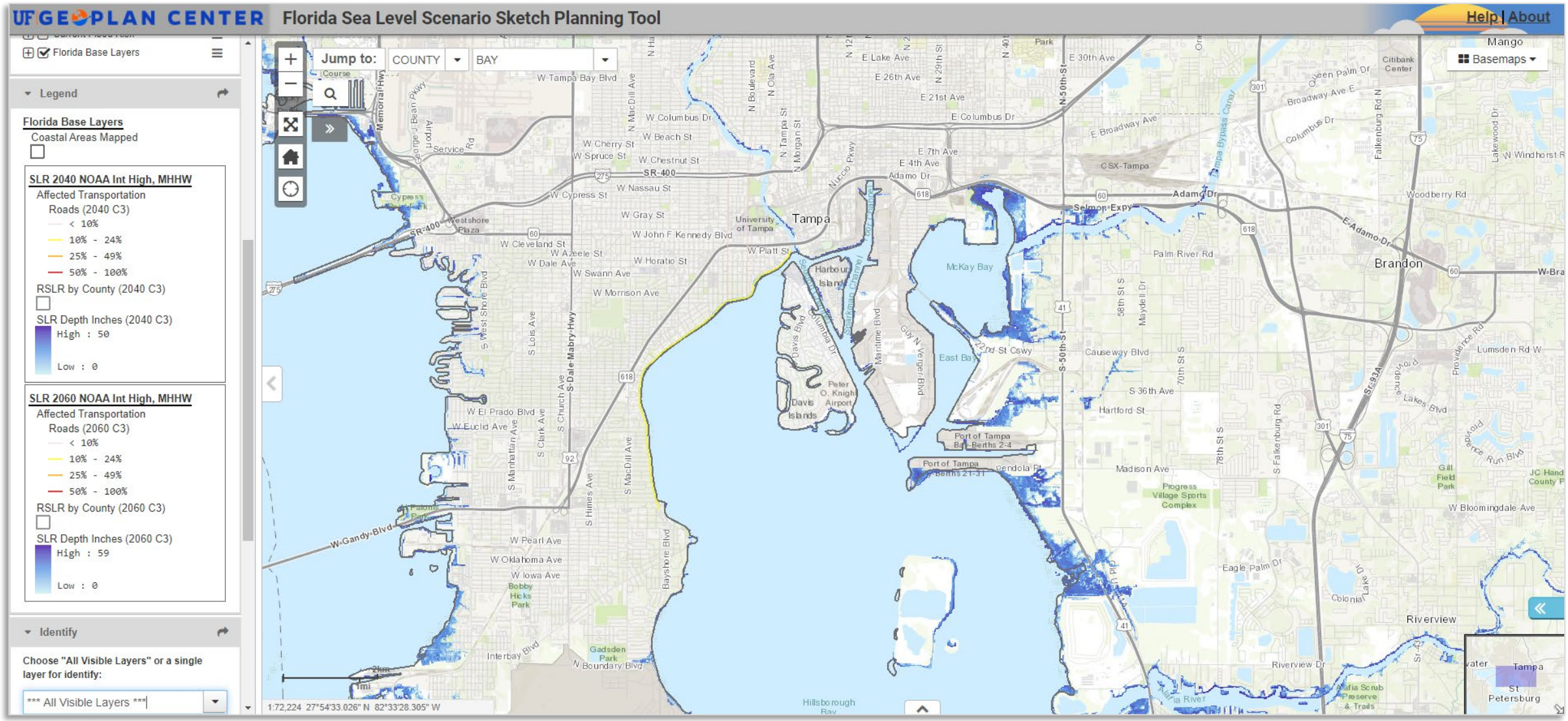
USACE Sea Level Change Curve Calculator (2017.55)

Project Name: Enter Project Name
Select Gauge: Select NOAA Gauge
Scenarios Source: USACE 2013

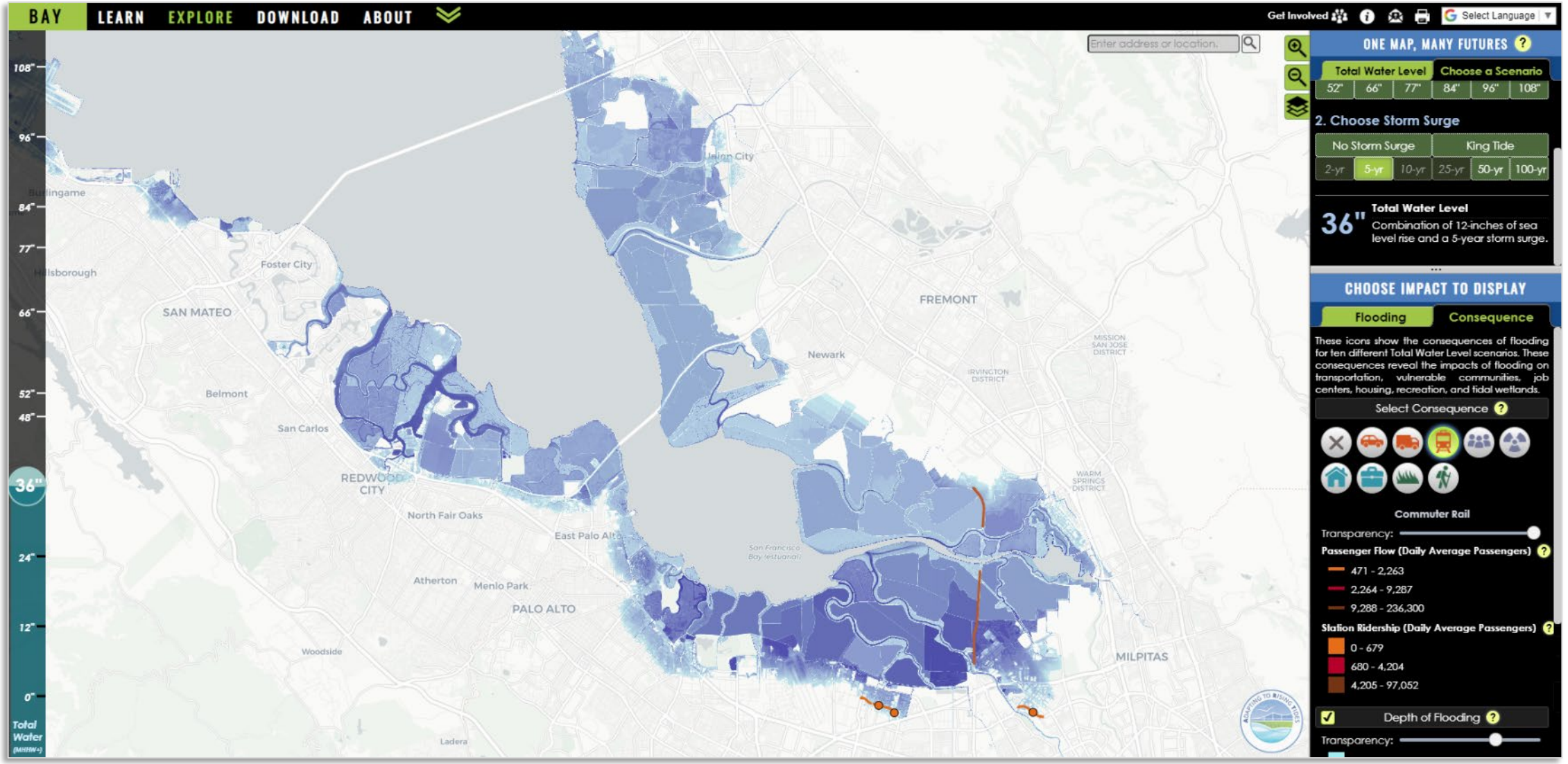
Output Units: (•) Feet ( ) Meters
Output Datum: ( ) LMSL (•) NAVD88
Critical Elevation #1 (ft) : 0 NAVD88 - Description:
Critical Elevation #2 (ft) : 0 NAVD88 - Description:
SLC Rate:? NOAA 2006 Rates or enter rate (ft/yr) Display Data
FEMA BFE (ft): ? Information 0 (NAVD88) Search for BFE here
Project Start Year: 1992
Interval Year: 5
Project End Year: 2100
User's Index (ft): ? 0 Description:
Datum Shift to MSL: 0(ft)
EWL Type: (•) Highs ( ) Lows
EWL Source: (•) NOAA (GEV) ( ) USACE (Percentile)
Plot EWL/BFE/Tides: None Select Curve: USACE High



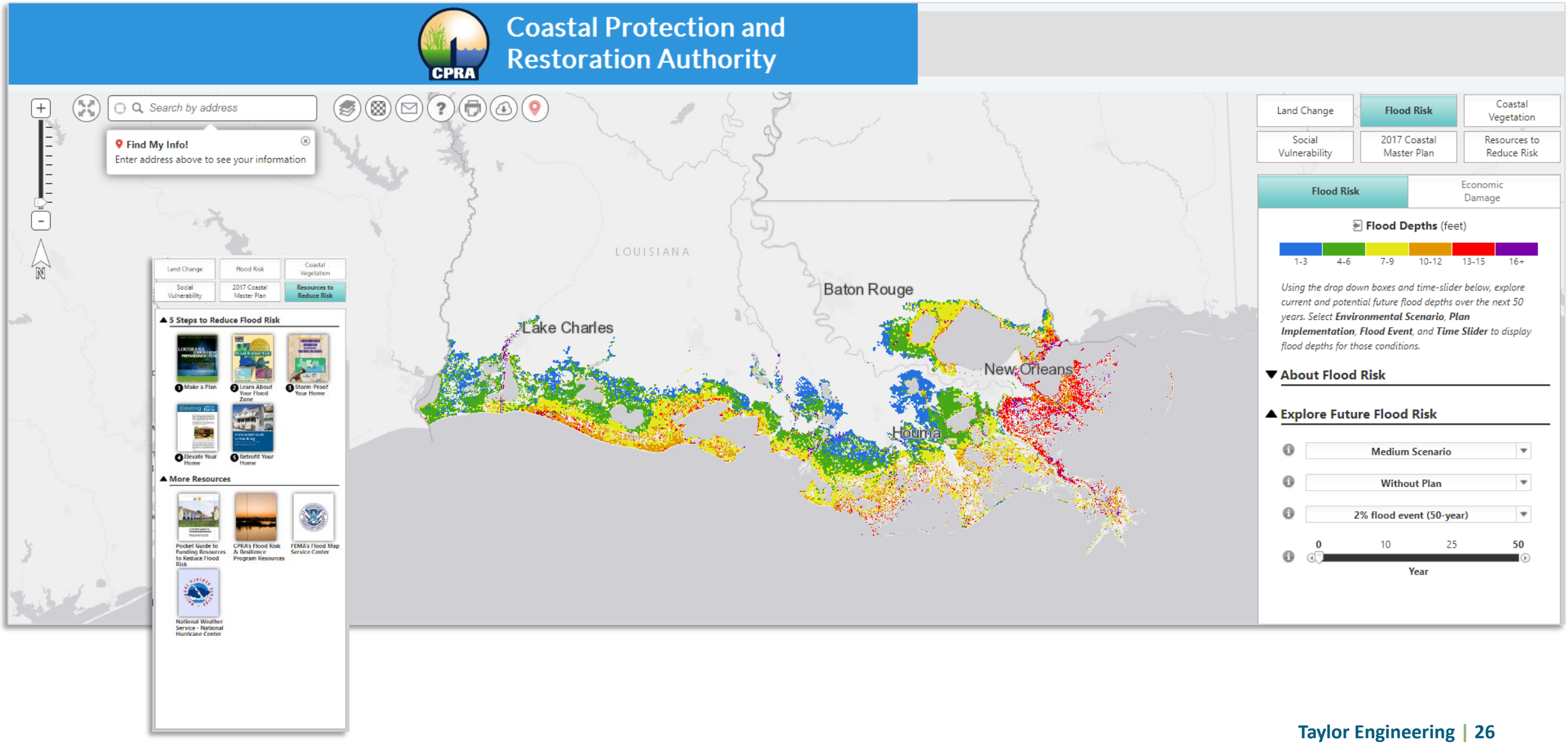
Florida Sea Level Scenario Sketch Planning Tool: Florida



ART Bay Shoreline Flood Explorer: San Francisco Bay

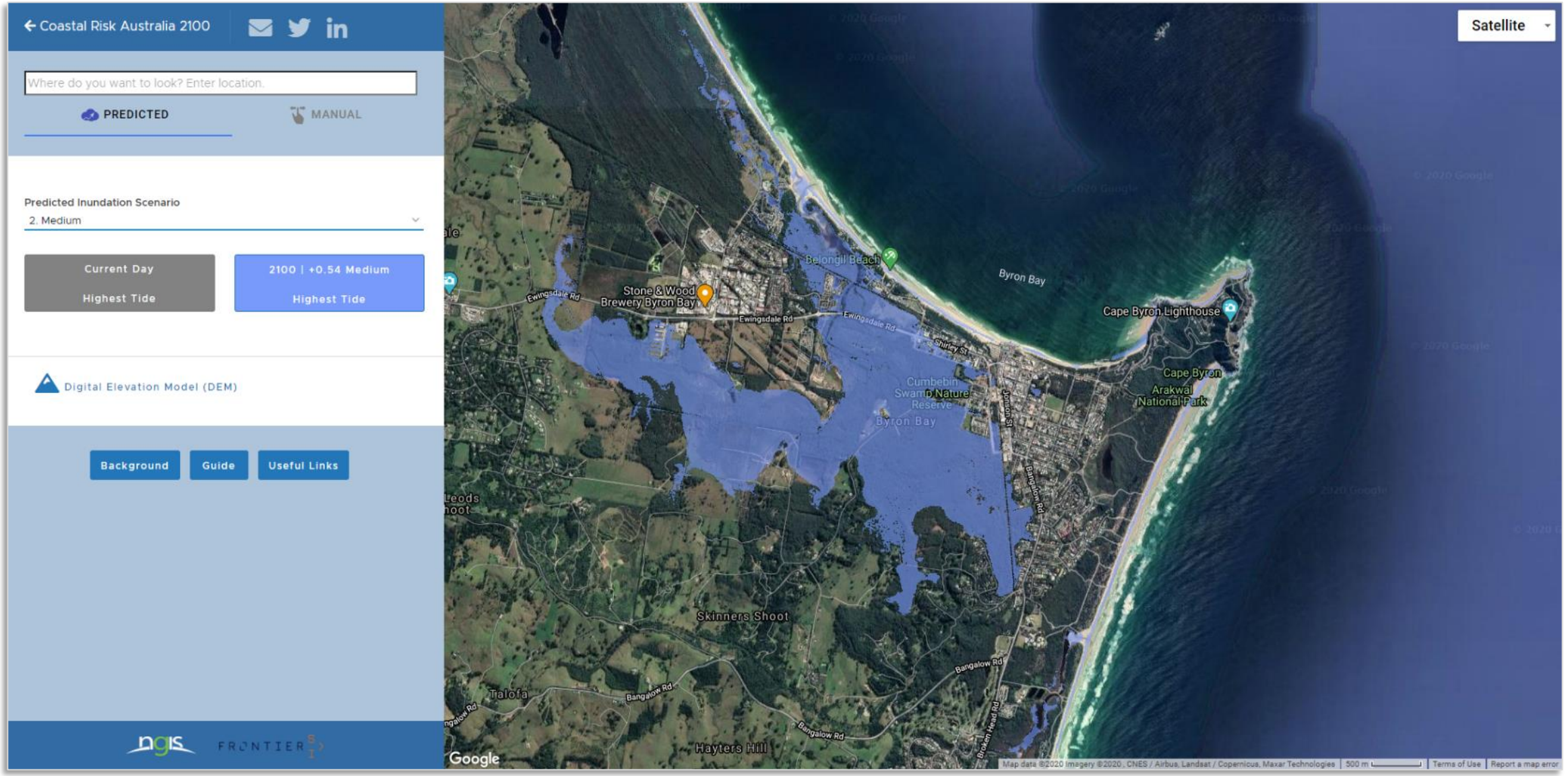


Coastal Protection and Restoration Authority Master Plan Data Viewer: Louisiana

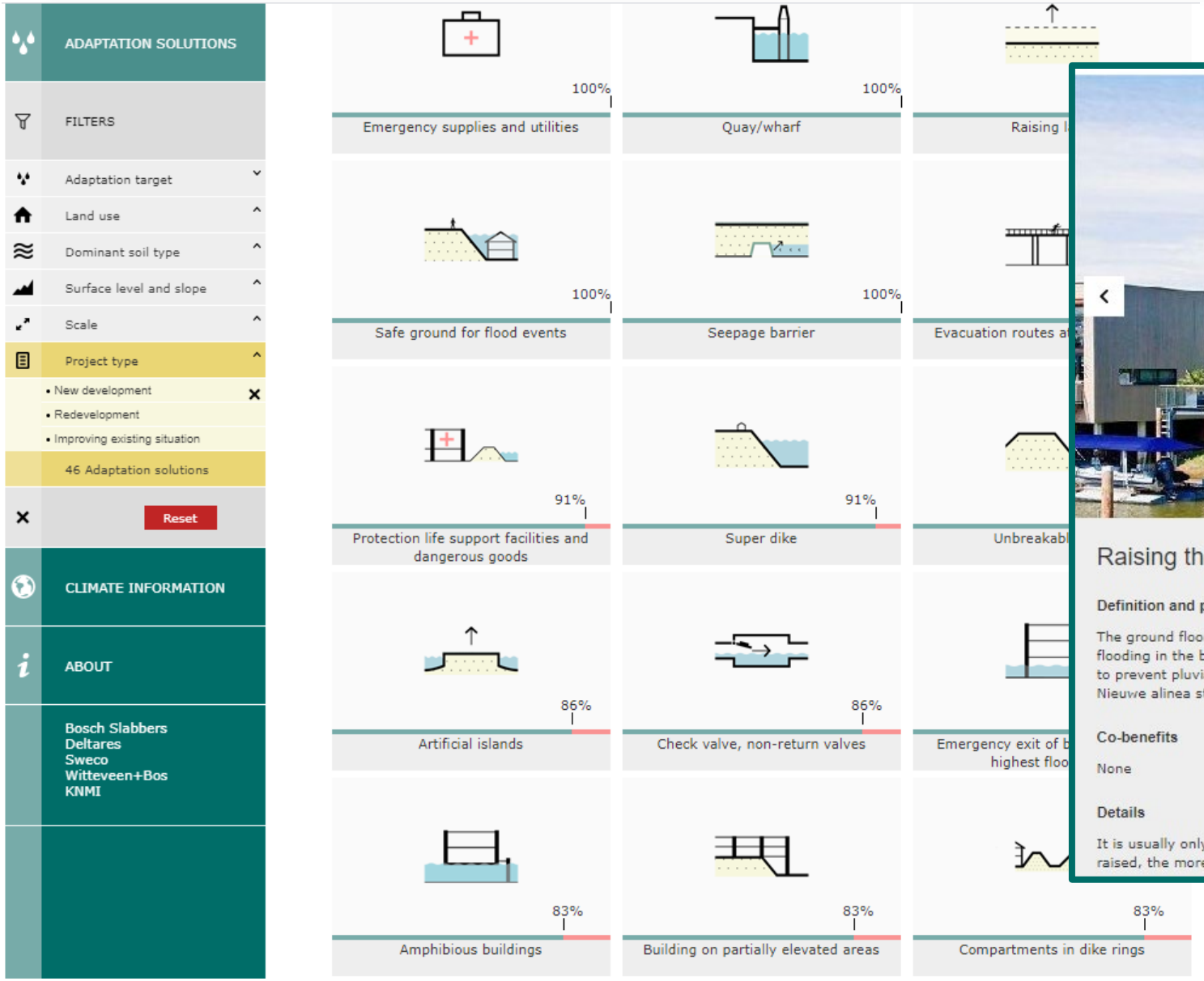


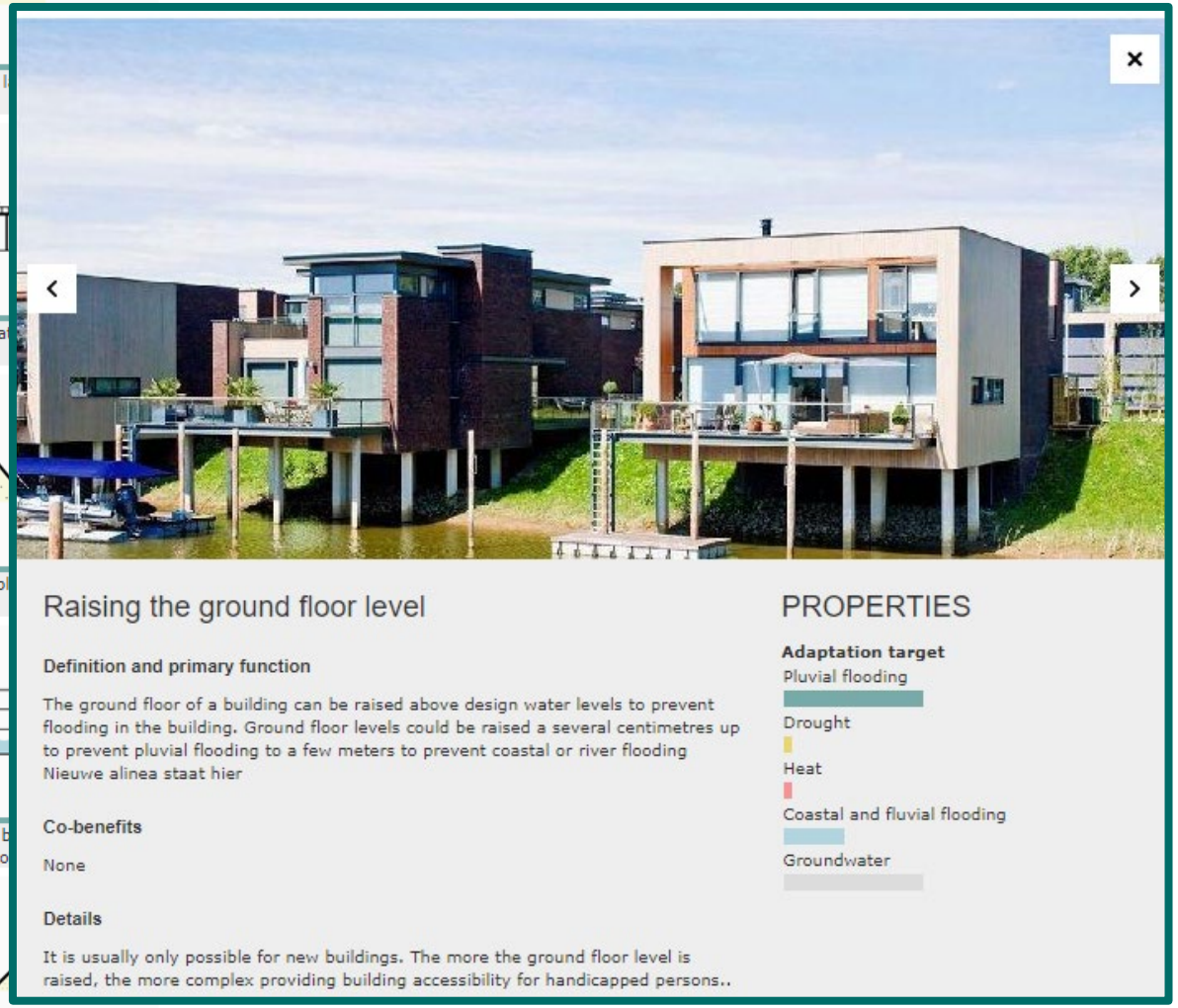
STORMTOOLS: Rhode Island

Coastal Risk Australia: Australia



Adaptation Solutions: Netherlands





Home Page

Florida Department of Environmental Protection

Home Learn Contact SLIP Study

Sea Level Rise 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 more about SLIP Studies and how to create a report using this website

Continue

Section 161.551, F.S.

Learn more about the Florida statute that mandates SLIP studies.

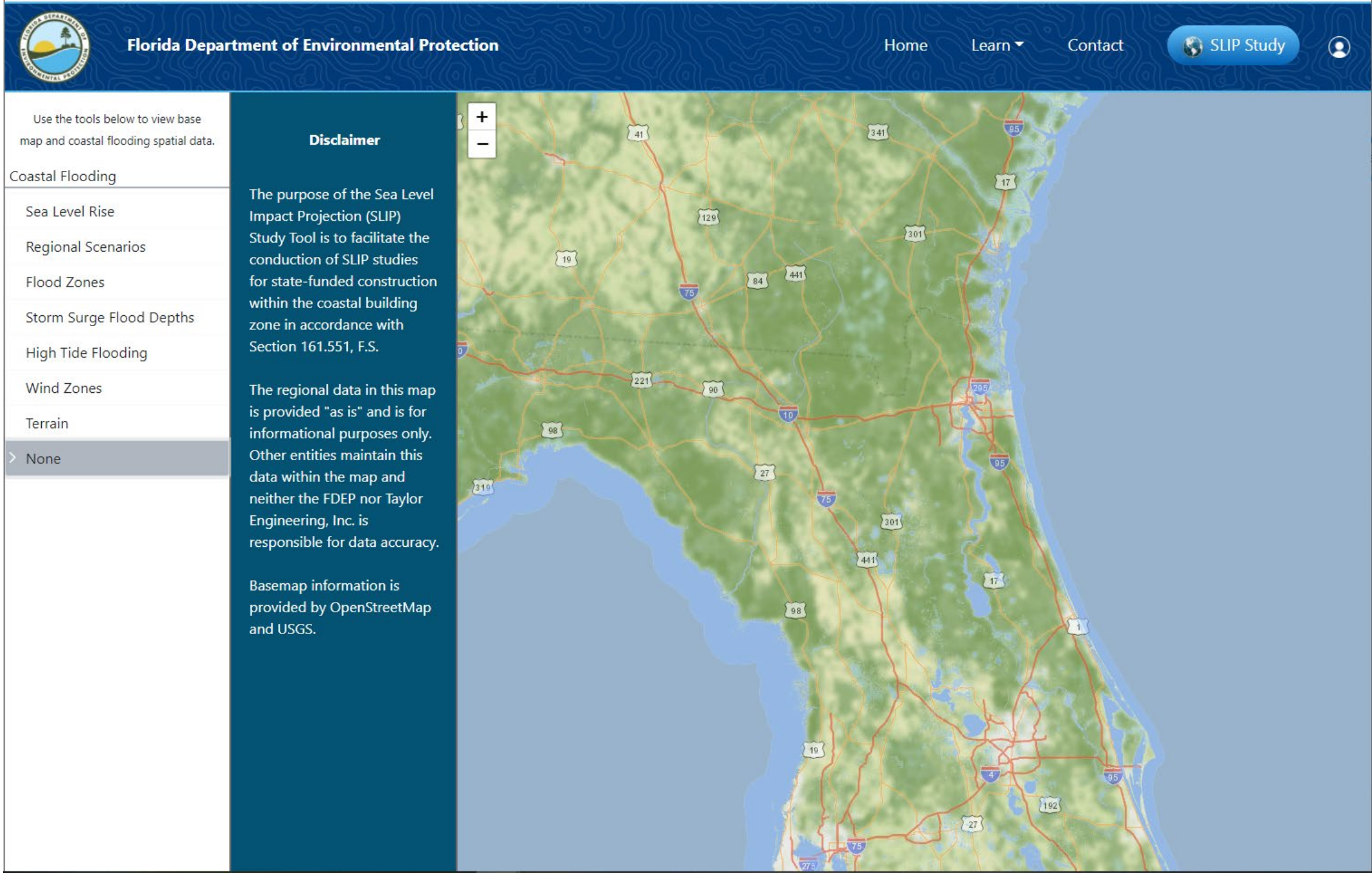
Continue

Adaptation

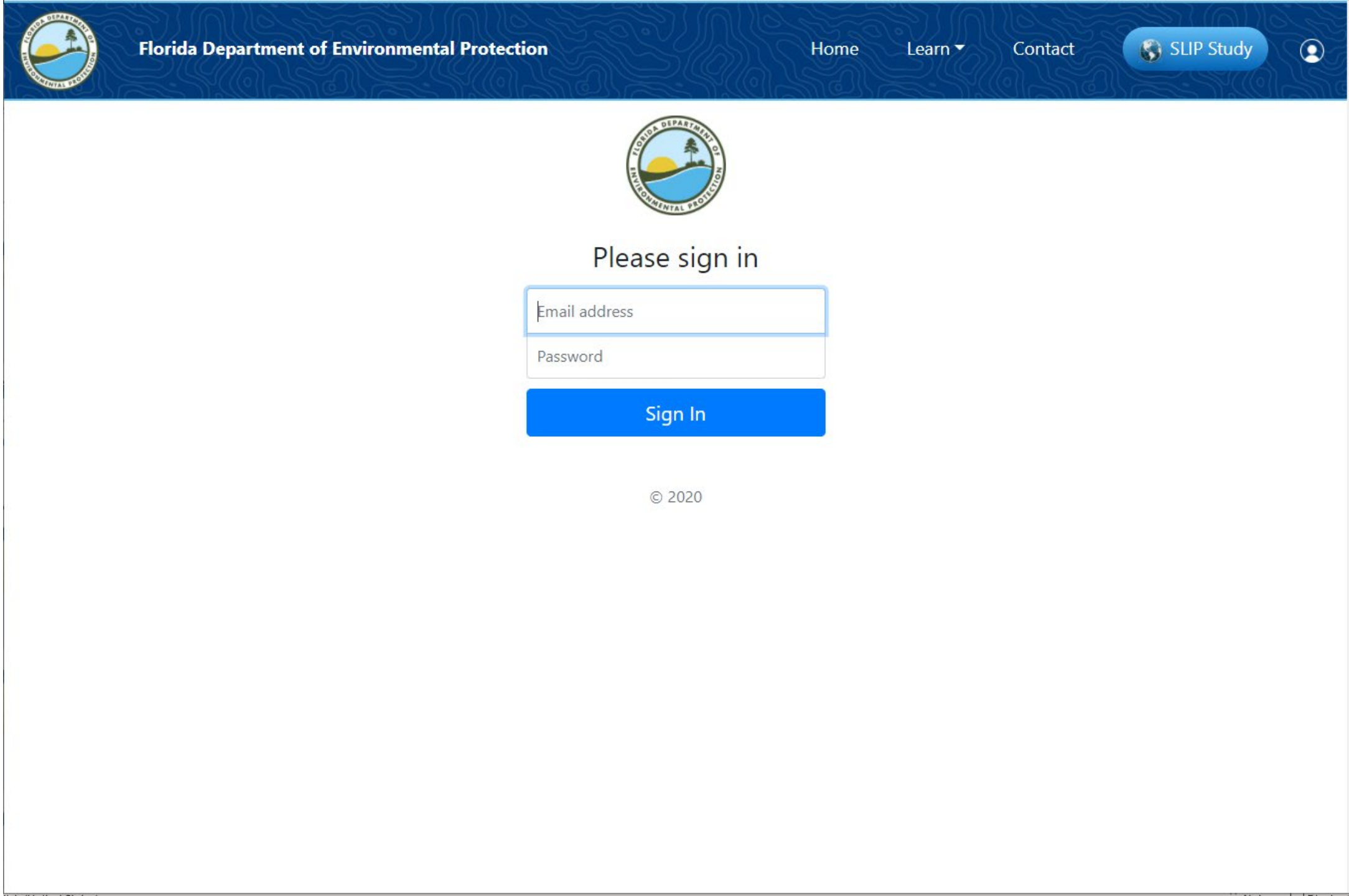
Learn about adaptation strategies for your construction projects.

Continue

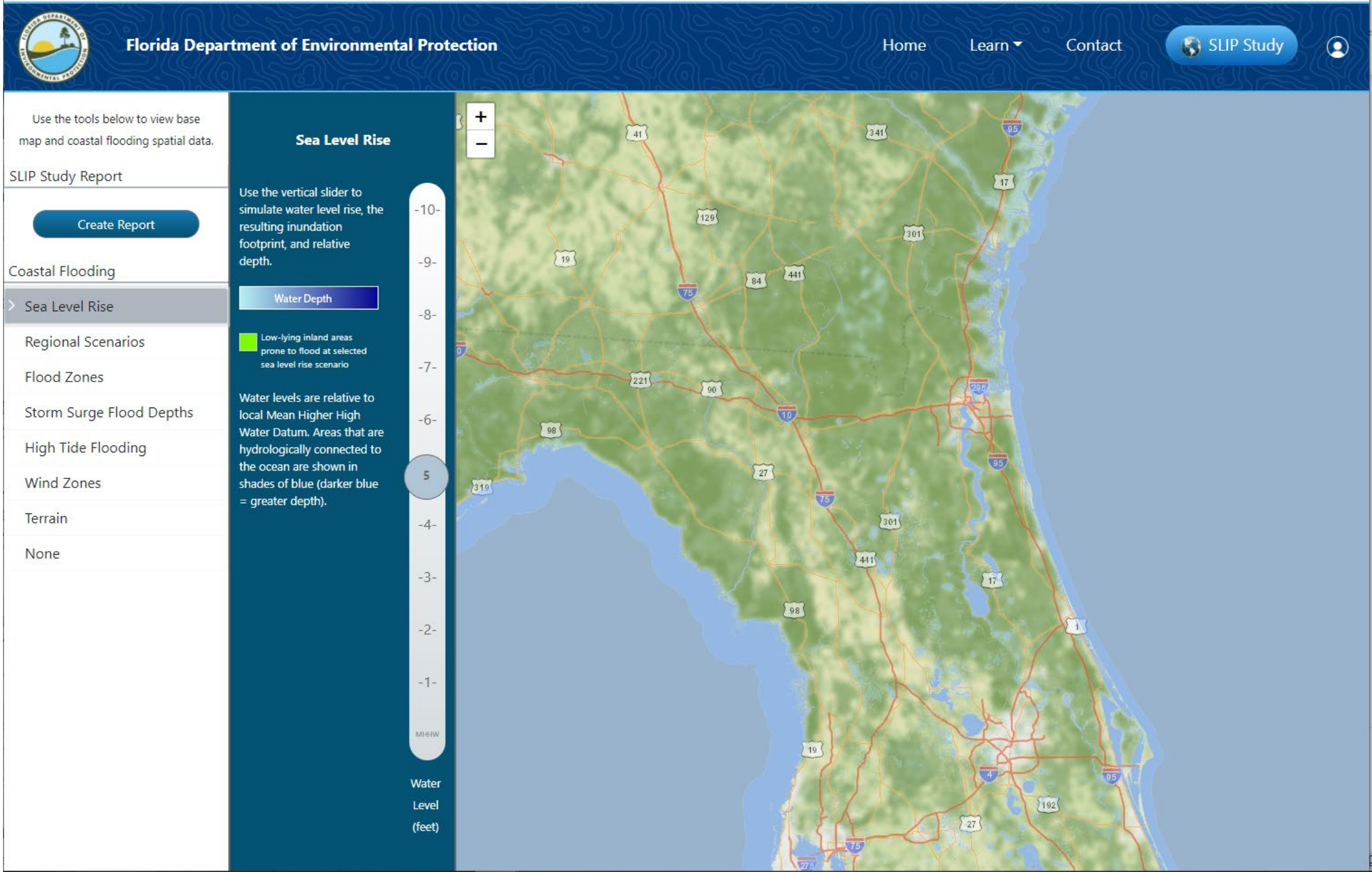
This page shows SLIP Study map along with disclaimer



This page shows the sign in form, allowing users to access functions that are only available to users with accounts.



This page shows the sea level rise options. When you click on Sea Level Rise in the map, you will see the info window (in blue) and be able to see the sea level rise data using the selected parameters.



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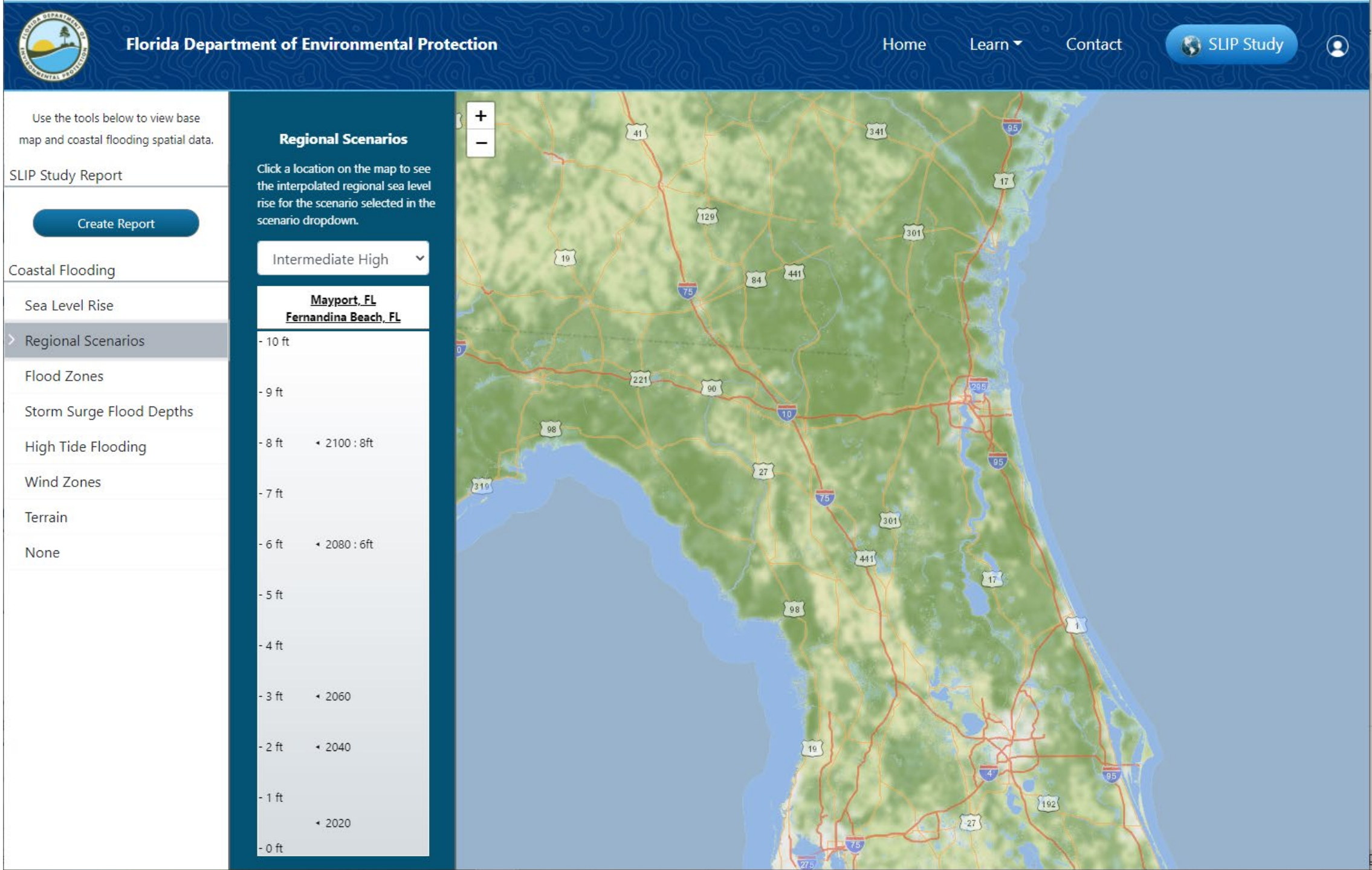
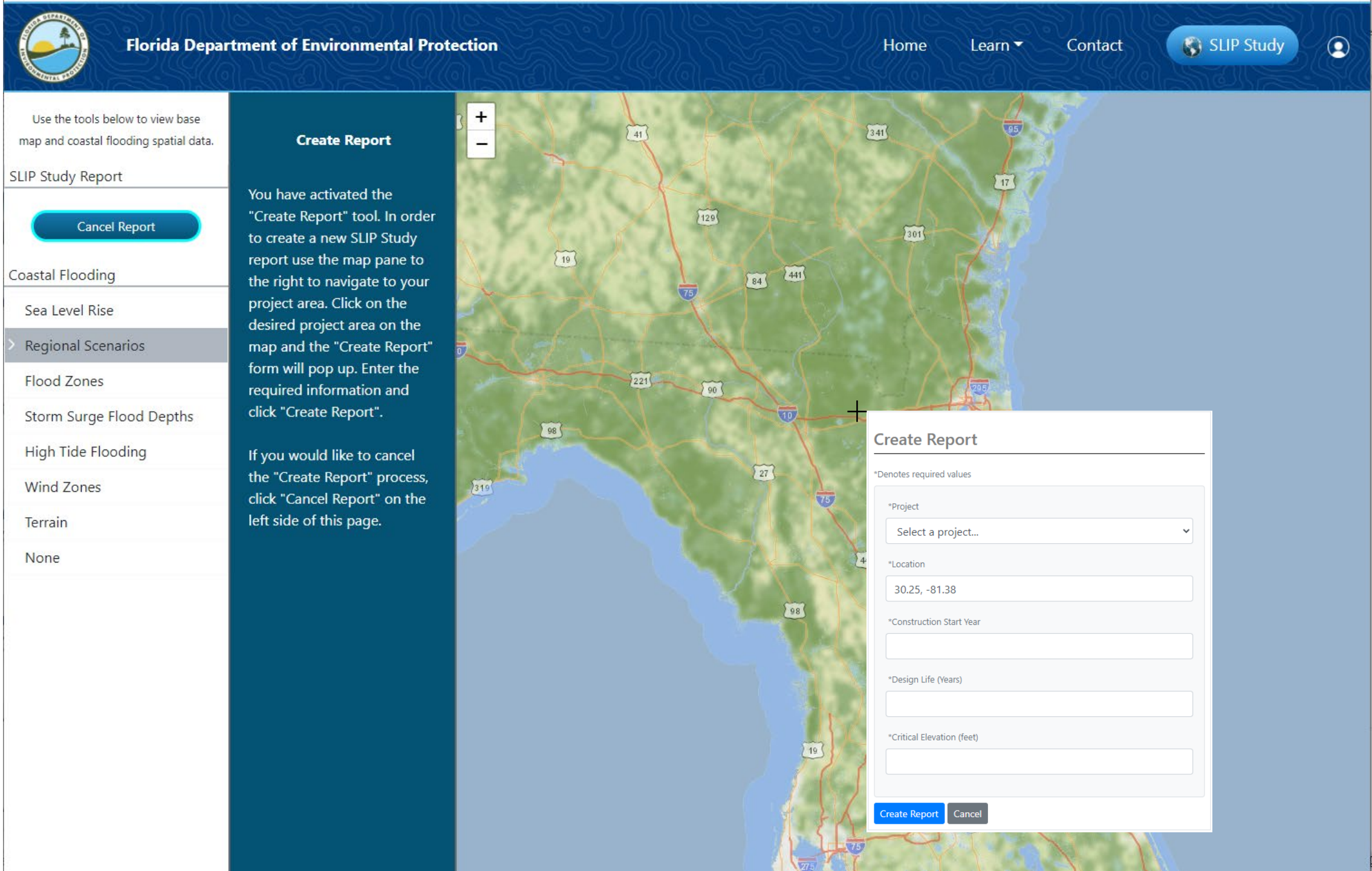
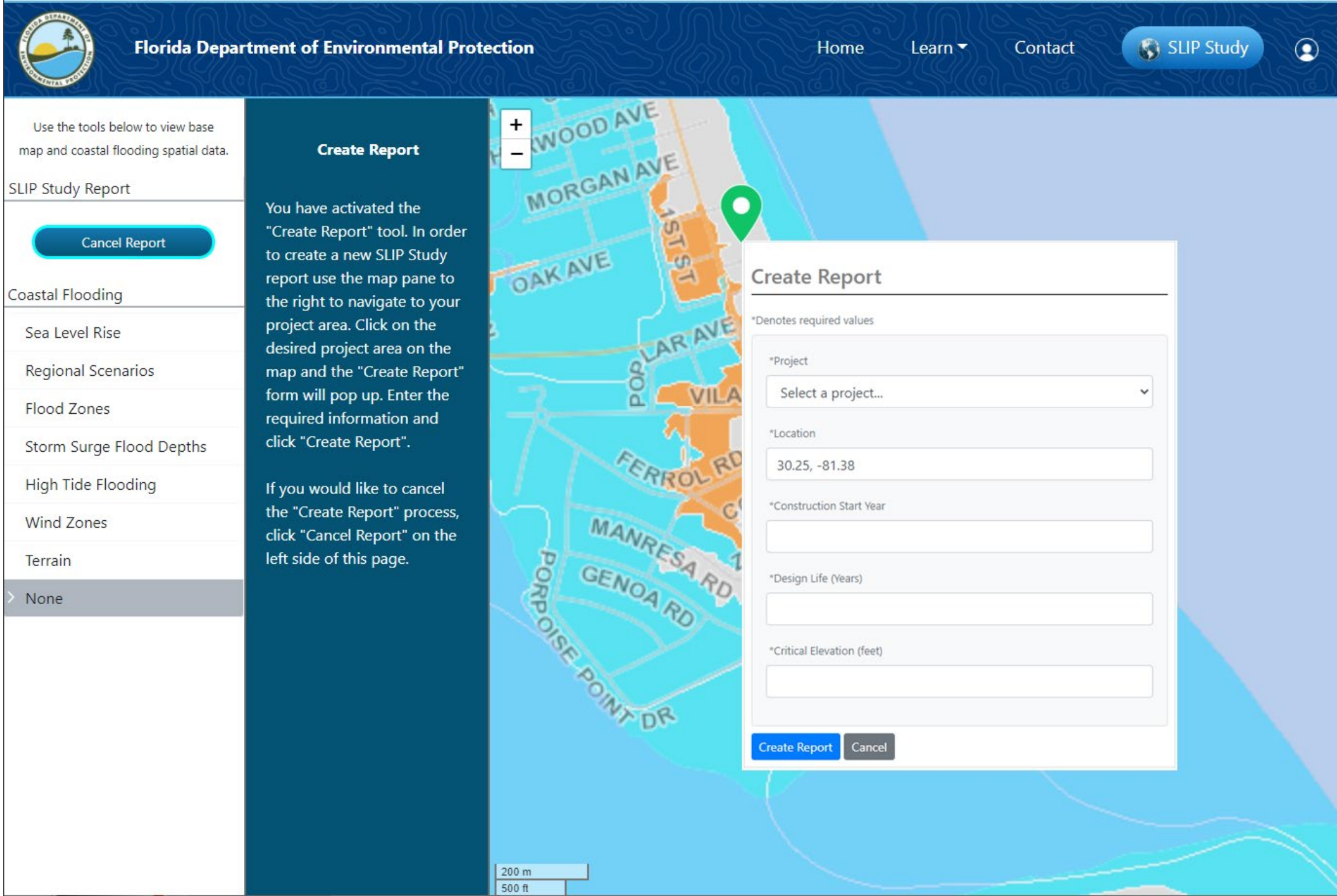


This page shows the Create Report process for creating a SLIP Study Report



This page shows SLIP Study map zoomed in to a project location



This is an example format of the proposed SLIP Study Report. As with all the webpages, this is a work in progress and will include much more data in the future.

Sea Level Rise Impact (SLIP) Study Report

Project Name: Sample Project Name
DEP Client: Sample Client
Report Date: 9/17/2020
Selected Location: 30.5, -81.3

Results

Mean Average Annual Chance of Flood Damage: **5%**
FEMA Flood Hazard Zone: **AE**
Base Flood Elevation**: 3 ft**
Flood Depth**: 1 ft**
Ground Elevation: **2 ft**
100 year Stillwater: **3 ft**
Sea Level Rise: **.6 ft**

Summary:
The selected project location has a 5% mean average annual chance of flood damage. This result is greater the generally accepted percentage and recommendations based on industry best practices have been outlined below. This percentage was calculated using the data above, which was extracted from the best information available. The remainder of this report contains the detailed analysis.

Recommendations

Elevate on a New Foundation

- Assess Potential Impacts of Elevation
- Document the Property with Photographs and/or Drawings
- Elevate the Building on a New Foundation

Elevate the Interior Structure

- Assess Potential Impacts of Elevation
- Document the Property with Photographs and/or Drawings
- Elevate the Interior Structure (i.e. build up interior floor)

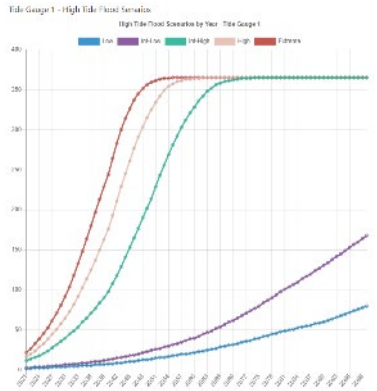
Sea Level Rise Impact (SLIP) Study Report (page 2)

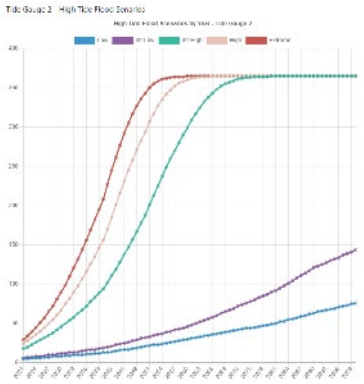
FEMA Flood Hazards

Stillwater Elevations
10 year: **1.4 ft**
50 year: **2.0 ft**
100 year**: 3 ft**
500 year**: 3.9 ft**

Flood Hazard Area
Zone: **AE**
Floodway**: No**
Base Flood Elevation: **3 ft**
Flood Depth: N/A

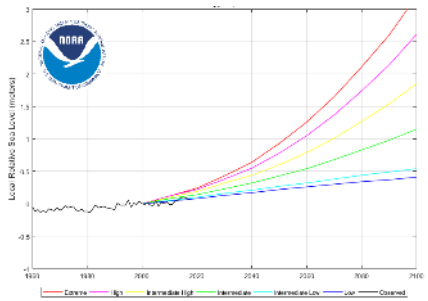
High Tide Flooding



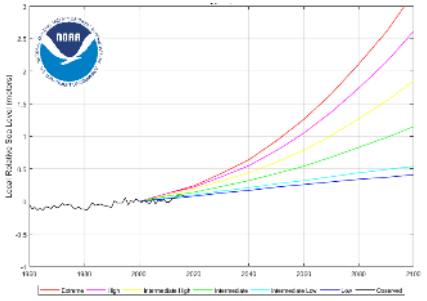


NOAA Sea Level Rise Scenarios

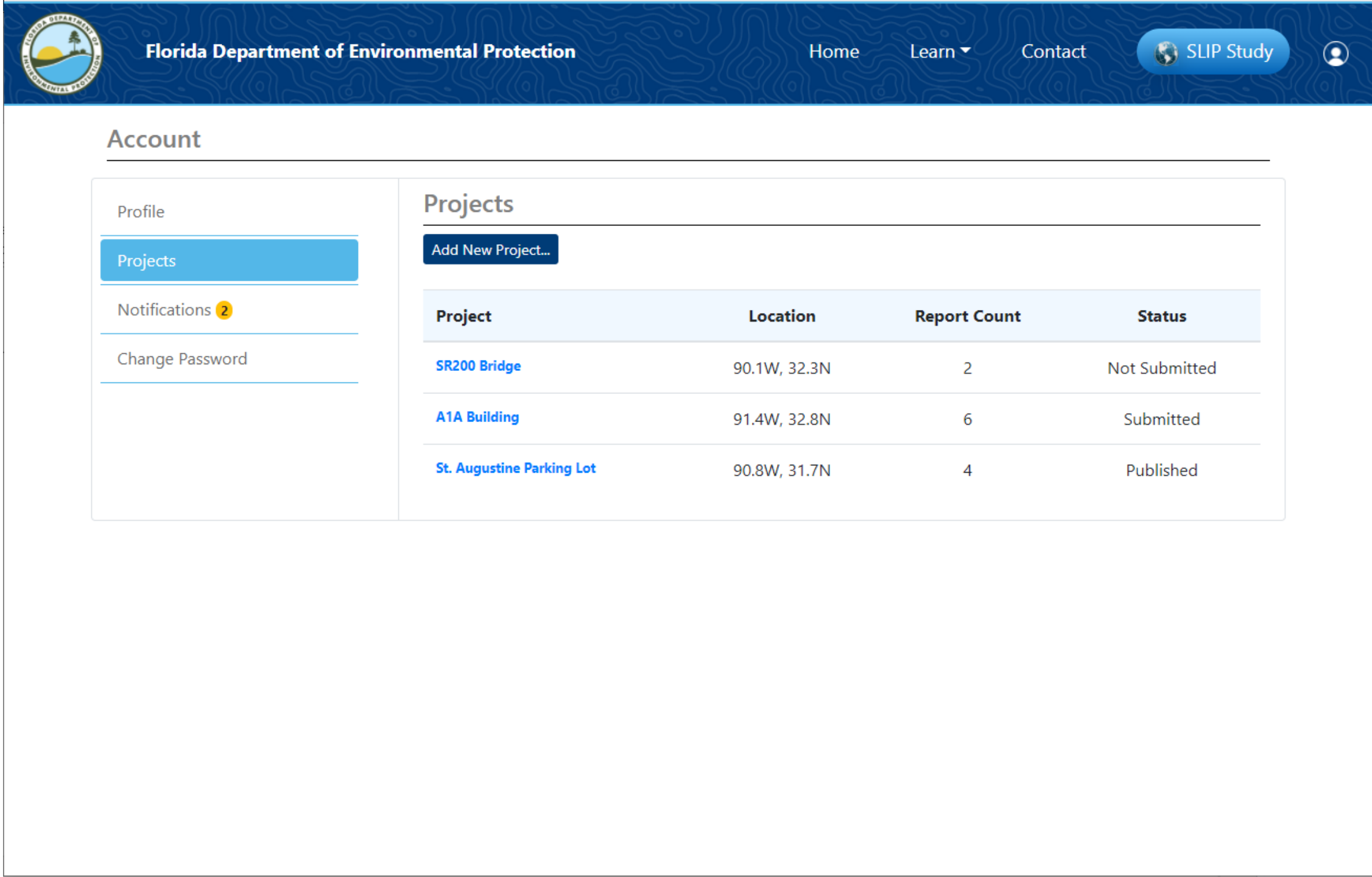
Mayport, FL



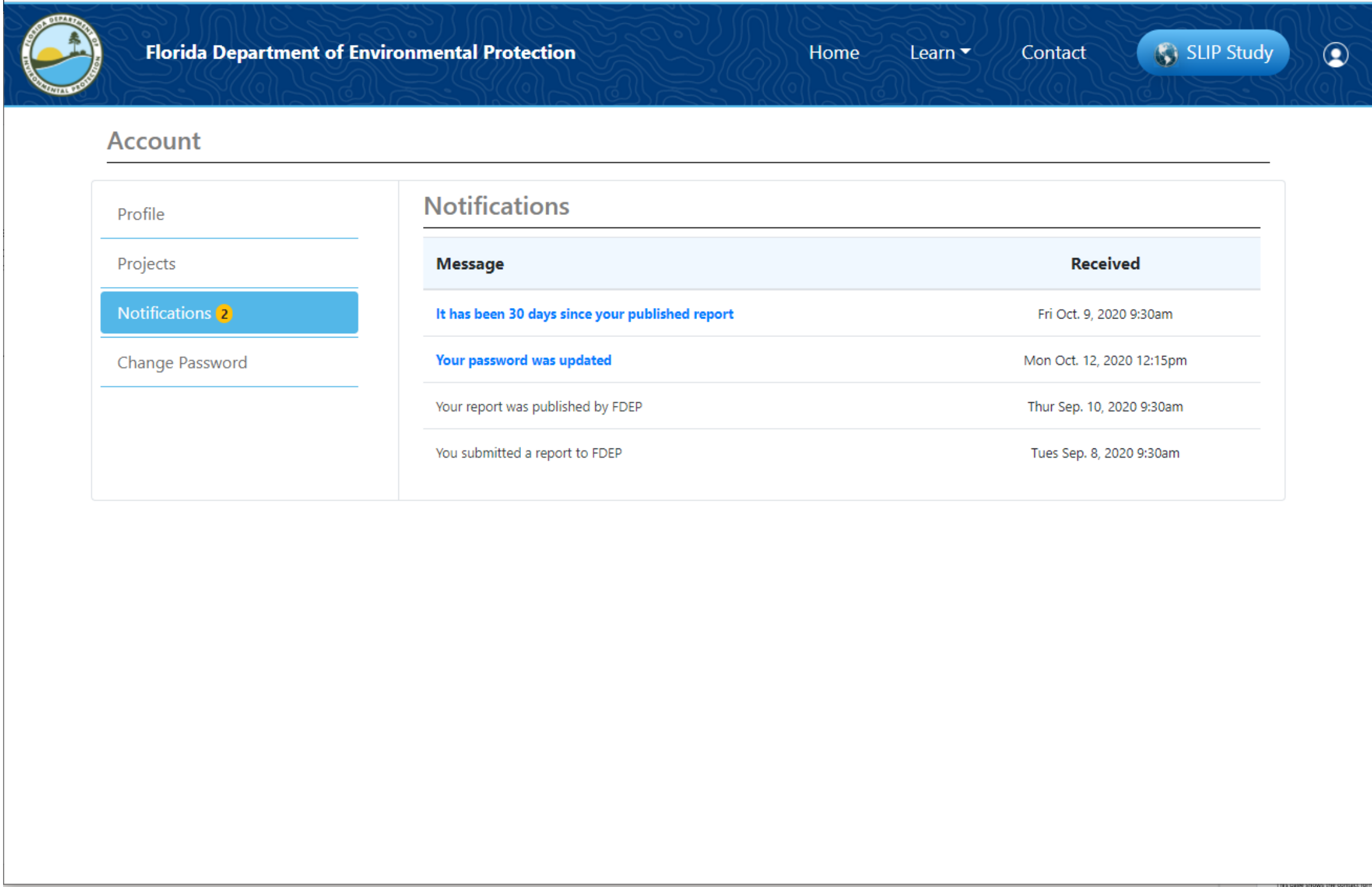
Daytona Beach, FL



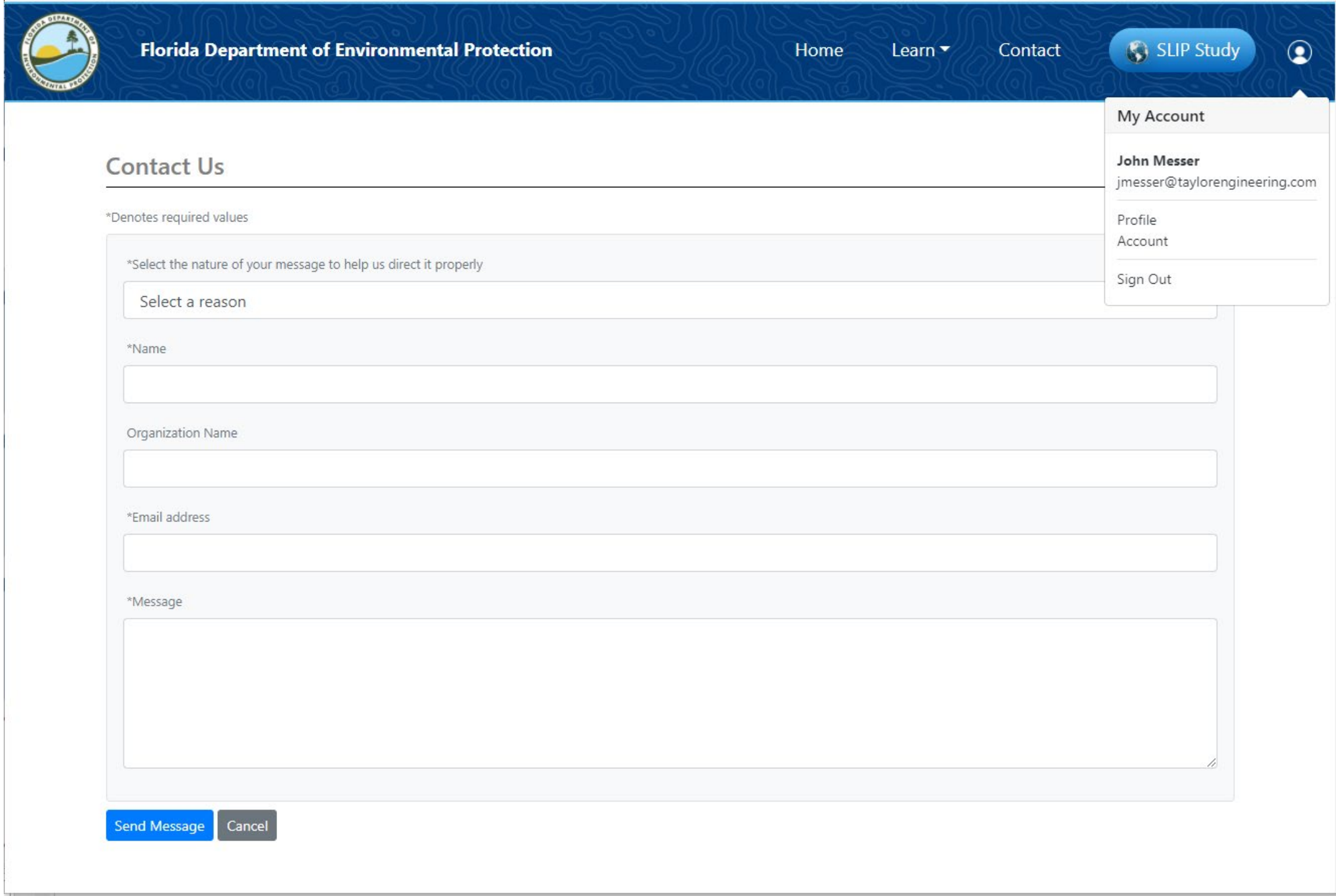
This is an example of the projects section on the account page. Each client would see all of their projects here.



This is an example of the notifications section of the account page.



This page shows the contact form along with an example of the account popup that appears if you click on the profile button on the top right menu item.



Group Discussion

Please type your questions in the Chat

Summary of Workshop Outcomes

THANK YOU
Questions?

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