

42nd Annual State Construction Conference

March 2, 2023



NC★**DOA**
Department of Administration
State Construction Office

Executive Order 266

The Future of Floodplain Management in North Carolina



Presenters

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DPS – Emergency Management

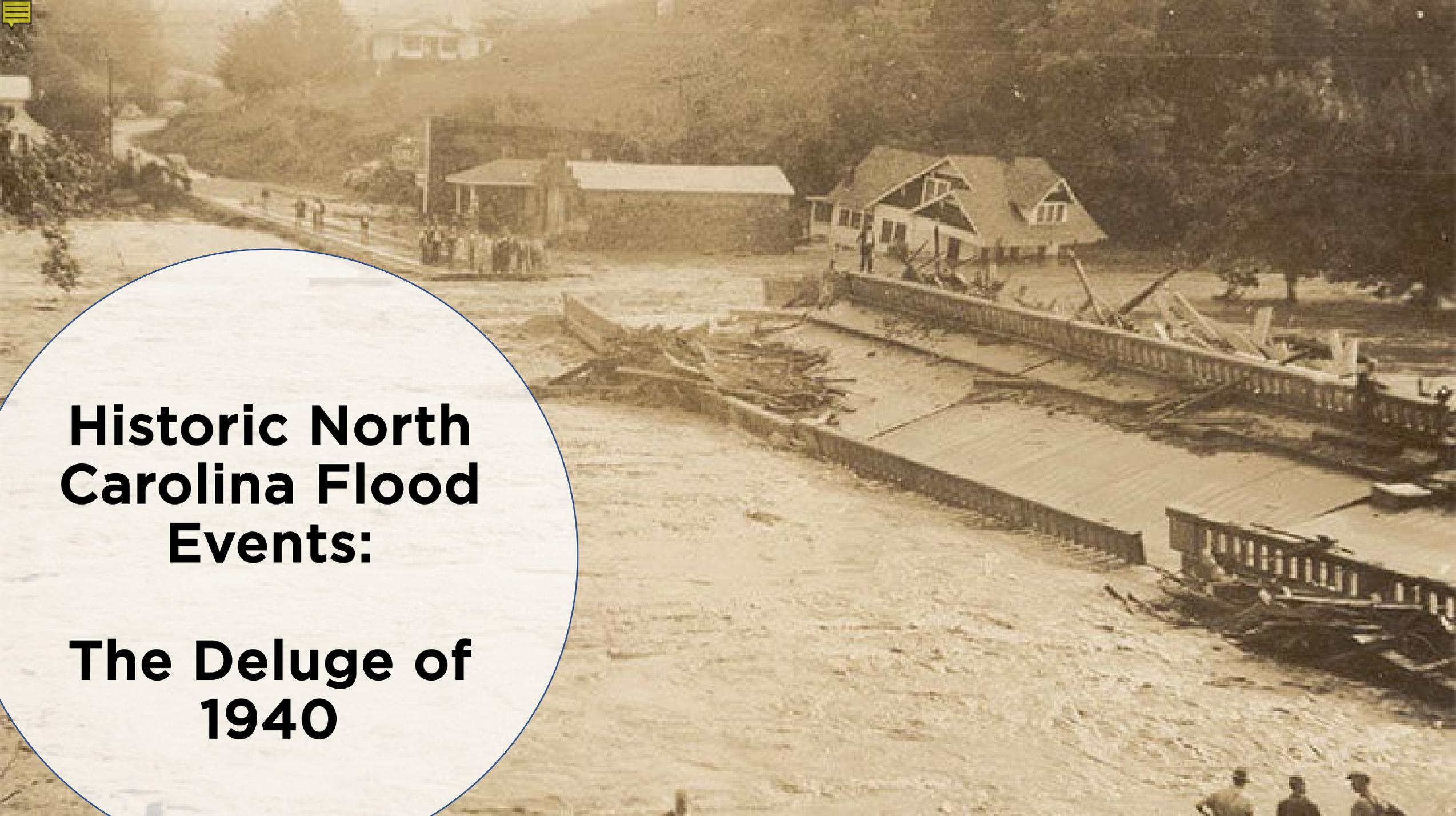


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State Construction Office

A historical black and white photograph showing a town completely inundated with floodwaters. In the foreground, a large, chaotic pile of debris, including wooden planks and other building materials, is visible. In the middle ground, a long, multi-story industrial building with a series of arched windows stands partially submerged. In the background, a hillside is covered with dense trees, and several houses are visible on the slope. The sky is overcast and grey.

**Historic North
Carolina Flood
Events:**

**Great Flood of
1916**

A historical black and white photograph showing a residential area severely affected by flooding. The foreground is dominated by a wide, turbulent river of muddy water. In the middle ground, several houses are visible, some with significant structural damage. Debris, including wooden planks and beams, is scattered across the flooded area. In the background, more houses are situated on a hillside, some appearing to be partially submerged. The overall scene conveys the scale and impact of the flood.

Historic North Carolina Flood Events:

The Deluge of 1940

A historical black and white photograph showing the aftermath of a flood. In the foreground, there is a large area of debris, including wooden planks and other wreckage. A small, white, single-story building is partially submerged in water. In the background, several utility poles with power lines are visible, and more buildings are partially obscured by the haze of the flood. The sky is overcast and grey.

**Historic North
Carolina Flood
Events:**

**Hurricane Hazel
1954**



History of Floodplain Management

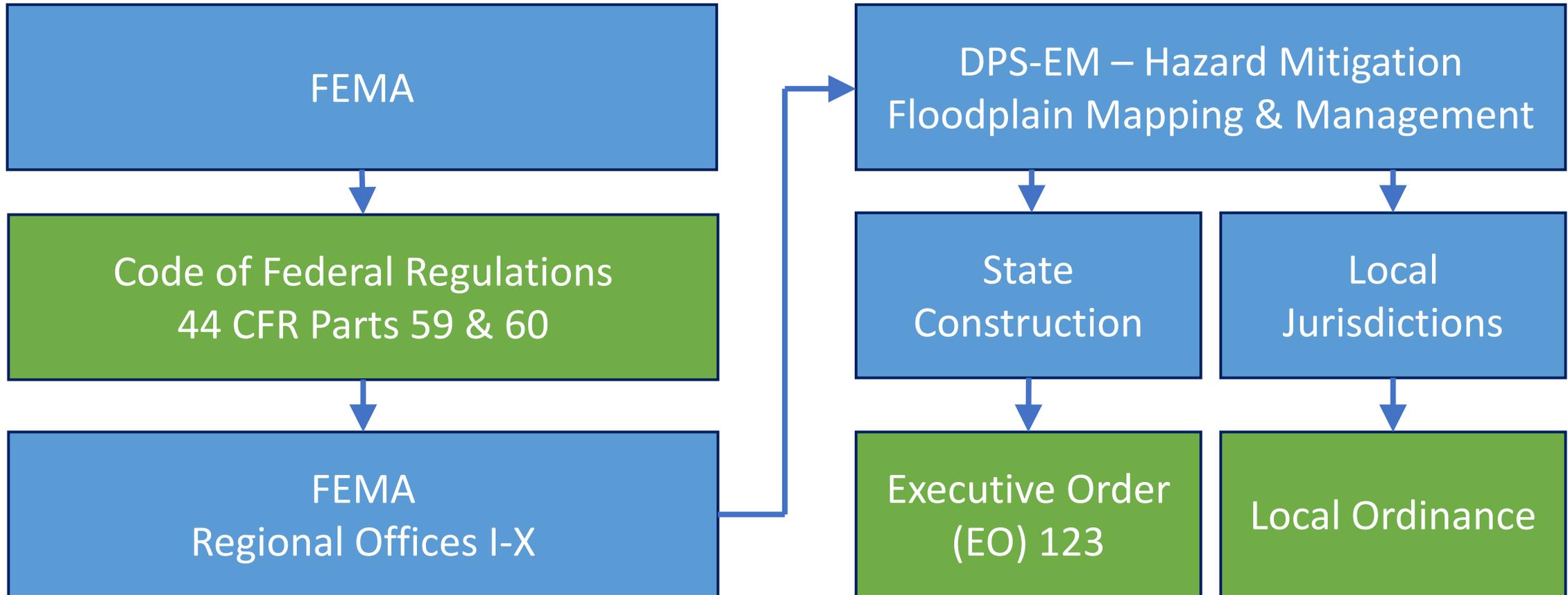
- The National Flood Insurance Act (NFIA) and the National Flood Insurance Program (NFIP) were created in 1968.
- NFIP administered by the Federal Emergency Management Agency (FEMA)
- NFIA was “retooled” in 1973 by the Flood Disaster Protection Act to increase participation.
- NFIP introduces the Community Rating System (CRS) in 1990.



History of Floodplain Management

- Additional penalties, programs, and policies were enacted in 1994 under the National Flood Insurance Reform Act
- In 2012, the Biggert-Waters amendment attempted to eliminate subsidies and grandfathering, as well as shift policies to actuarial rates.
- Most provisions of Biggert-Waters were repealed under the Homeowners Flood Insurance Affordability Act (HFIAA) in 2014.
- HFIAA limits annual increases for policy premiums and imposes occupancy-based surcharges and other fees

Floodplain Management in NC





**Historic North
Carolina Flood
Events:**

**Hurricane Floyd
1999**

A rescue boat with two men and two dogs navigating a flooded road. The boat is a Crestliner with a Yamaha 40 outboard motor. The men are wearing life jackets and caps. One dog is a large brown dog, and the other is a white dog. A yellow speed limit sign is visible in the background.

Historic North Carolina Flood Events:

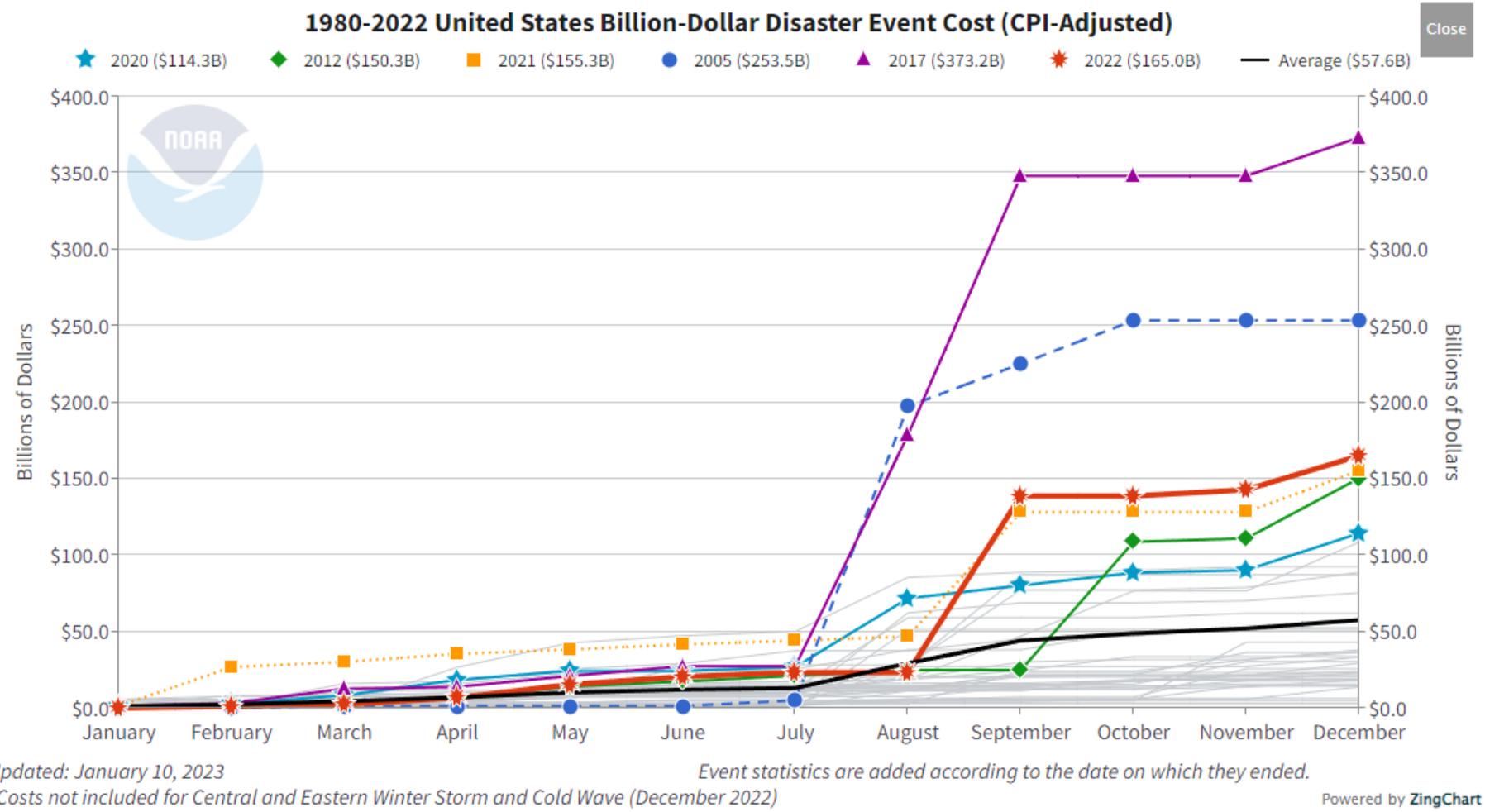
Hurricane Matthew 2016

An aerial photograph showing a multi-lane road completely submerged in floodwater. The water is a deep blue-grey color. On the right side of the road, there is a dense line of green trees. In the background, a town or city is visible under a cloudy sky. The overall scene depicts the aftermath of a major flood event.

**Historic North
Carolina Flood
Events:**

**Hurricane
Florence 2018**

Billion-Dollar Disasters on the Rise



EO266 Creation

EO80 – NC’s Commitment to Address Climate Change

NC Climate Risk Assessment and Resiliency Plan

NC Climate Change Interagency Council

Agencies to incorporate climate adaptation and resiliency into their policies

NC Climate Risk Assessment and Resiliency Plan

- Analyzed historical data and projected climate trends
- Identified areas of vulnerability of State infrastructure, assets and programs
- Provides a framework to guide future state action.
- Establish an Interagency Resilience Team.



EO123

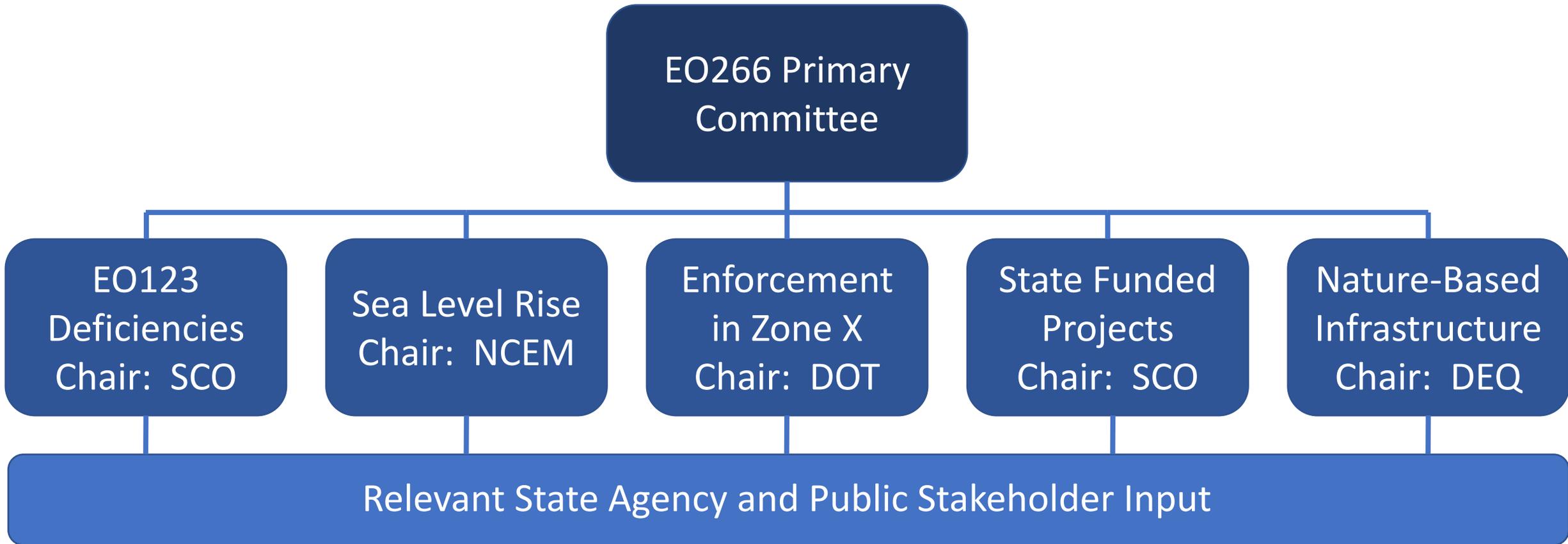
What's Wrong with EO123?

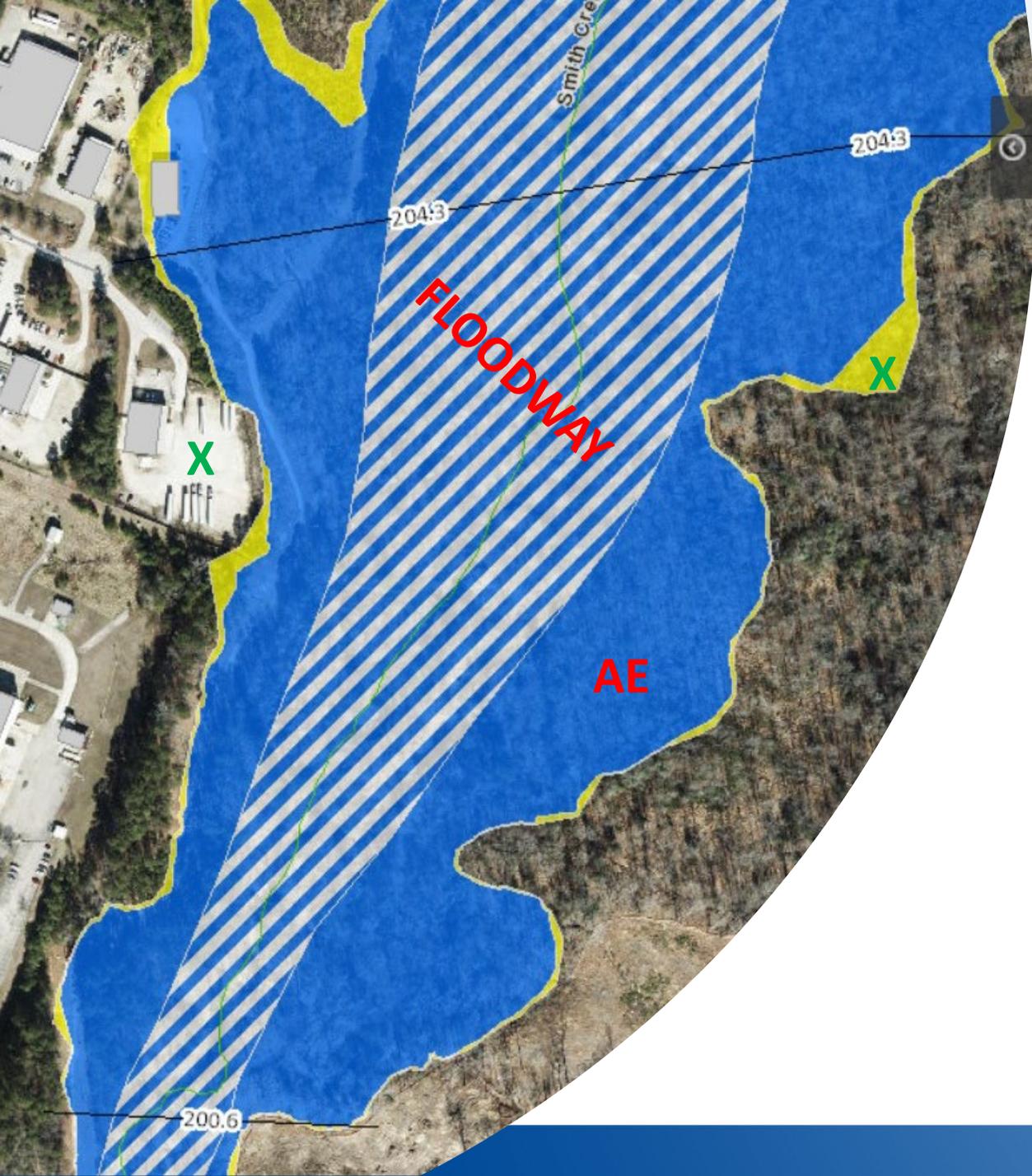
- Outdated. Last updated in 1990.
- Freeboard requirements not in accordance with current recommendations.
- Does not discourage or prevent new development in the floodplain.
- Sea Level Rise is not addressed.

What does EO266 ask us to do?

- NCDOA, in consultation w/ NCDEQ, NCDOT, NCEM & NCORR shall update EO123 as follows:
 - Reduce construction in the floodplain to the greatest extent feasible.
 - Minimize flood damage to state-owned assets.
 - Consider the impacts of sea level rise and climate change.
 - Support natural hydrologic conditions and the beneficial services provided by natural infrastructure.
 - Expand policy to state-funded construction to the extent feasible and permitted by law.

Tackling the Problem...

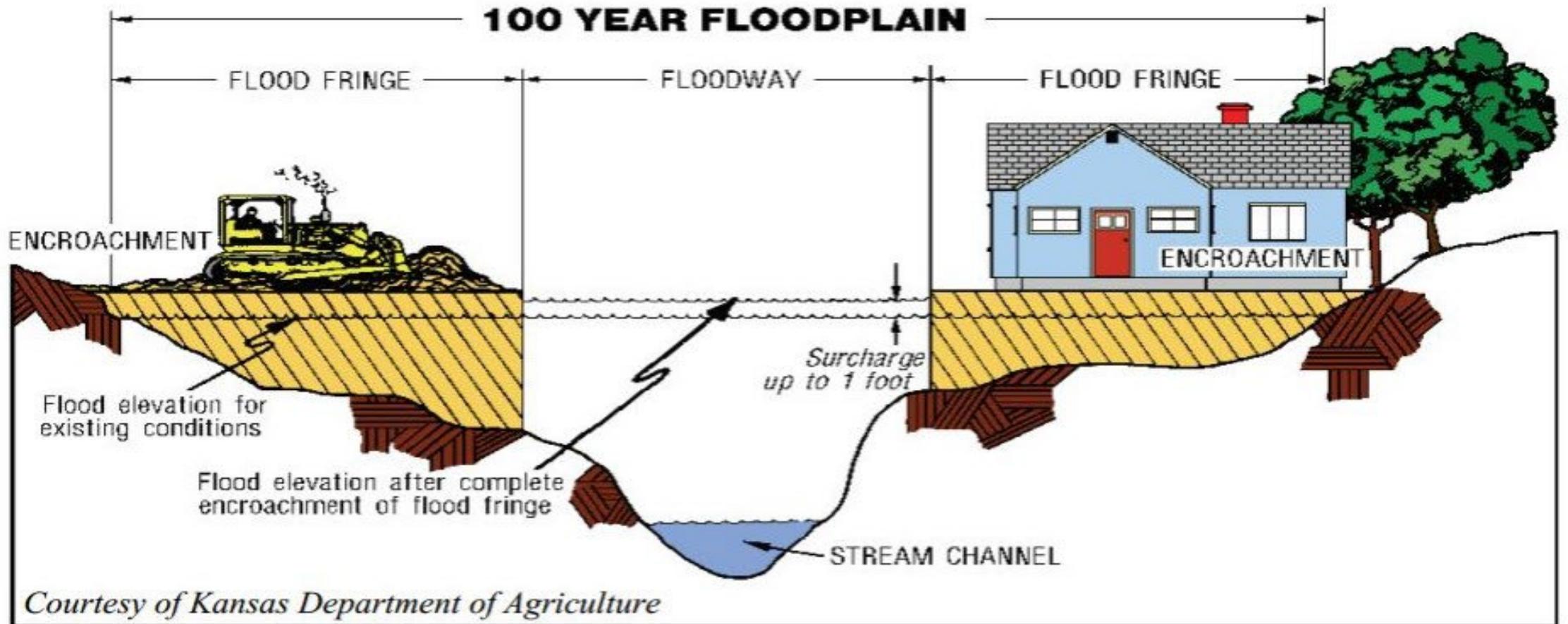




Terms and Definitions:

- Zone X (unshaded) – Area of minimal flood hazard, usually above the 500-year flood elevation. Currently **unregulated**.
- Zone X (shaded) – Area of moderate flood hazard, usually btwn limits of 100-year and 500-year flood. Currently **unregulated**.
- Zone AE – Has a 1% annual chance of flooding and coincides with the 100-year floodplain. **Regulated**.
- Floodway – **Highly Regulated**.

Terms and Definitions:



- Floodway – **Highly Regulated.**

Ad-Hoc #1: Updating EO123 Provisions

- Synchronize EO266, ASCE24, and NC Model Ordinance.
- Update Zone AE requirements per EO266.
- Integrate Coastal A-zones.
- Incorporate non-encroachment zones.
- Define “substantial improvement / repair” construction window.
- Delineate buoyancy safety factors.
- Clarify wet and dry floodproofing requirements and applicability.
- Incorporate § 143-215.54 into EO266 base language.

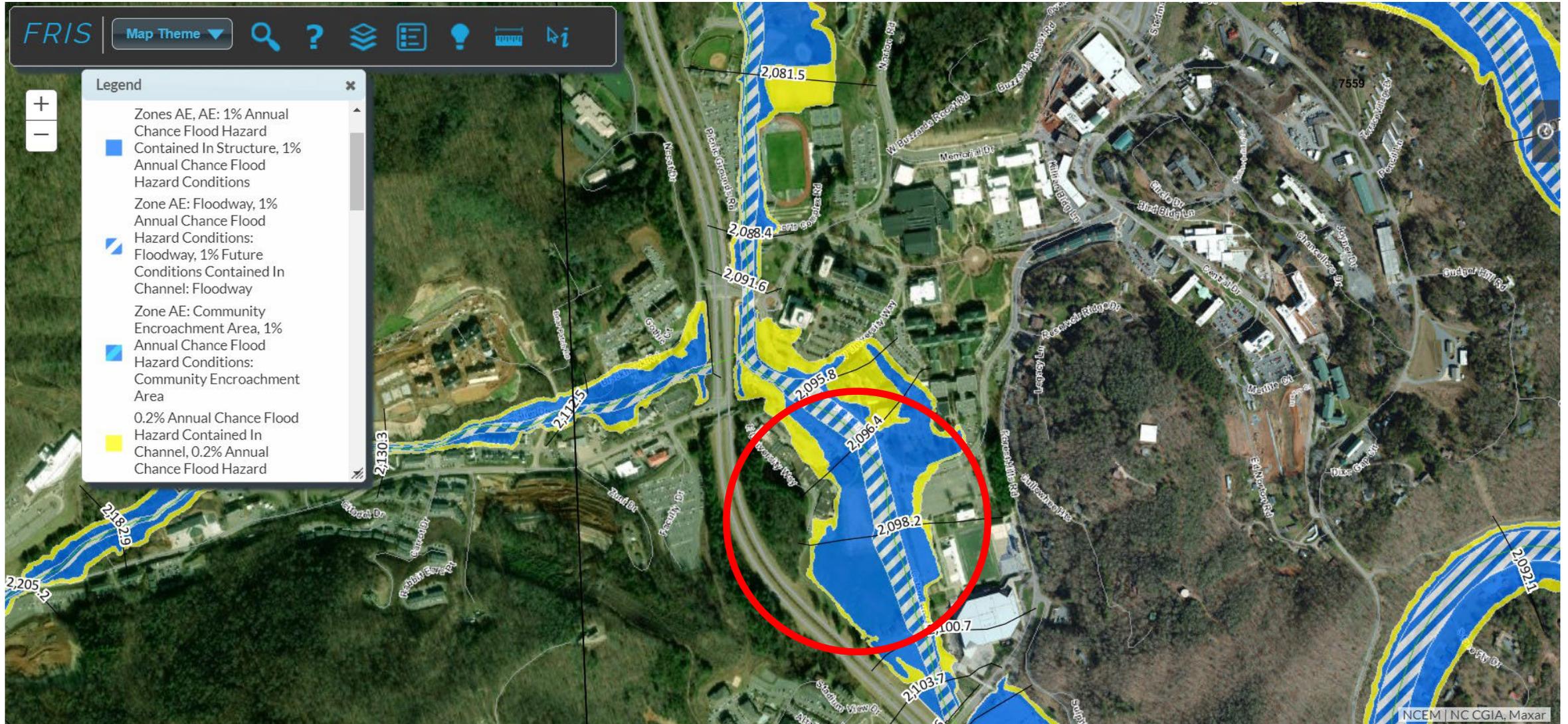
Construction in Zone AE



Western Carolina University

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Construction in Zone AE



Construction in Zone AE



Construction in Zone AE

EO123

- Construction not limited
- Buildings must be elevated or floodproofed.
- Flood permits and elevation certificates required.
- Freeboard = 2'-0"

EO266

- Not permitted
- Variance process for:
 - Functionally dependent structures
 - Historic structures
 - Conditions of "exceptional hardship"
 - Appurtenant structures
- If variance is granted, development must comply with all other aspects of EO266.
- Freeboard = 3'-0" to 4'-0".

Non-Encroachment Zones



NCDNCR Lake James State Park

Non-Encroachment Zones



Non-Encroachment Zones

EO123

- No special requirements defined
- 44 CFR 60.3(c)(10) minimum requirements apply
- In the absence of a regulatory floodway, water surface elevation of the base flood may not increase more than 1-foot at any point.

EO266

- Will be treated like regulatory floodway.
- Planned development, when combined with a fully developed fringe, may not rise water surface elevation in Non-Encroachment Zone
- NO RISE

Substantial Improvement / Repair



ASU Rankin Science Building

2023 State Construction Conference

Substantial Improvement / Repair



Substantial Improvement / Repair

EO123

- < 50% of the building's market value: Unregulated but SCO will push for compliance with current standards when feasible.
- > 50% of the building's market value: Entire building must comply with current floodplain management standards.
- Improvement / repairs not tracked.

EO266

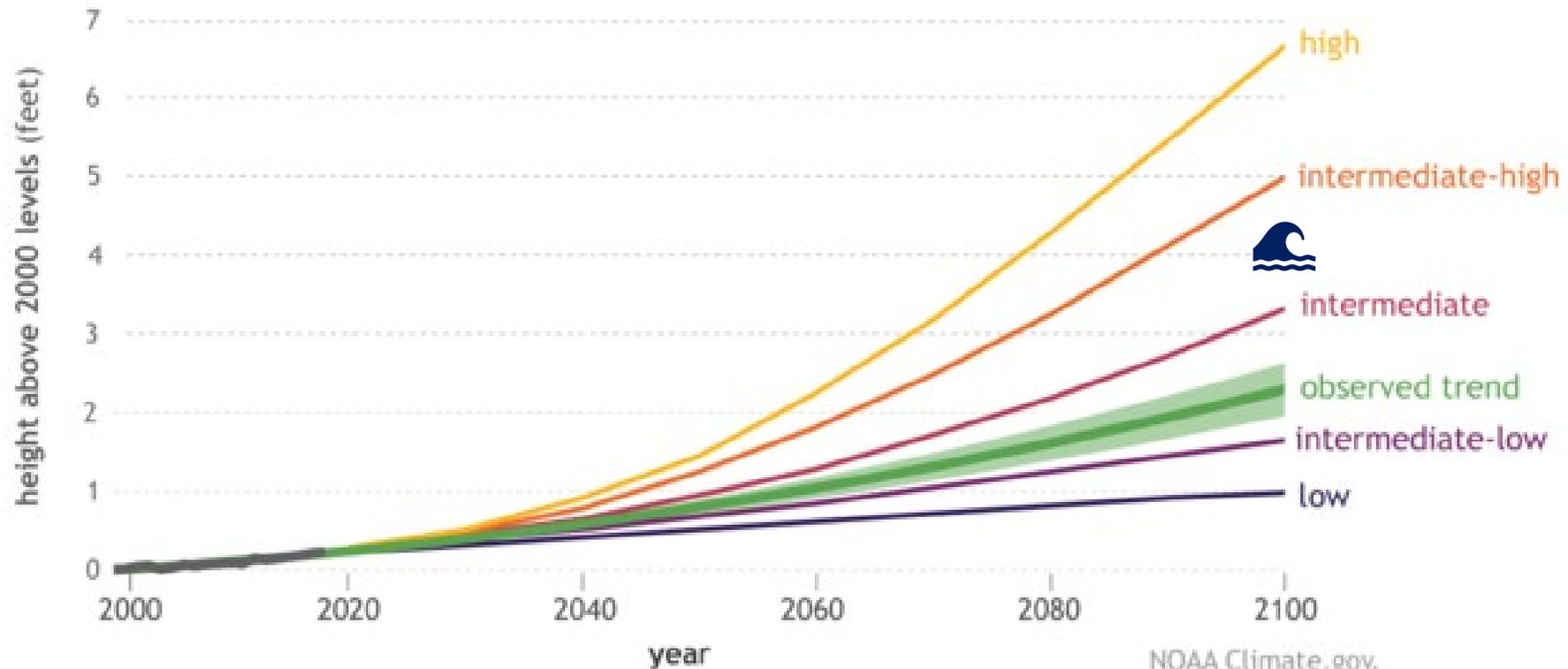
- Same as EO123 except...
- Improvement / repairs will be tracked on a 6-year cycle.
- *Full compliance* with current floodplain management standards will be more difficult under EO266.

Ad-Hoc #2: Sea Level Rise

- How much sea level rise should be considered?
- What data source should be used?
- How can sea level rise inundation data be communicated to end users?
- How should current FIRMS and future sea levels be combined?
- How will sea level rise change coastal A and V zones?

How much sea level rise?

Possible pathways for future sea level rise



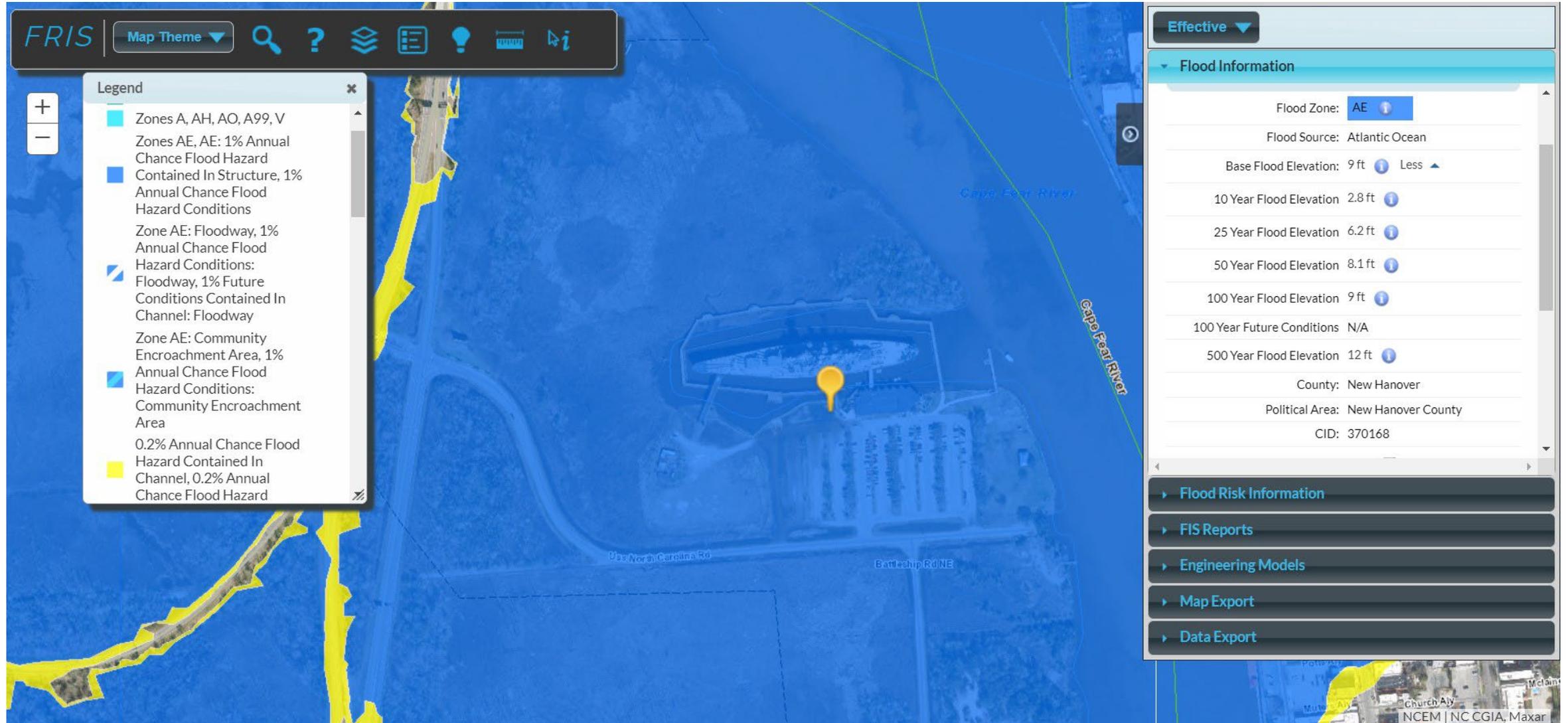
NOAA Climate.gov,
adapted from Sweet et al., 2022

Incorporating Sea Level Rise

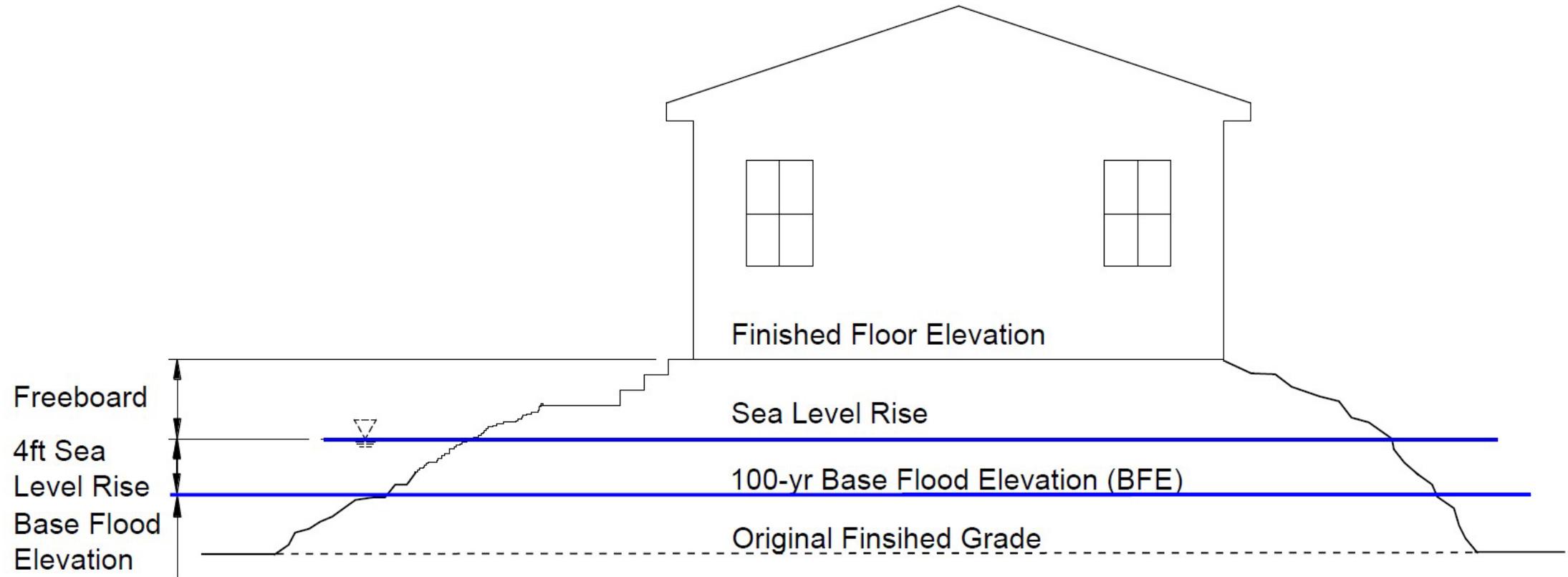


NCDNCR USS Battleship North Carolina

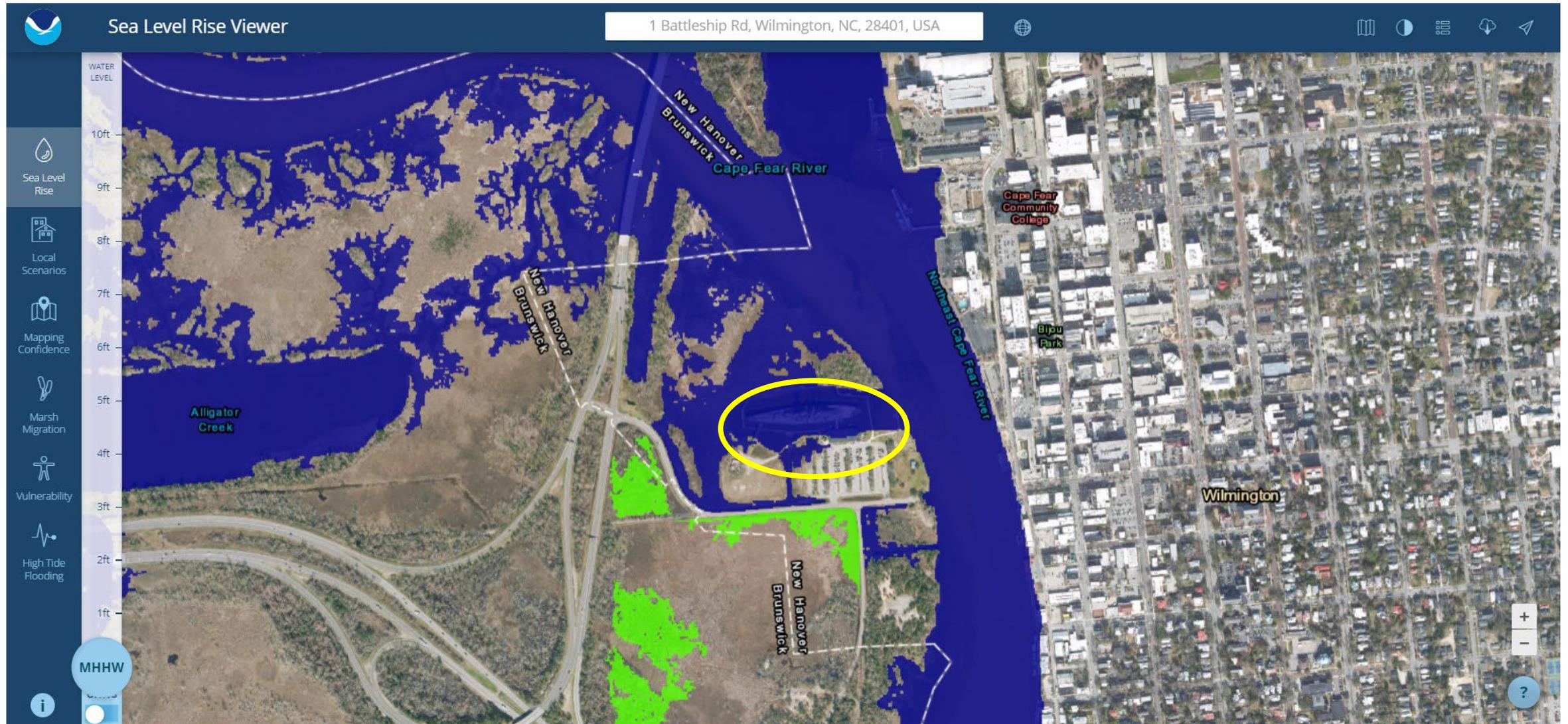
Incorporating Sea Level Rise



Incorporating Sea Level Rise



Incorporating Sea Level Rise



Incorporating Sea Level Rise



Incorporating Sea Level Rise (SLR)

EO123

- SLR not considered
- BFE + Freeboard
- Battleship: 9ft + 2ft. Minimum Finished Floor Elevation of 11'-0".

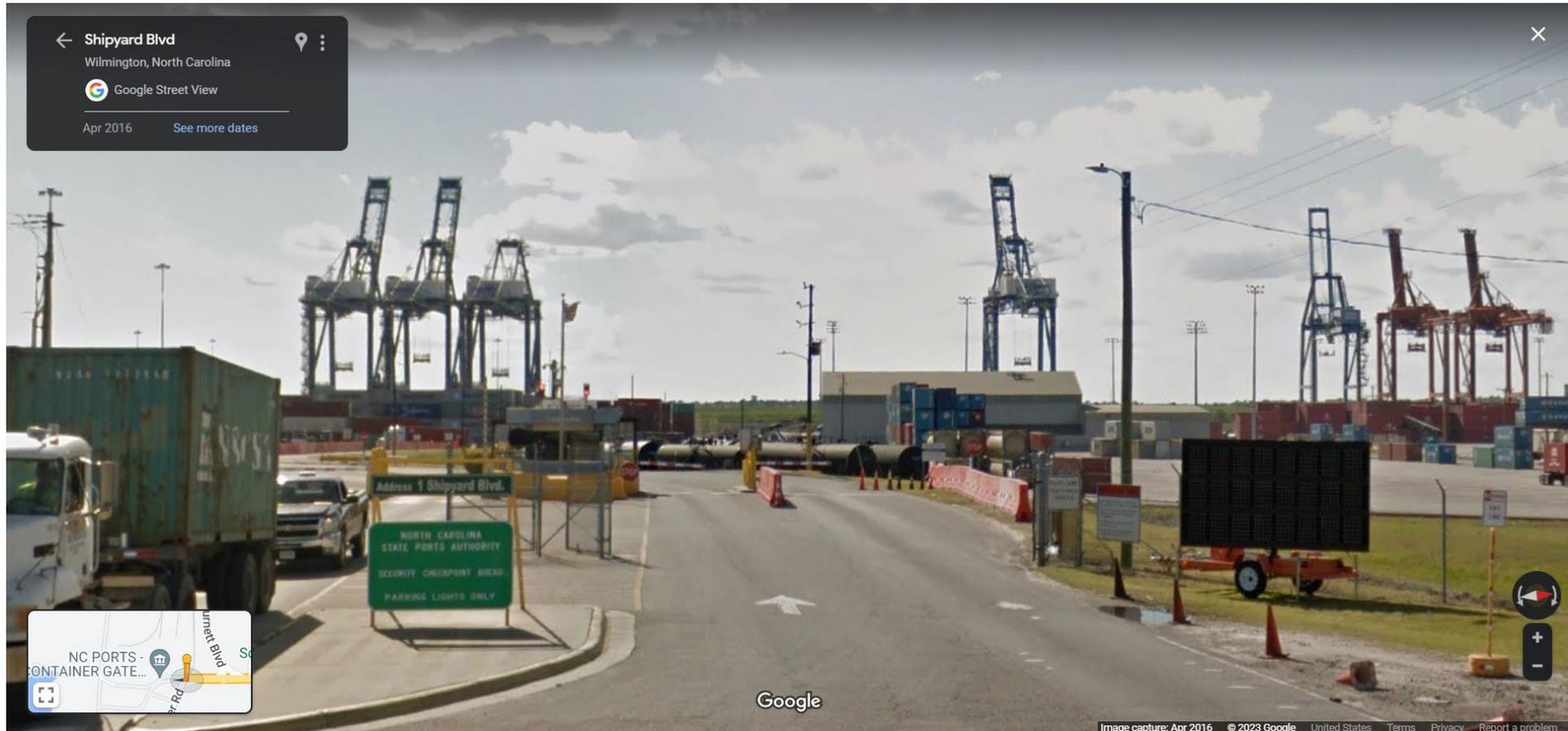
EO266

- Areas inundated by sea-level rise now regulated.
- Areas adjacent to inundation currently under review.
- BFE + SLR + Freeboard
- Battleship: 9ft + 4ft + 4ft. Minimum Finished Floor Elevation 17'-0".

Ad-Hoc #3: Expanding into Zone X

- How do we incorporate shaded Zone X?
- Can we reasonably incorporate flood prone areas in an unshaded Zone X?
- Will either have a meaningful impact on State insurance rates?

Construction in Shaded Zone X



NCDOT Port of Wilmington

2023 State Construction Conference

Construction in Shaded Zone X

The screenshot displays the FRIS (Flood Risk Information System) web application. The main map shows an aerial view of a construction site with a red rectangle highlighting a specific area. The site is overlaid with flood hazard zones: a blue shaded area (Zone AE) and a yellow shaded area (Zone X). A legend on the left provides details for these zones and other flood conditions. The right-hand panel, titled 'Effective', shows 'Flood Information' for the selected area, including the flood zone (0.2% Annual Chance Flood Hazard), flood source (Atlantic Ocean), and various flood elevations. The bottom right corner of the map area contains the text 'NCEM | NC CGIA, Maxar, Microsoft'.

Legend

- Chance Flood Hazard Contained In Structure, 1% Annual Chance Flood Hazard Conditions
- Zone AE: Floodway, 1% Annual Chance Flood Hazard Conditions: Floodway, 1% Future Conditions Contained In Channel: Floodway
- Zone AE: Community Encroachment Area, 1% Annual Chance Flood Hazard Conditions: Community Encroachment Area
- 0.2% Annual Chance Flood Hazard Contained In Channel, 0.2% Annual Chance Flood Hazard
- Zone X: 1% Future Conditions, 1% Future

Flood Information

Effective

Flood Zone: 0.2% Annual Chance Flood Hazard

Flood Source: Atlantic Ocean

Base Flood Elevation: N/A Less

10 Year Flood Elevation N/A

25 Year Flood Elevation N/A

50 Year Flood Elevation N/A

100 Year Flood Elevation N/A

100 Year Future Conditions N/A

500 Year Flood Elevation 12 ft

County: New Hanover

Political Area: City Of Wilmington

CID: 370171

Panel: 3116 Download

[Flood Risk Information](#)

[FIS Reports](#)

[Engineering Models](#)

[Map Export](#)

[Data Export](#)

NCEM | NC CGIA, Maxar, Microsoft

Construction in Shaded Zone X

EO123

- Construction not limited

EO266

- Not permitted
- If variance is granted, development must comply with all other aspects of EO266.
- Finished floor elevated to more stringent of:
 - Nearest adjacent 100-yr floodplain BFE + 4'-0" freeboard
 - 500-yr flood elevation

Ad-Hoc #4: State Funded Projects

- EO123 applies to State Property. Can EO226 be expanded to include all stated funded projects?
- Do we have the legal authority? Is this currently allowed?
- If it is not allowed, what are the next steps toward incorporation?
- If it is allowed:
 - How is the requirement communicated?
 - How will it be enforced during design and permitting?
 - How will conformance be ensured during construction?

State Funded Projects

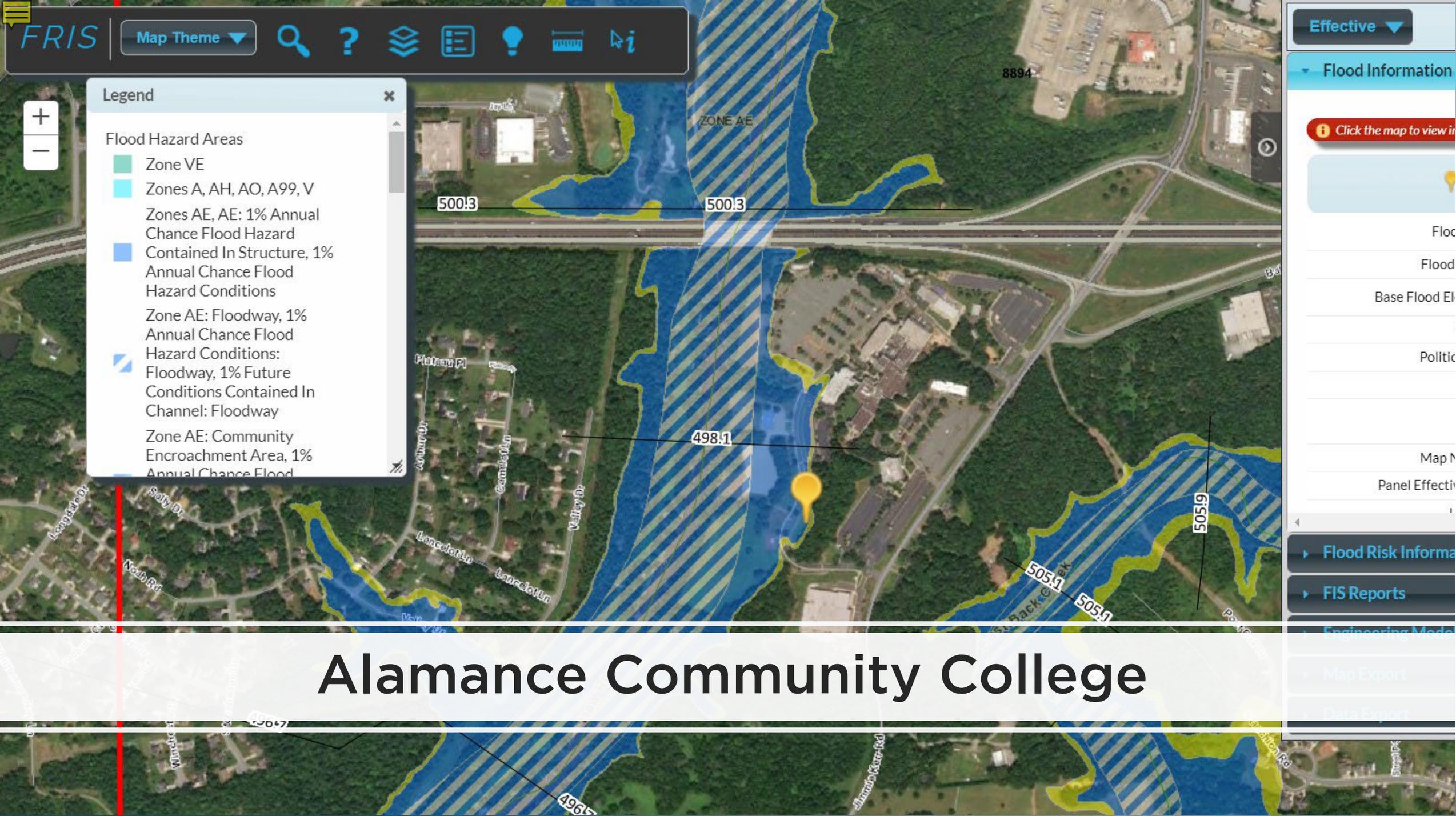


Alamance Community College

Legend

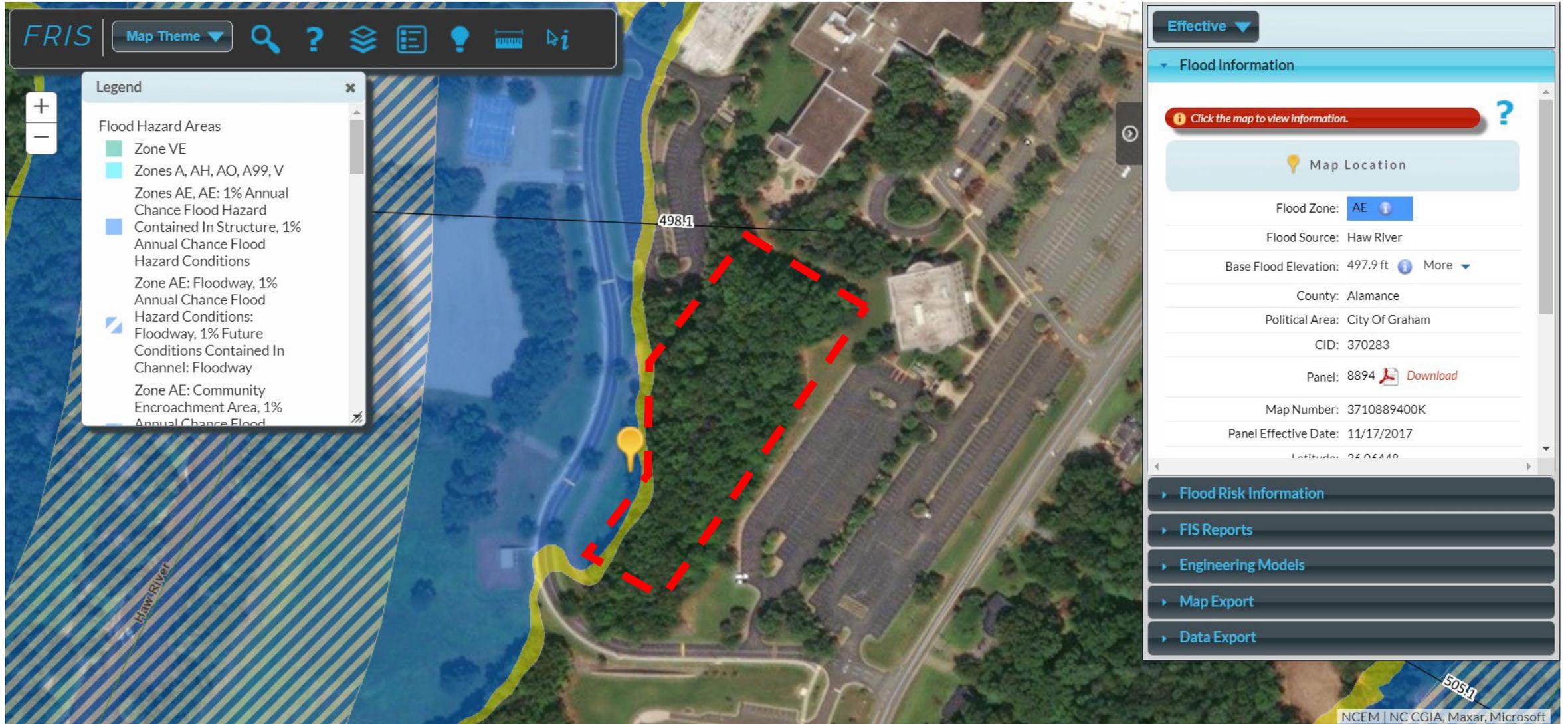
Flood Hazard Areas

- Zone VE
- Zones A, AH, AO, A99, V
- Zones AE, AE: 1% Annual Chance Flood Hazard
- Contained In Structure, 1% Annual Chance Flood Hazard Conditions
- Zone AE: Floodway, 1% Annual Chance Flood Hazard Conditions:
- Floodway, 1% Future Conditions Contained In Channel: Floodway
- Zone AE: Community Encroachment Area, 1% Annual Chance Flood



Alamance Community College

State Funded Projects





State Funded Projects

EO123

- Must comply with local floodplain ordinance
- Construction typically not limited

EO266

- No change... For now.
- If new laws are written...
 - Must comply with more restrictive of local ordinance and EO266.
 - Construction in the floodplain will be limited
 - Enforcement by local jurisdiction and possibly State entities.



Ad-Hoc #5: Nature Based Infrastructure

- Focus #1: At-risk coastal areas and shorelines.
- Focus #2: Areas subject to urban pluvial flooding due to extreme precipitation events.
- Focus areas may not be tied to the mapped floodplain.
- How can fundamental design considerations be fairly integrated into a regulatory text?
- When should nature based infrastructure be considered.

Carteret Community College Living



Carteret Community College Living



Nature Based Infrastructure

EO123

- No requirements
- Not included

EO266

- Provide options and considerations for including nature-based infrastructure to reduce flood risk
- Encourage incorporation of nature-based solutions into project/site design

Questions, Comments, Concerns...

EO123 Deficiencies
Chair: SCO

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Sea Level Rise
Chair: NCEM

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Enforcement in Zone X
Chair: DOT

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State Funded Projects
Chair: SCO

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Nature-Based Infrastructure
Chair: NCORR

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