



PORTSMOUTH'S HISTORIC DISTRICT AND SEA LEVEL RISE

City Council Chambers, February 22, 2017







Partridge Street





Ceres Street





Marcy Street

Local Adaptation Committee

Assembled by City staff with >10 members from

- Historic District Commission
- Strawberry Banke
- Interested local businesses and residents
- City Departments

Five meetings through 2017

- Review project progress
- Evaluate results and how to use them
- Contribute to draft recommendations

Presentation Overview

- Process through 2017
- Survey results and implications
- Sample of the planning actions identified
- Groundwater issues and next steps
- Questions and discussion

BACKGROUND



City of Portsmouth, New Hampshire

COASTAL RESILIENCE INITIATIVE

Climate Change Vulnerability Assessment and Adaptation Plan

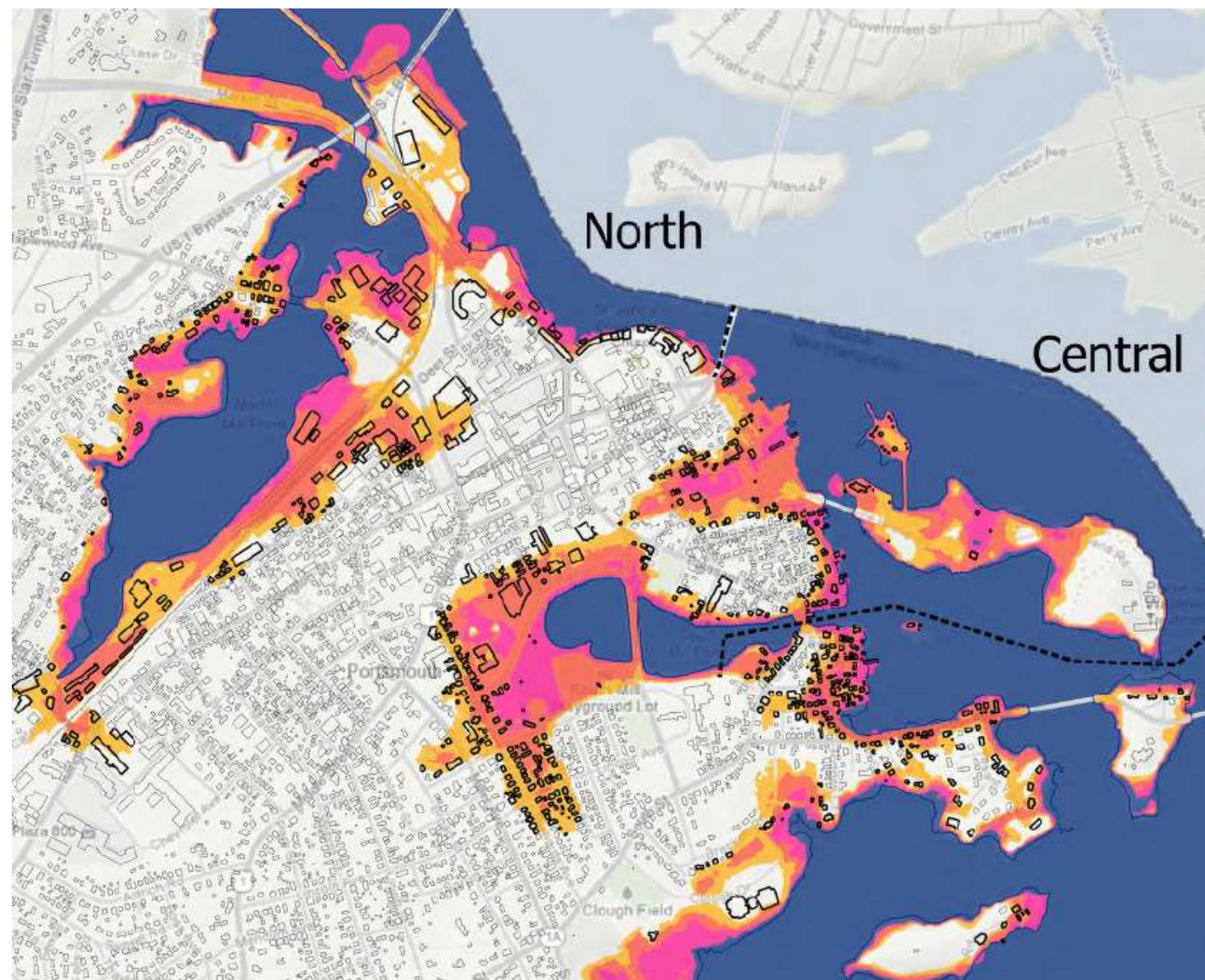
April 2, 2013



GEI



13.5' Flooded Building Layer



Methods

1. Identify four strategy areas
2. Survey parcels for their **historic value** scores (1 – 5)
3. Determine **cultural resource value** scores (1 – 5)
4. Calculate **tax value** scores (1 – 5)
5. Calculate **risk** scores (1 – 5)
6. Calculate **composite risk and value score**

Methods

1. Identify four strategy areas





Legend

Area

- Downtown
- North Mill Pond
- South Mill Pond
- South End
- Flood 13.5 ft



Strategy Areas Map



Methods

1. Identify four strategy areas
2. Survey parcels for their **historic value** scores (1 – 5)
 - Location
 - Design
 - Setting
 - Materials
 - Workmanship
 - Feeling
 - Association

For 503 parcels



Historic Valuation in the NRHP District



- Valuation Score 5
 - Retains all aspects of integrity
 - Very little or no alterations or modern materials
 - Historically sensitive restoration and/or renovation

Historic Valuation in the NRHP District



- Valuation Score 4
 - Retains nearly all aspects of integrity
 - Very few alterations
 - Only minor use of modern building materials
 - Historically sensitive restoration and/or renovation

Historic Valuation in the NRHP District



- Valuation Score 3
 - Retains some aspects of integrity
 - Large or significant alterations
 - Additions
 - Use of modern building materials and/or partial loss of original materials
 - Still retains some historic characteristics

Historic Valuation in the NRHP District



- Valuation Score 2
 - Retains very few aspects of integrity
 - Large or significant alterations
 - Additions, especially on the main facade
 - Use of modern building materials and loss of majority of original materials
 - Retains very few historic features

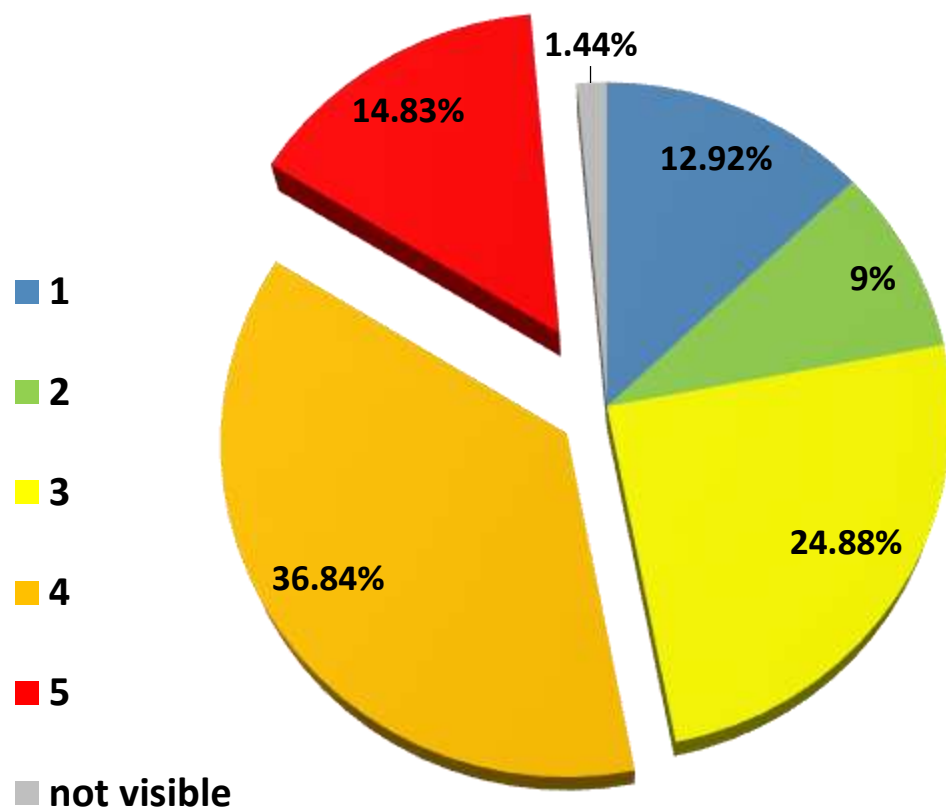
Historic Valuation in the NRHP District



- Valuation Score 1
 - Not of historic age
 - Retains almost no historic/original building materials
 - Major additions and/or alterations
 - No longer exhibits historic features

Historic Valuation in the NRHP District

Value Scores



Portsmouth's Historic District and Sea Level Rise



Portsmouth's Historic District and Sea Level Rise



Methods

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3. Determine **cultural resource value** scores (1 – 5)

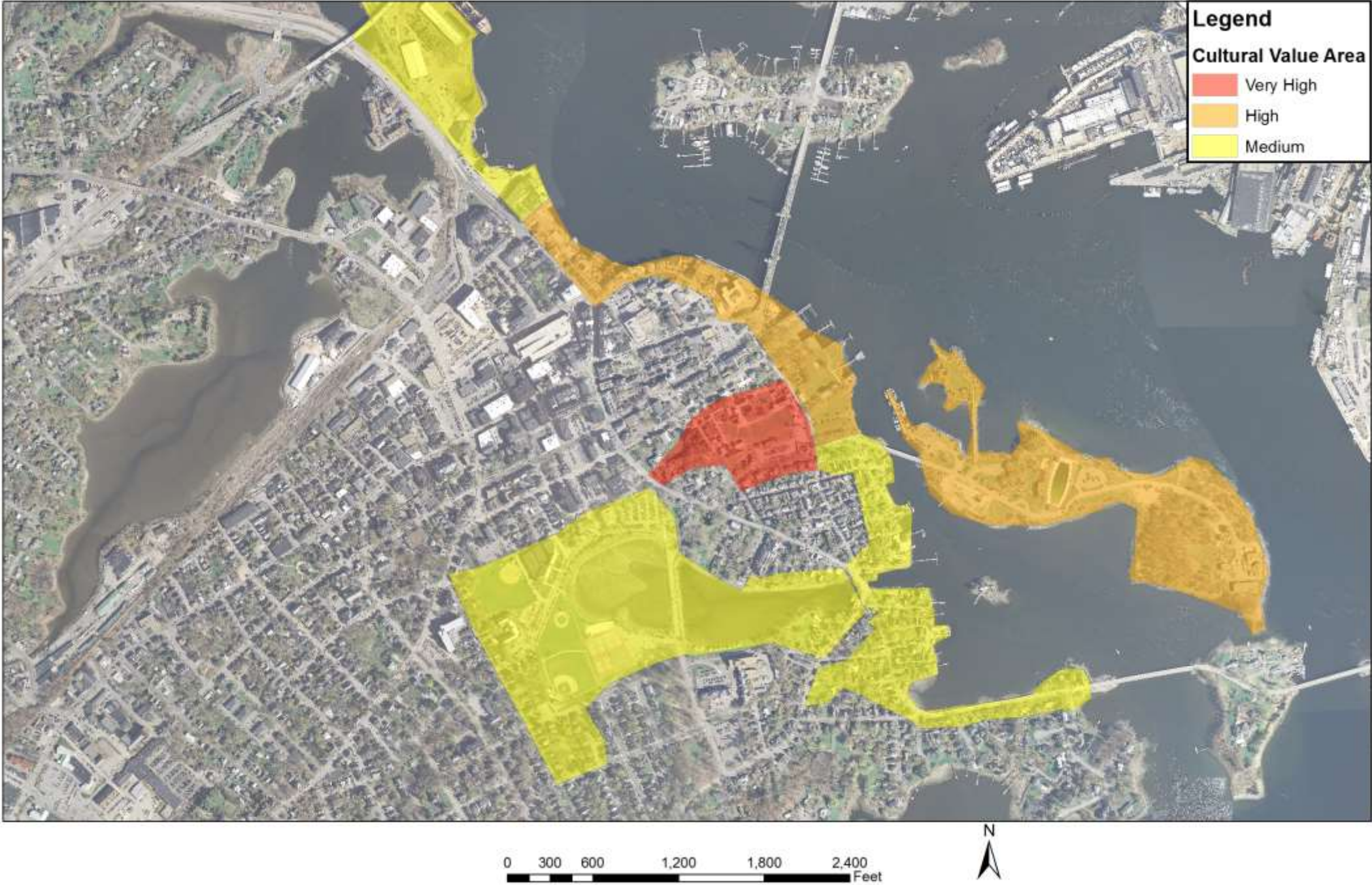


Cultural Value Areas Evaluation Matrix

- Public Use & Access
- Aesthetic Value
- Economic Value
- Educational Value
- Symbolic Value

#	CULTURAL VALUE AREA			SCORING - STEP 1		RANKING - STEP 2		CULTURAL VALUE (Final Score in Bold)
	LAC Score	Staff Score		LAC Score	Staff Score			
1 WORKING WATERFRONT	0	0	Public Use & Access	0	0			Very Low
	2	0	Aesthetic Value	0	2			Low
	6	2	Economic Value	5	2			Moderate
	2	2	Educational Value	0	0			High
	6	4	Symbolic Value	0	0			Very High
	6	4	Public Use & Access	0	0			Very Low
	6	4	Aesthetic Value	0	0			Low
	6	4	Economic Value	3	1			Moderate
	2	3	Educational Value	1	2			High
	6	4	Symbolic Value	2	1			Very High
3 PRESCOTT PARK	6	4	Public Use & Access	0	0			Very Low
	5	4	Aesthetic Value	1	0			Low
	4	4	Economic Value	2	0			Moderate
	2	4	Educational Value	2	4			High
	3	4	Symbolic Value	1	0			Very High
4 STRAWBERY BANKE	6	4	Public Use & Access	0	0			Very Low
	6	4	Aesthetic Value	0	0			Low
	6	4	Economic Value	0	0			Moderate
	6	4	Educational Value	1	0			High
	6	4	Symbolic Value	5	4			Very High
5 PEIRCE ISLAND	6	4	Public Use & Access	1	0			Very Low
	4	2	Aesthetic Value	1	2			Low
	4	3	Economic Value	2	2			Moderate
	2	2	Educational Value	2	0			High
	4	3	Symbolic Value	0	0			Very High
6 CIVIC CAMPUS ALONG THE SOUTH MILL POND	6	4	Public Use & Access	1	0			Very Low
	5	2	Aesthetic Value	0	2			Low
	2	0	Economic Value	2	2			Moderate
	5	4	Educational Value	3	0			High
	3	1	Symbolic Value	0	0			Very High
7 SOUTH END NEIGHBORHOOD	5	3	Public Use & Access	0	0			Very Low
	6	4	Aesthetic Value	1	0			Low
	6	4	Economic Value	1	0			Moderate
	4	4	Educational Value	1	1			High
	5	4	Symbolic Value	3	3			Very High

Portsmouth's Historic District and Sea Level Rise



Portsmouth's Historic District and Sea Level Rise

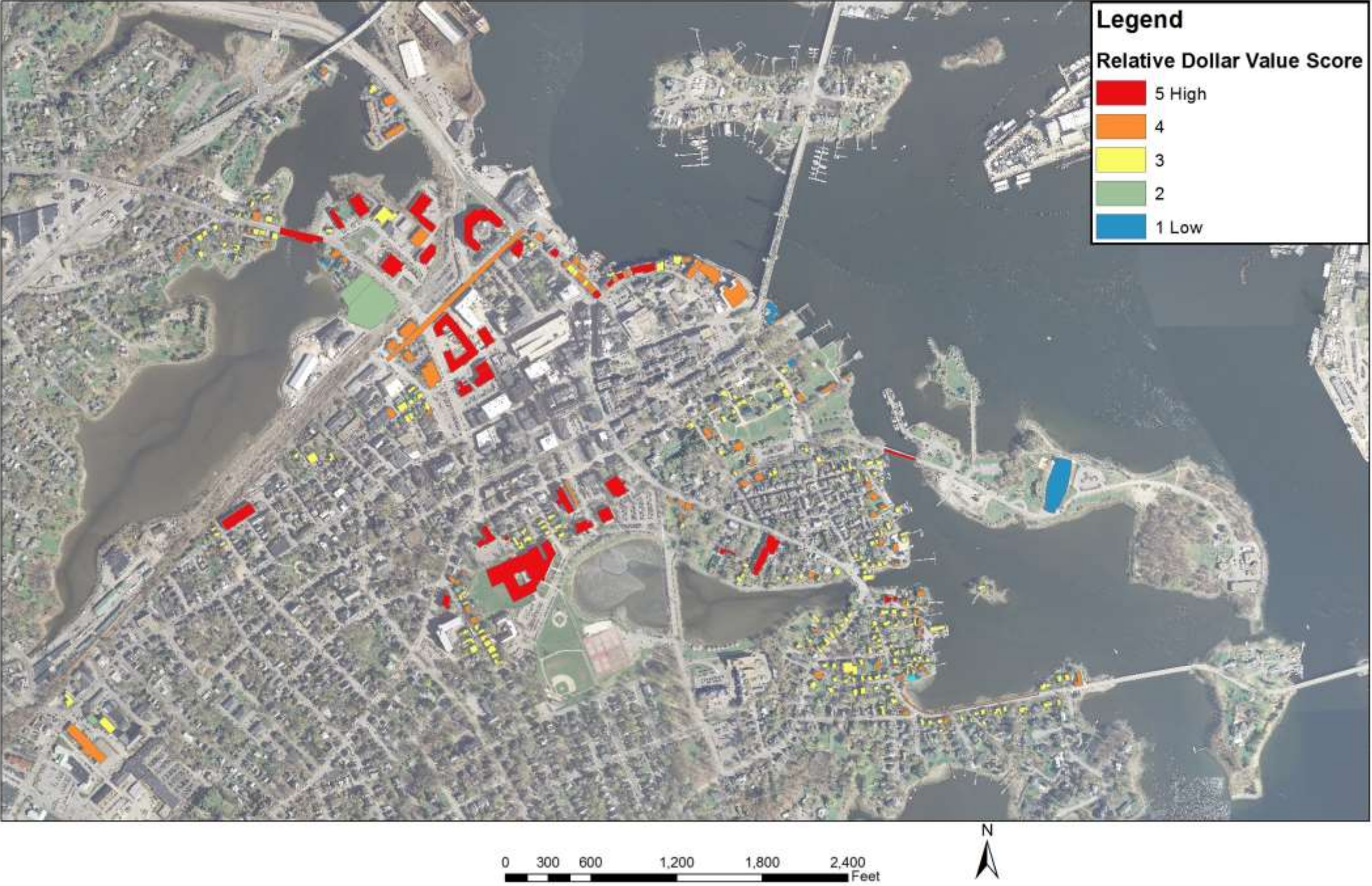


Methods

1. Identify four strategy areas
2. Survey parcels for their **historic value** scores (1 – 5)
3. Determine **cultural resource value** scores (1 – 5)
4. Calculate **tax value** scores (1 – 5)



Portsmouth's Historic District and Sea Level Rise

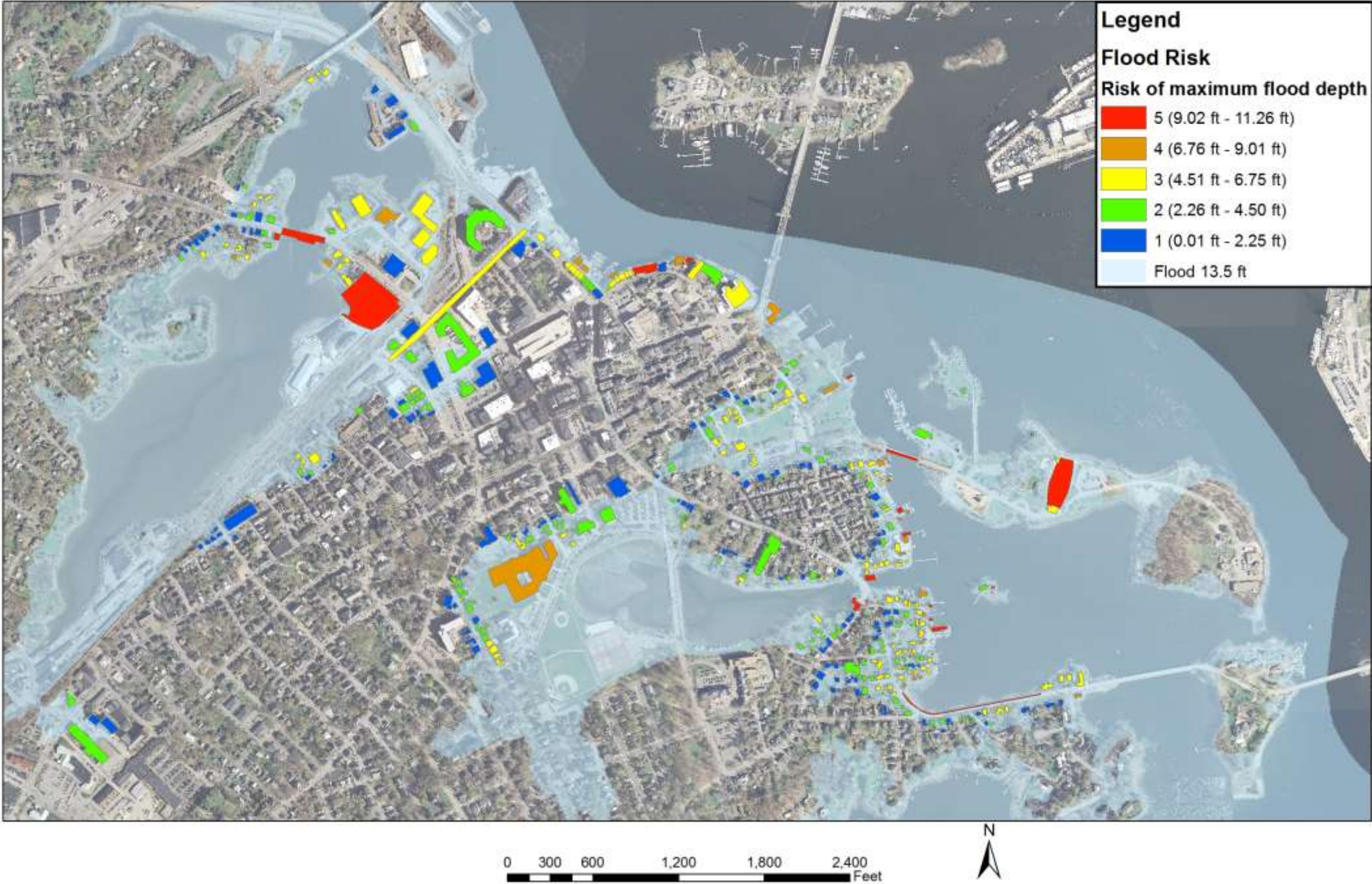


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Portsmouth's Historic District and Sea Level Rise



Methods

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6. Calculate composite **risk and value score**

Portsmouth's Historic District and Sea Level Rise



Flood Modeling

Created six scenarios:

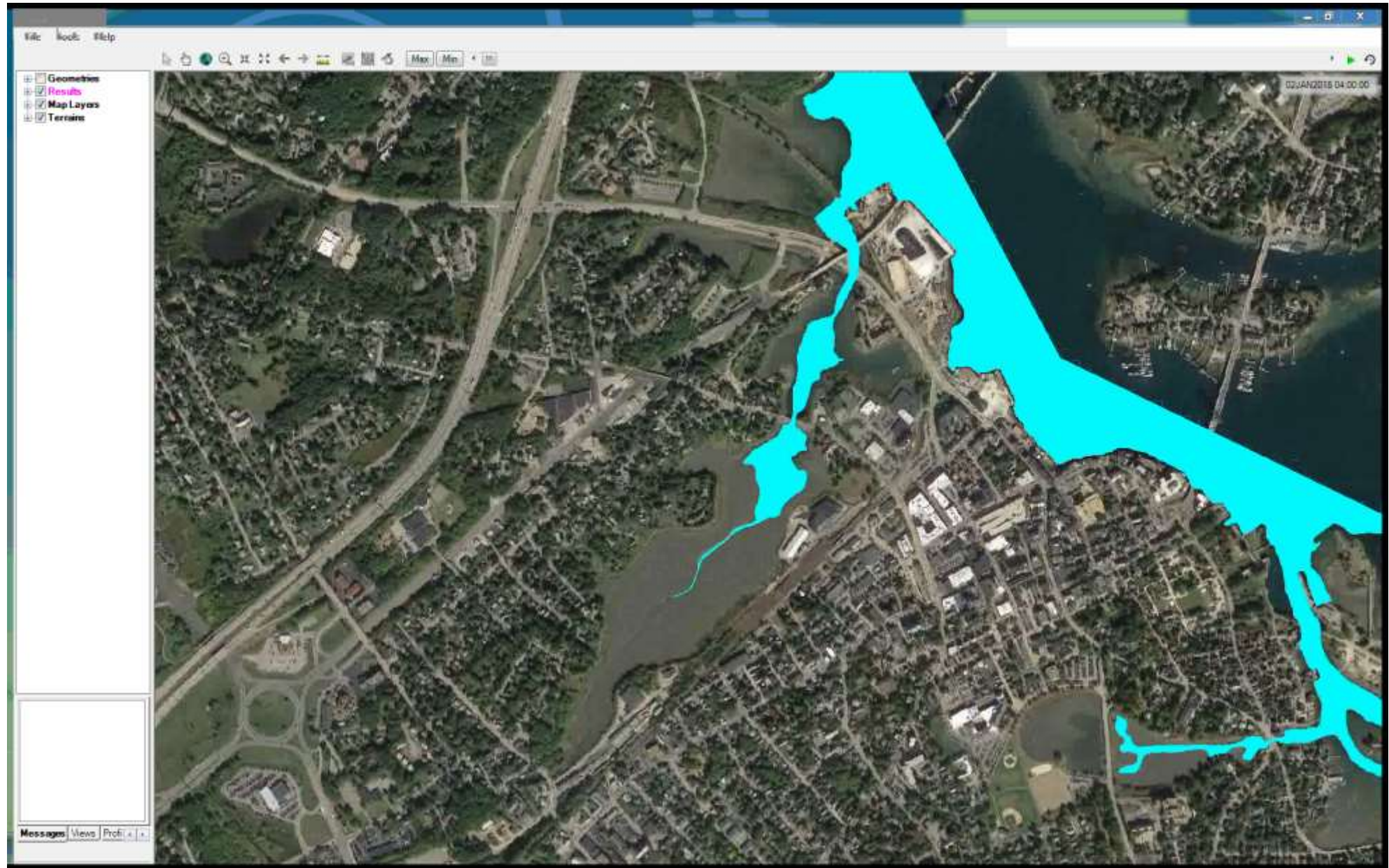
Today	+1.7' SLR	+2.5' SLR
1) King tide	3) King tide	5) King tide
2) Storm surge in addition	4) Storm surge in addition	6) Storm surge in addition

Each uses the King tide and surge elevations from events in early January 2018.

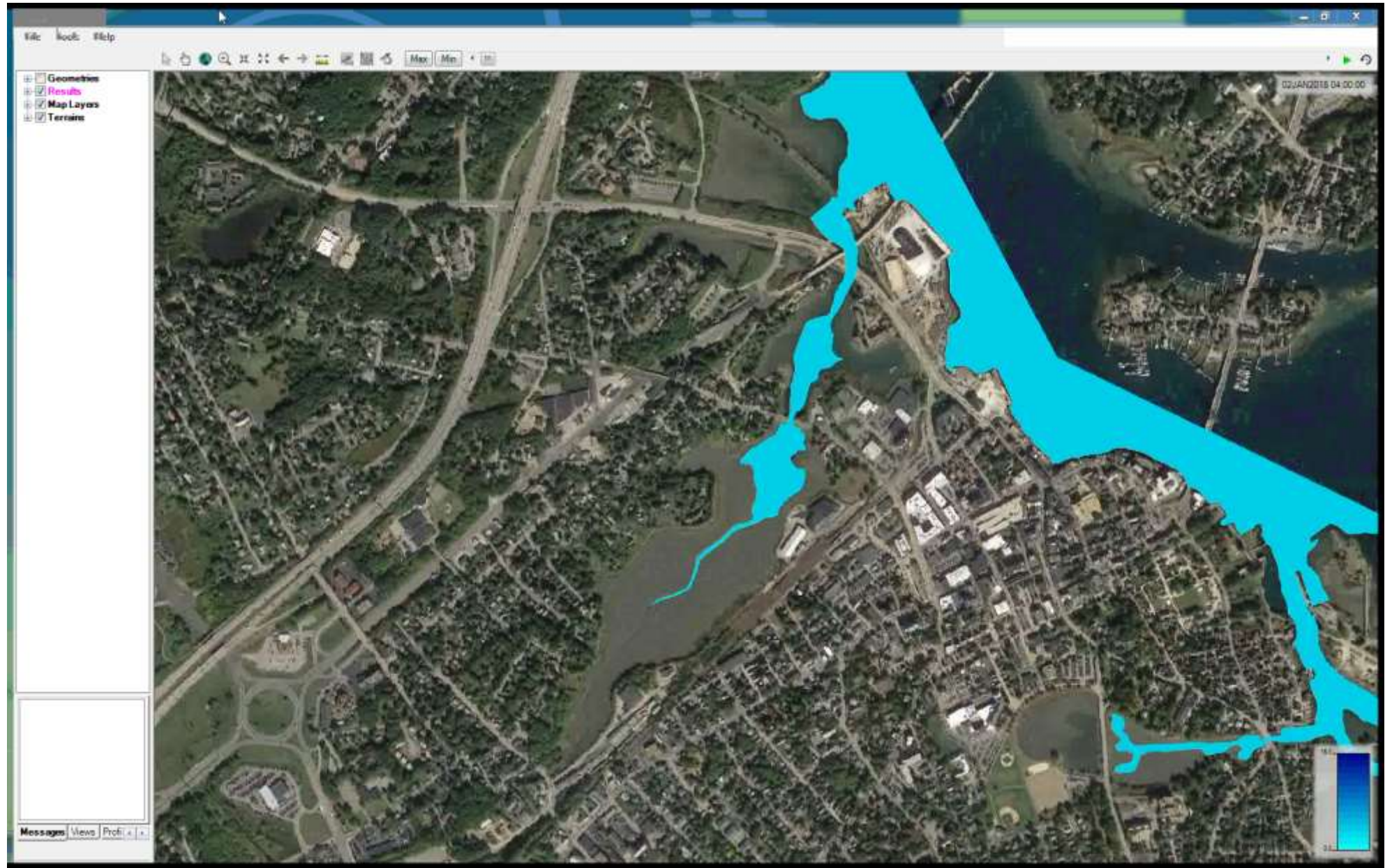
Each has a short video spanning three tide cycles.

To illustrate, we will now show two of these (1 and 6 above) for part of Portsmouth.

January 2018 King Tide



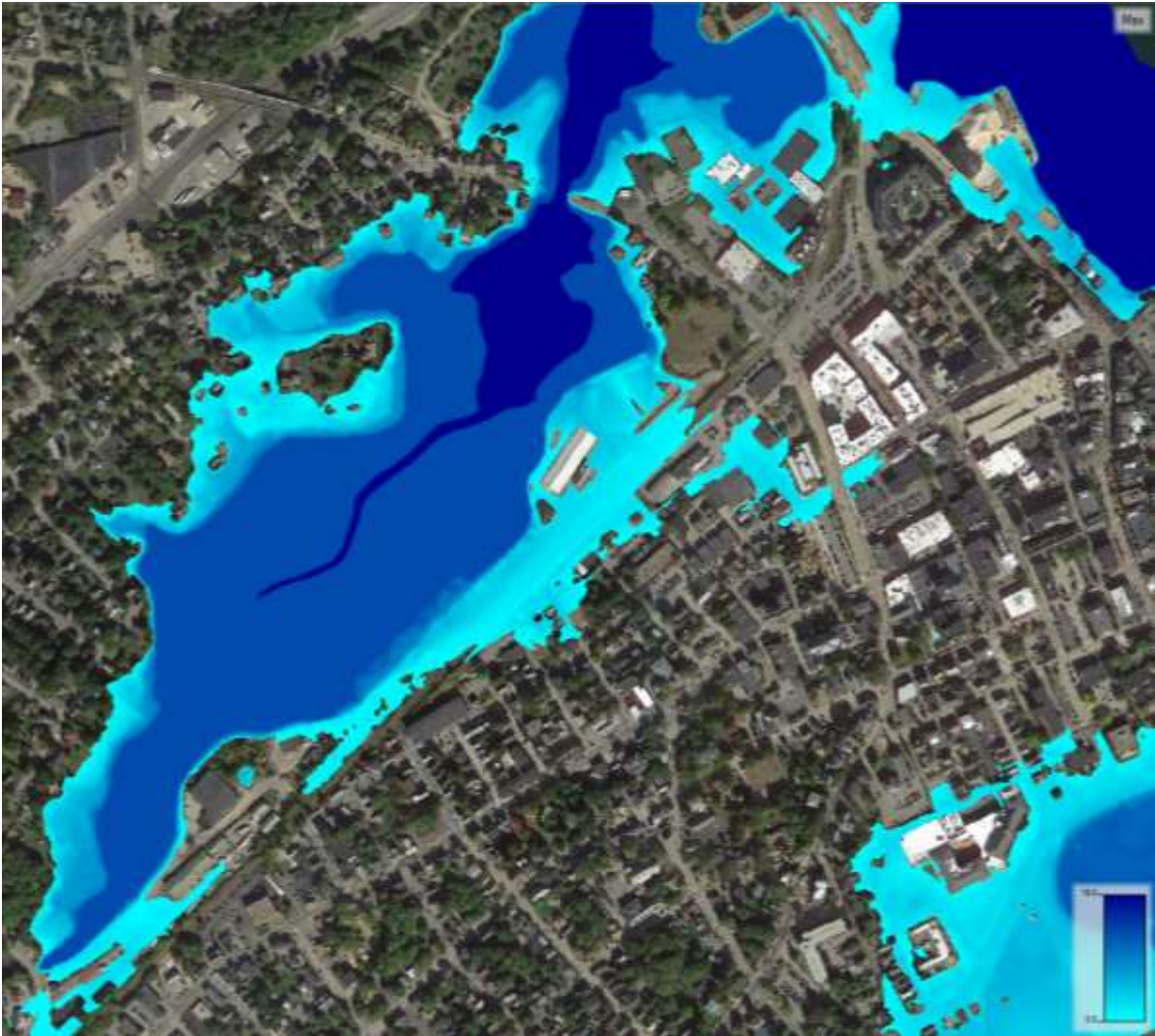
January 2018 King Tide + Surge + 2.5' SLR



January 2018 King Tide
Peak Depth



January 2018 King Tide Plus Surge and 2.5' SLR
Peak Depth



Adaptation Actions

- 1) Examined 18 candidate locations and specific actions
- 2) Considered planning and emergency management actions
- 3) Developed possible groundwater monitoring actions

Adaptation Actions

- 1) Examined 18 candidate locations and specific actions
 - Grouped by neighborhood and action type
 - Presented in an interactive online format



Legend

Area

- Downtown
- North Mill Pond
- South Mill Pond
- South End
- Flood 13.5 ft

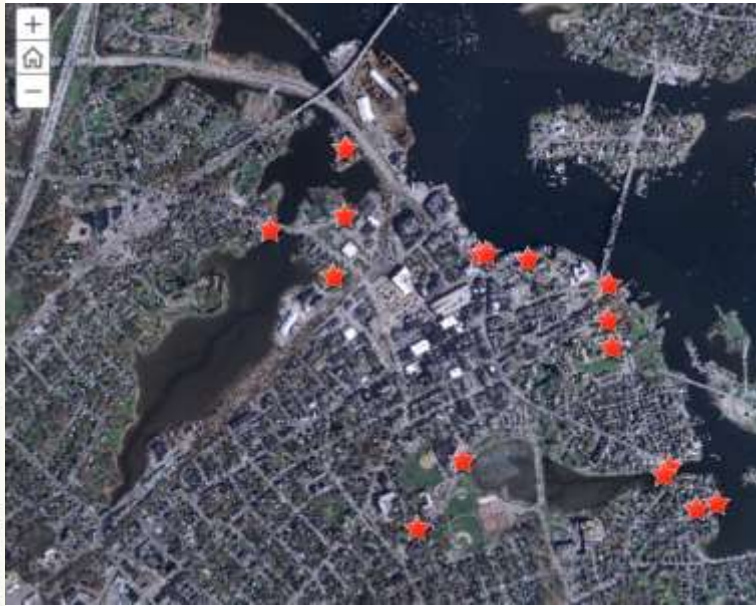


Strategy Areas Map



Portsmouth Historic Vulnerability Assessment

Portsmouth Historic Properties Climate Change Vulnerability Assessment and Adaptation Planning Initiative
Using coastal flooding projections, Historic District studies, and input from the Local Adaptation Committee, a set of adaptation actions has been developed to illustrate a range of approaches that may merit further consideration by the City. For each of 16 actions, this site discusses feasibility, potential effectiveness, cost, and impact on historic character.





Portsmouth Historic Vulnerability Assessment

Strategy #15



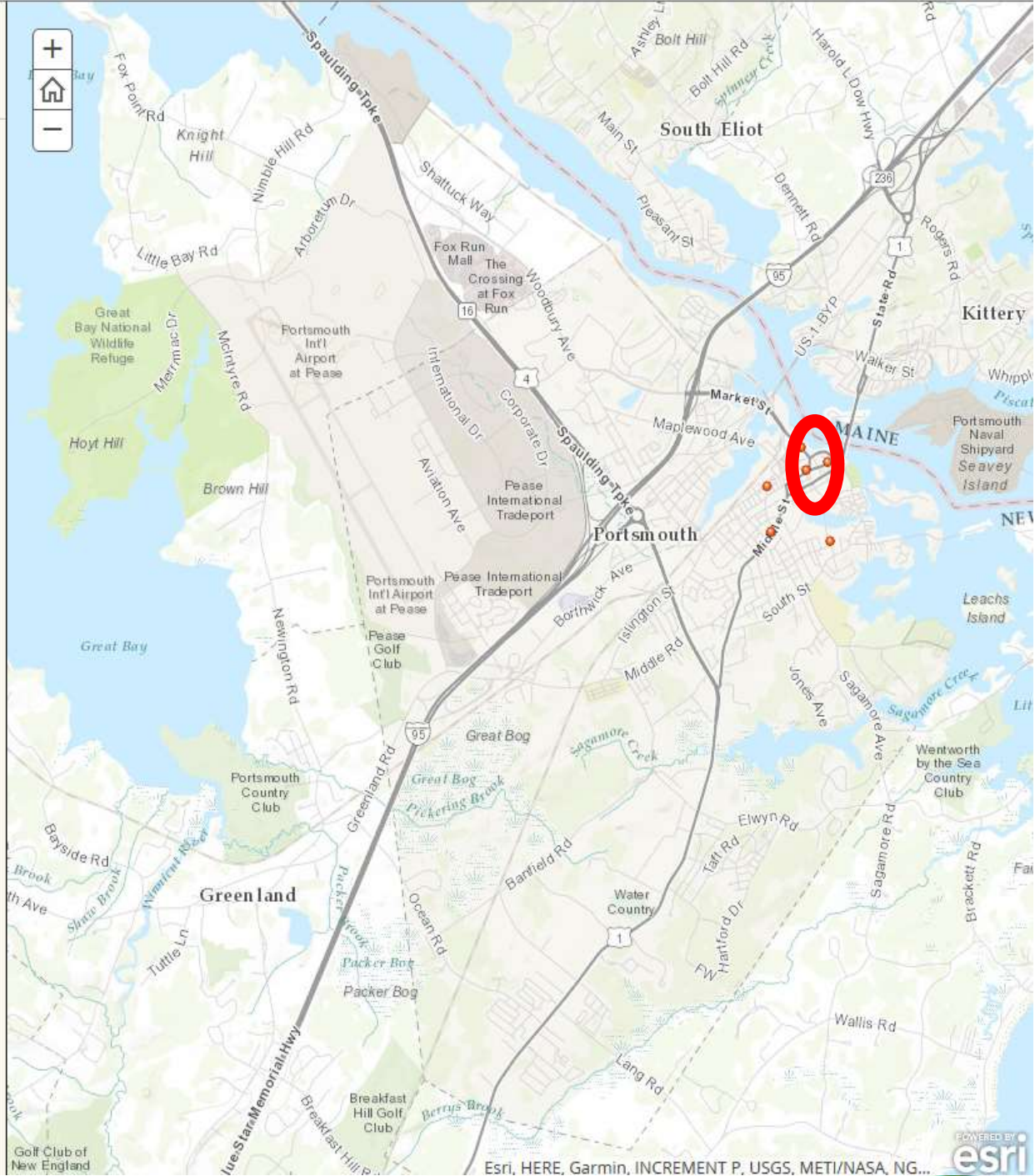
Market and Ceres Streets/Warehouses

Candidate Actions

Dry floodproof, abandon below grade space

Potential Feasibility

Dry floodproofing is a standard approach used in many commercial and residential coastal settings that involves keeping water out of the structure and away from its contents. It comprises a diverse set of possible activities including sealing exterior brick and concrete, closing basement openings, and arranging for immediate availability of temporary flood barriers over doors and windows. These buildings of masonry construction are good candidates for dry floodproofing. Openings around the perimeter of the buildings can be protected with removable flood coverings over doors and windows, which can be stored when flood conditions are not present. The first several feet of brick can be sealed with impermeable coating and recovered with false brick covering to eliminate the appearance of a modified structure. An additional strategy to consider is providing incentives to encourage abandonment of below grade space, including providing incentives for termination of all business activity there and moving objects to higher floors. Feasibility of these actions is often determined by cost, who would pay, and public or private acceptance of both the possible aesthetic changes and the reduction in business activity that might accompany abandonment of commercial space currently in use. Although these actions may be feasible in this location, firm conclusions would need to be further evaluated through additional engineering, and conversations with property



Story Map Online Visualization

Actions evaluated included

- Floodproofing structures (dry and wet techniques)
- Structural elevation
- Sea walls, revetments
- Voluntary buyout programs
- Floodproofing rebate programs

<https://arcg.is/1XXj5u>



Story Map Online Visualization

For each action we discuss:

- Potential feasibility
- Potential effectiveness
- Potential cost
- Potential impacts to historic character

<https://arcg.is/1XXj5u>



Adaptation Actions

- 1) Examined 18 candidate locations and specific actions
- 2) Considered planning and emergency management actions
- 3) Developed groundwater monitoring actions



Possible Planning Actions

City of Portsmouth Master Plan (2017)

Theme 2 Authentic. A city that treasures its unique character, natural resources, and historic assets.

Action 2.1.1. Implement standards and guidelines to protect community character and assets, including....resilience.

Theme 5 Resilient. A city that considers and values the long-term health of its natural and built environments.

Action 5.5.1. Incorporate sea-level rise projections....into adaptation planning and land use regulations.

Local Design and Guidelines

Flood Risk Assessment. Require evaluation of 100-year/1% chance flood and projected sea-level rise

Resilient Design. Require for developments in identified high risk flood areas

Habitat and Shoreline Protection. Encourage “living shoreline” practices where feasible

Property Buy-Out Program. Voluntary program; convert land to open space, parks, flood storage

Possible Planning Actions

Regulatory Options

Section 10.620 - Portsmouth's Flood Plain District

Variances. When a variance is requested, require that utilities be relocated to appropriate elevations (may be determined on a case by case based on flood depth maps) when interior renovations are made, and floodproofing to the extent practicable when exterior renovations are made.

Review Criteria. Add flood risk reduction measures for consideration, and a definition.

Exemptions. For a number of exempted actions, require flood risk reduction measures to be incorporated.

Temporary Measures. Include standards for installation of temporary flood risk reduction measures.

Section 10.630 - Portsmouth's Historic District

Exempt Activities. Add incentives and performance standards for adaptation strategies.

Certificate of Approval - Major Projects. Add requirements for adaptation strategies.

Design Guidelines. Develop guidelines and policies that encourage adaptation strategies.

Possible Planning Actions

Coastal Resilience Initiative Report (2013)

Recommendation ZLU-6: Prepare a Historic District Flood Hazard Adaptation Plan which utilizes the results of an inventory to provide a long-term framework for floodproofing of structures, and opportunities for protection or relocation of structures.

Recommendation ZLU-1. Extended Flood Hazard Overlay District. Capture high risk flood areas not contained within the current 100-year/1% chance annual flood area.

Recommendation ZLU-8 & 13. Infrastructure Planning. Establish road and street elevations based on flood elevations in high risk flood areas. Determine costs associated with maintenance and reinforcement of critical infrastructure based on increasing flood risks.

Policies and Practices

Develop a comprehensive Climate Adaptation Policy including integration of adaptation across plans, regulations, practices.

Develop guidance for voluntary adaptation actions by property owners.

Possible Emergency Management Actions

Recommendation

Prepare an Addendum to the city's Hazard Mitigation Plan (HMP) designating high-risk flood area of the Historic District, as identified in this assessment, as a "special flood mitigation area" for the purpose of protecting against and mitigating flood impacts from sea-level rise and storm surge. Specific flood hazard mitigation strategies should describe specifically what historic resources in the designated area would be saved or protected.

Other Recommendations

Adopt Addendum to HMP and incorporate in 2022 HMP update.

Incorporate HMP adaptation measures into Capital Improvement Plan and DPW work plan.

Convene an annual meeting of the HMP workgroup to evaluate implementation progress.

Explore public/private partnerships for implementation of adaptation measures.

Provide public outreach about the benefits of flood insurance.

Adaptation Actions

- 1) Examine 18 candidate locations and specific actions
- 2) Considered planning and emergency management actions
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GROUNDWATER

1. View a 3-minute video prepared for the Strawberry Banke Museum and posted online in December 2017.
(<https://www.youtube.com/watch?v=IHAPJUQGwjg>)
2. Discuss 2017 research on these trends in relation to sea level rise in the Portsmouth area.
3. Present next steps the City is considering.

Portsmouth's Historic District and Sea Level Rise



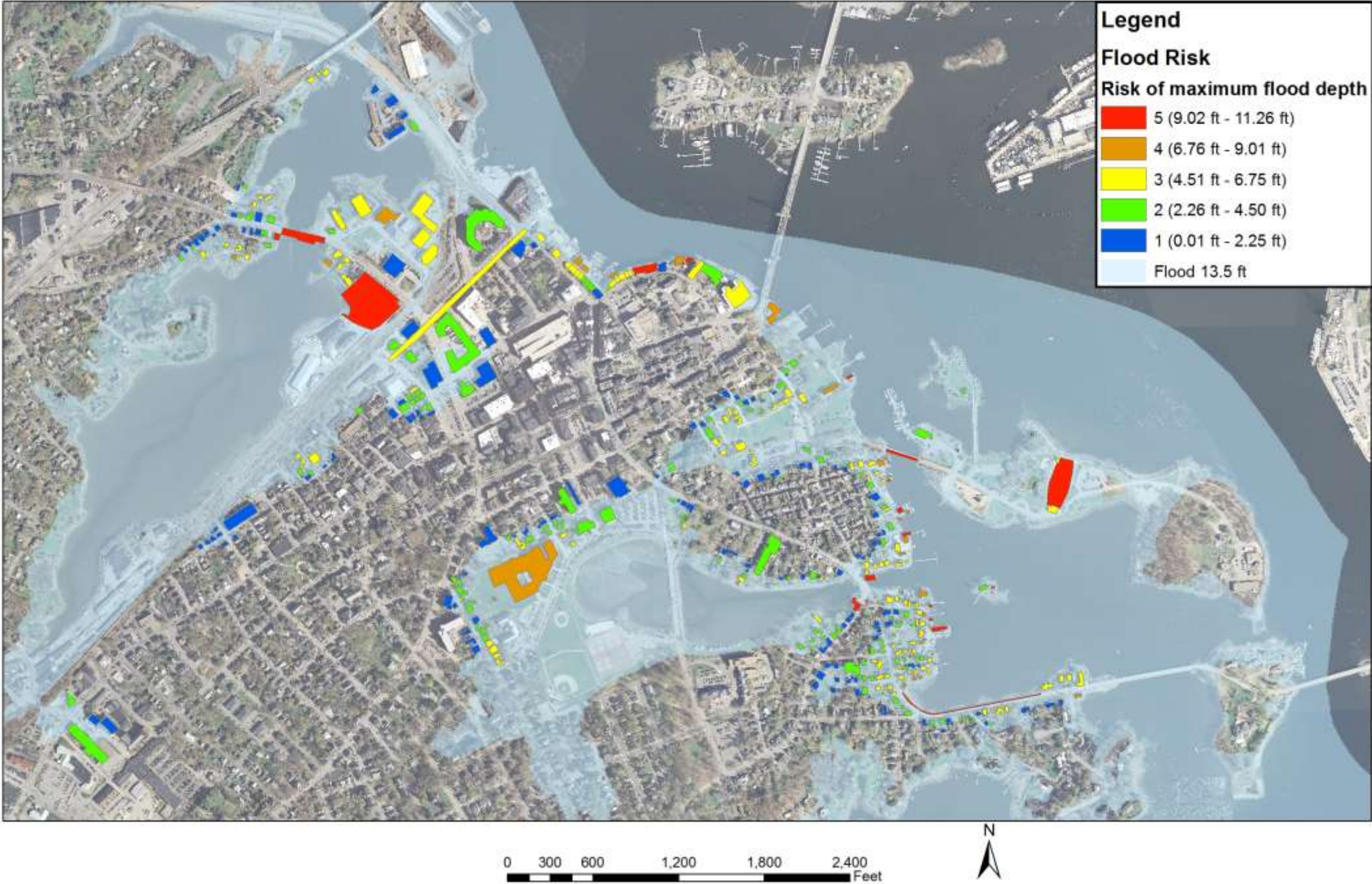
Hydraulic Head



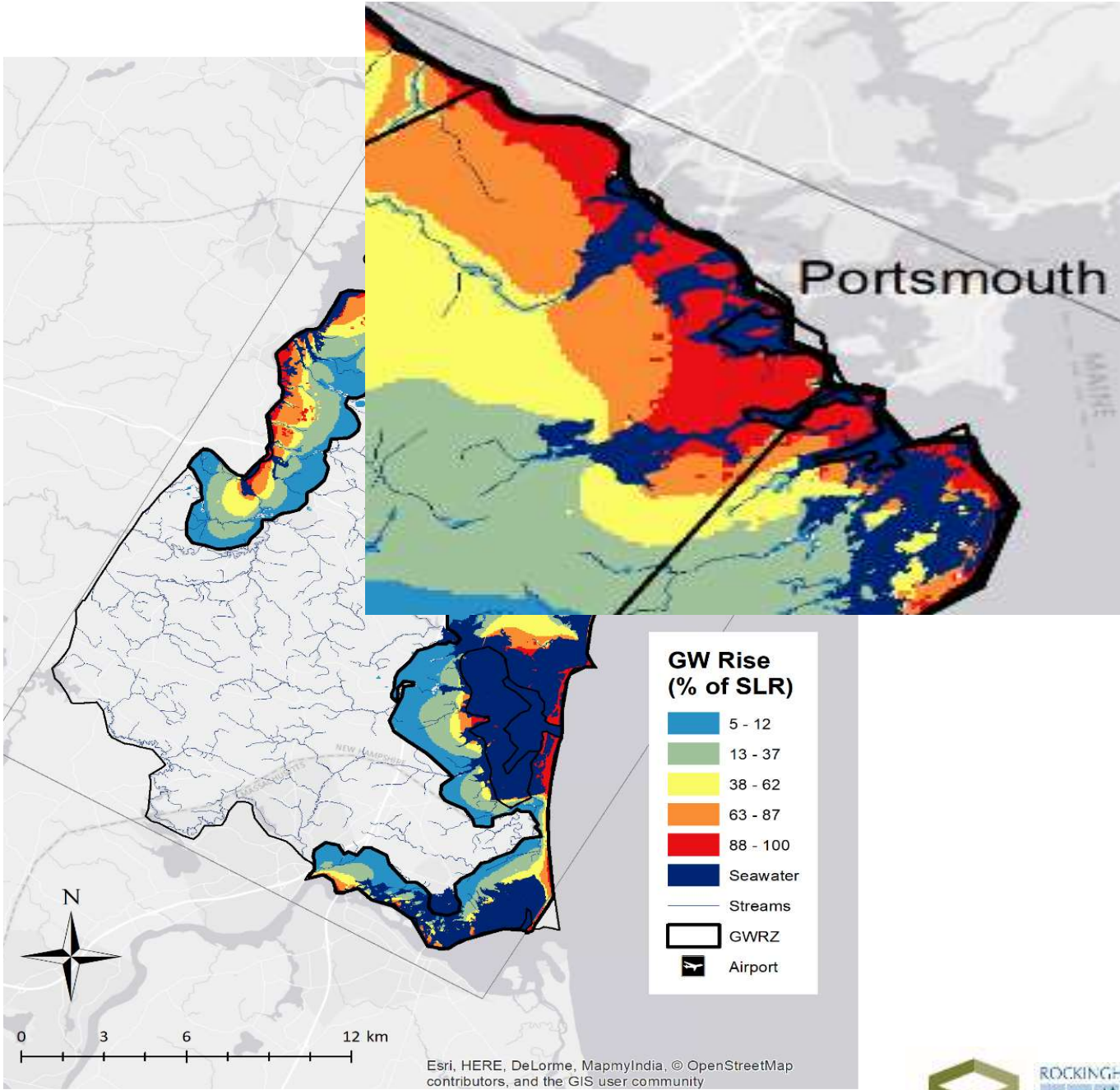
Ocean floor, saltwater

Source: water.usgs.gov

Portsmouth's Historic District and Sea Level Rise

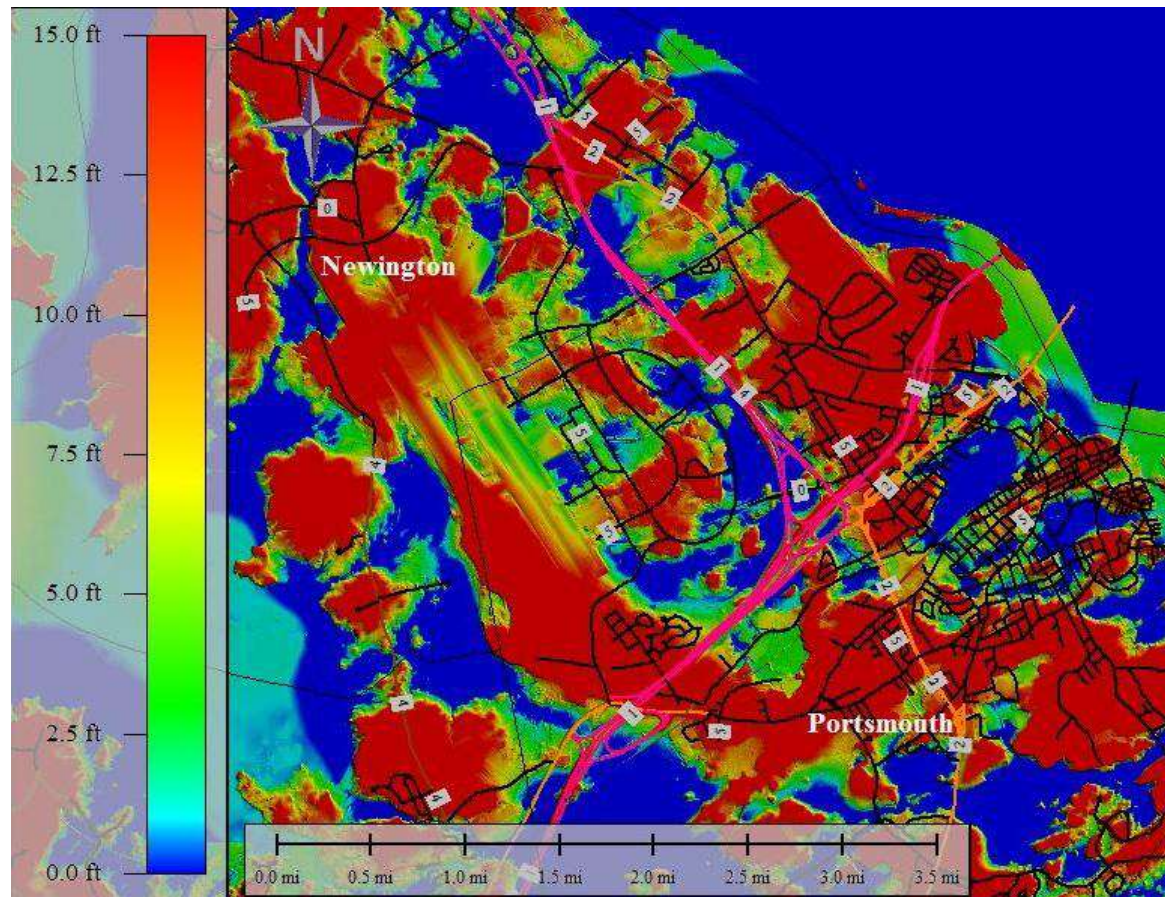


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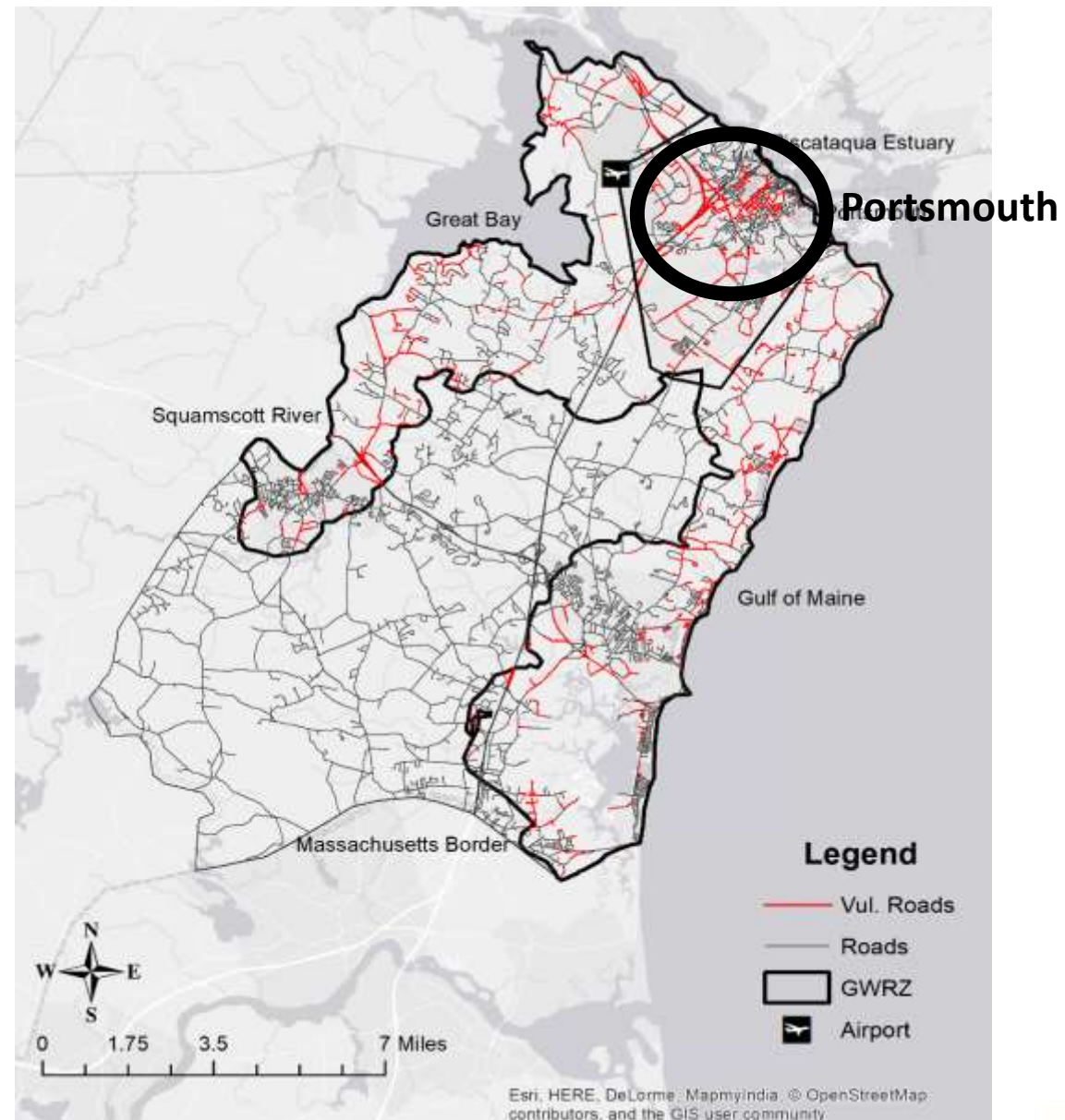


Source: Jacobs et al. 2017

Portsmouth



Source: Jacobs et al. 2017



Source: Knott et al. 2017



Collaborative Monitoring

- Steps taken to track changes that could trigger actions in policy, finance, or other adaptation action.
- They prepare Portsmouth to have programs in place and structures adapted before significant damage has occurred.

Collaborative Monitoring

- Steps taken to track changes that could trigger actions in policy, finance, or other adaptation action. e.g.,
 - Property owners checking basements for humidity and standing water, possibly through checklists provided to homeowners with request for data submission.
 - The City establishing a new network of groundwater monitoring wells and a system to track changes over time and identify appropriate actions at certain trigger points.



QUESTIONS AND DISCUSSION

Contact information:

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Thank you!

