



**2019 Coastal Hazards & Adaptation Team Review**

January 28, 2020, amended November 2, 2020

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## 1. Purpose of this Summary

The purpose of this report is to summarize CHAT's activity, progress, and findings. This summary was developed in advance of the process of developing recommendations for the Board of Selectmen, Master Plan Subcommittee, and others. A target date of March 2020 has been set for producing recommendations.

## 2. Introduction

### A. Overview

The Coastal Hazards and Adaptation Team (CHAT) was formed in January 2019 following the preparation of the Seabrook Hamptons Estuary Alliance (SHEA)'s Flood Situation Assessment, which was funded by the Consensus Building Institute (CBI).<sup>1</sup> CHAT was convened to guide and implement a second phase of flood vulnerability planning and consensus building. When funding for this effort was no longer available through CBI, SHEA succeeded in securing financial and technical support from the New Hampshire Department of Environmental Services (NHDES) Coastal Program to continue to advance flood resiliency in Hampton. CHAT met once a month for two hours throughout 2019.

CHAT is comprised of representatives from board and commissions in Hampton, planning and public works staff, individuals from the Hampton Beach Area Commission and Hampton Beach Village Precinct, the Seabrook-Hamptons Estuary Alliance (SHEA), and two resident representatives. SHEA serves as the group's administrator. NHDES Coastal Program staff and a consultant provide support and technical support. A list of members and affiliations is included in Appendix A.

### B. Primary Objectives for CHAT

Early in the process, CHAT developed and adopted rules and procedures. Along with operating principles, members agreed on four primary objectives for CHAT:

1. Improve coordination of flood hazard management and adaptation efforts in Hampton.
2. Investigate, analyze, and prioritize flood management and adaptation strategies and present recommendations to the Municipal Boards and Commissions for consideration.
3. Inform residents about the flood hazard management and adaptation options the Town is considering and enable residents to provide input on these options.
4. Provide educational and public outreach opportunities concerning flood hazard management and adaptation strategies.

*"...the purpose of this effort is to develop a trusted group of town residents and Town representatives to work on the topic of flooding in Hampton" – Jay Diener*

Additional roles that emerged during the process include:

- Become the experts.
- Serve as an advisor to and help the town determine appropriate mechanisms for raising match.

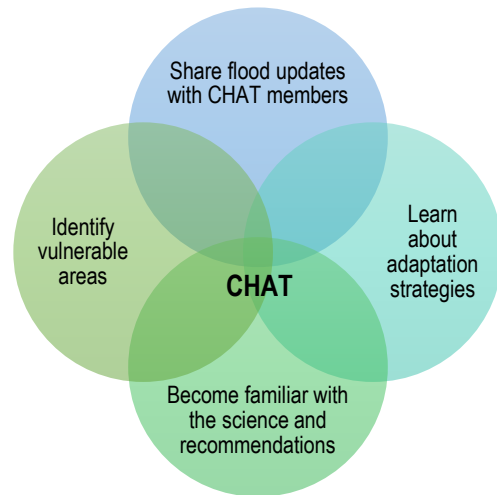
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<sup>1</sup> Available at: [http://shea4nh.org/wp-content/uploads/2019/08/SHEA\\_SituationAssessment\\_Final.pdf](http://shea4nh.org/wp-content/uploads/2019/08/SHEA_SituationAssessment_Final.pdf)

During the process of establishing its rules and procedures, CHAT members discussed the challenges and merits of holding meetings that were open to the public. The group determined that CHAT meetings would not be open to the public but that CHAT would host educational meetings for the public. It was decided that minutes would be available on request.

### C. Approach

To date, there have been four core components (right) of CHAT's approach to meeting its goals and objectives. In the future, it is likely that the group will begin to emphasize outreach, education, and dissemination of information as well.



## 3. Flood Updates

Each meeting, CHAT members shared updates related to flooding or flood resiliency. This provided the group with the opportunity to learn about what boards, commissions, departments, groups, and residents were engaged in, to discuss past and upcoming events, and to respond to one another's updates. An abbreviated, working summary of these updates is included in Appendix B.

## 4. Summary of Actions Taken by Town

The Town of Hampton has taken many strides to better understand its risk from sea-level rise and storm-based flooding. A summary of some of these actions follows:

- Worked with the Rockingham Planning Commission on a vulnerability assessment of the Town's assets to sea-level rise and storms.
  - Report: <https://bit.ly/32RIROD>
  - Maps are available at the Town Office (ask Rayann Dionne, [rdionne@town.hampton.nh.us](mailto:rdionne@town.hampton.nh.us))
- Participated on the New Hampshire Coastal Risk and Hazards Commission.
  - Final report and recommendations: <https://www.nhcrhc.org/>
- Updated the Hampton Hazard Mitigation Plan in 2017: <https://bit.ly/2Y63BmU>
- Adopted new regulations requiring 1' of freeboard in the floodplain for new and substantially improved construction, also allowing building height restriction waiver to allow elevation up to 3'.
- Adopted new regulations requiring new and substantially improved construction in the Wetlands Conservation District (50 feet from HOTL) to be elevated on open foundations.
- Working toward joining the National Flood Insurance Program Community Rating System which provides residents discounts on flood insurance in exchange for town activities above and beyond the minimum National Flood Insurance Program requirements.
- Installed a high-water mark sign at the Hampton Department of Public Works Transfer Station.
- Passed two funding warrant articles in 2018 to conduct flood and drainage studies in the Kings Highway and west of Ashworth Ave. neighborhoods, totaling \$180,000. Studies are moving forward and phase 1 is expected to be completed by the consultants in spring 2020. Town is in the process of applying for more grants to fund Phase 2 and additional work.

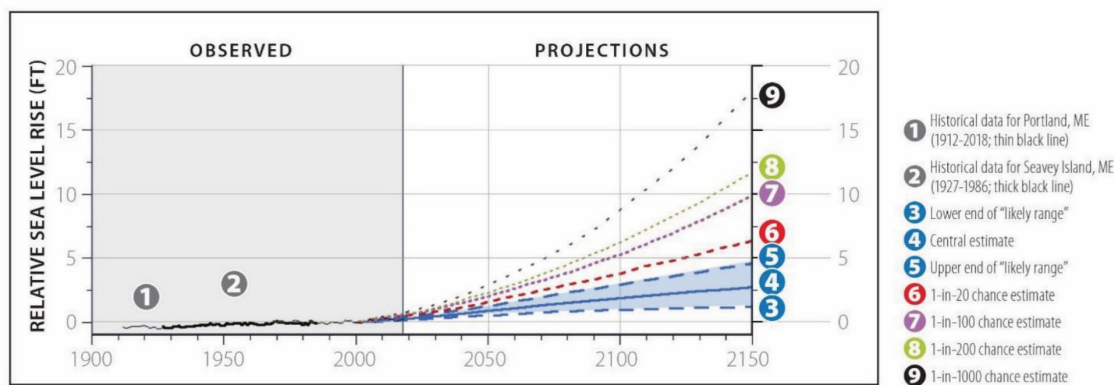
- Passed an ordinance to allow residents in floodprone neighborhoods to park in certain municipal lots for free during 10'+ high tides. (Pass required from town office).
- Participating in ongoing Hampton Coastal Hazards and Adaptation Team (CHAT) to educate town decision makers, staff, and residents about flood risks and possible options in order to support master plan efforts and improve public engagement.
- Creating a new town master plan that will include a new chapter focused on Coastal Hazards and Adaptation.
- Applied for and received a \$185,000 grant from the National Fish and Wildlife Foundation Coastal Resilience Fund. This is a matching grant that will be used for site assessment and preliminary designs to mitigate flooding in the Kings Highway neighborhood and neighborhoods west of Ashworth Avenue.
- Proposed flood-related Warrant Articles in 2020 (voter approval is pending):
  - To revise the definition and delineation for the Highest Observable Tide Line of the Wetland Conservation District to be consistent with the NHDES Wetland Bureau.
  - To add language under Coastal High Hazard Areas (Zone VE), Construction Standards requiring that breakaway wall shave flood openings that meet the existing criteria for enclosed areas below the lowest flood.
  - To raise and appropriate \$200,000 to move forward solutions with flood control design for the protection of the west side streets off of Ashworth Avenue, Brown Ave, the Island Path and Glade Path areas north to Winnacunnet Rd, including NH Route 1A and the areas surrounding Meadow Pond, including High Street, King's Highway, Gentian, Greene, and Meadow Pond Road, the Areas surrounding the Hampton-Seabrook Estuary, and all contributing water ways.
  - To raise and appropriate \$50,000 to participate in the FEMA Advanced Assistance Grant Program. Funding will enable the Town to establish a process to prioritize, manage, and administer requests for Hazard Mitigation Grant Program funds by Hampton on behalf of property owners interested in elevating their structures or selling their vulnerable properties to the Town within the FEMA flood hazard areas that are or will be subject to sea level rise.

## 5. Sea Level Rise Estimates

CHAT has been fortunate to have the support and guidance of Coastal Program staff, who have presented on climate science in New Hampshire and the recommended relative sea-level rise (RSLR) estimates for coastal New Hampshire. Under a stabilized greenhouse gas concentration scenario, the likely range of RSLR estimates recommended for the region is 0.5 to 1.3 ft by 2050; 1.0 to 2.9 ft by 2100; and 1.2 to 4.6 ft greater than 2000 levels by 2150.<sup>2</sup> The image below shows the range of projections that could occur.

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<sup>2</sup> New Hampshire Coastal Flood Risk Science and Technical Advisory Panel (2019) New Hampshire Coastal Flood Risk Summary Part II: Guidance for using Scientific Projections Draft for Public Review.



**Figure 1** (see also Figure 4.5 in 2019 NHCFR Science).<sup>13</sup> Observed and relative sea-level rise for the Seavey Island, ME tide gauge based on Kopp et al. 2014<sup>14</sup> (K14) and the stabilized greenhouse gas concentration scenario (RCP 4.5).

Source: New Hampshire Coastal Flood Risk Science and Technical Advisory Panel (2019) New Hampshire Coastal Flood Risk Summary Part II: Guidance for using Scientific Projections Draft for Public Review.

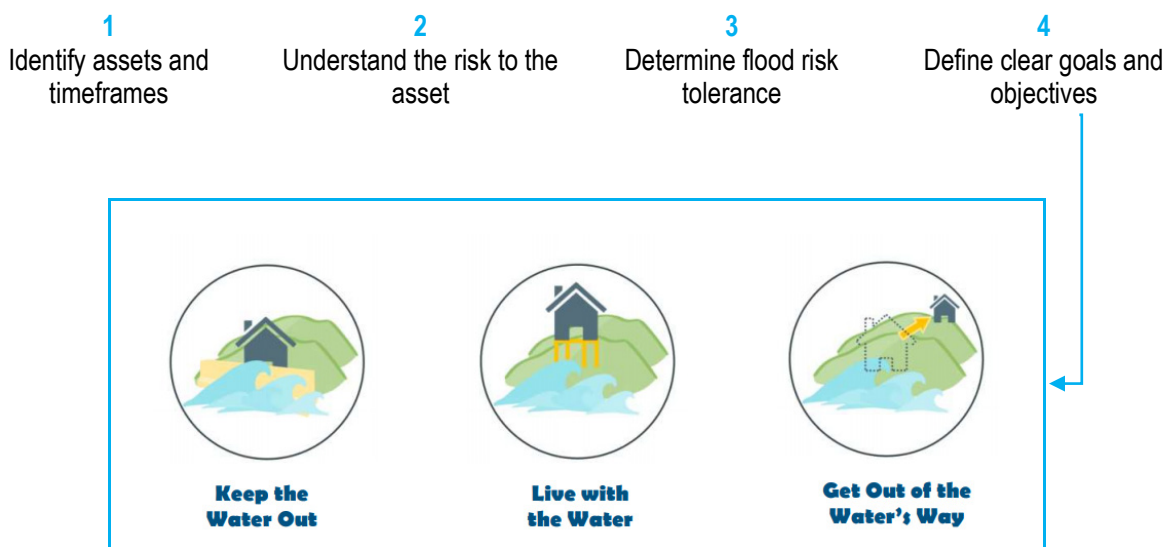
## 6. Adaptation Frameworks

### A. New Zealand Coastal Plan 10 Step Process

As a preliminary step, CHAT reviewed an adaptation framework from the New Zealand Coastal Plan with a 10-step process and applied this framework to work in Hampton. CHAT added the step 'evaluate option for funding adaptation' into the part of the process where actions and strategies are identified. Appendix C summarizes the process of this framework and the actions, activities, next steps, and anticipated timeframe for conducting the steps in the process. Currently, CHAT has primarily been operating in the 'what can we do about it' stage.

### B. Draft Framework for Coastal Flood & Erosion Management Action For Hampton CHAT

A draft framework for Coastal Flood & Erosion Management Action for Hampton was developed for CHAT. This steps in this framework are summarized below.



CHAT identified several adaptation strategies to explore further. These strategies were categorized according to the type of goal (keep the water out; live with the water; get out of the water's way) and type of action (structural; planning and zoning; financing). A summary table of these strategies is included in Appendix D. This table will continue to be filled in.

## 7. Characterization of Adaptation Strategies

After identifying and categorizing potential adaptation strategies, CHAT reviewed and refined a list of questions to ask about any action under consideration. These questions include:

1. In what context is this strategy appropriate? What type of location and attributes do we think this is best suited for? What are some site characteristics?
2. What scale(s) could this strategy be implemented at? (individual property, street, neighborhood, coast, town, region, etc.)
3. Does this strategy target a specific type or cause of flooding? (high tide & storm surge, groundwater, precipitation & stormwater)
4. What are the 'no regrets' benefits of this strategy?
5. Do we know of any potential negative impacts or attributes of this strategy?
6. What are the maintenance needs of this strategy?
7. What is the lifespan of this strategy?
8. Can this strategy be adapted or modified if projections change?
9. Who are the key players that need to be involved?
10. Do we know any potential funding sources?
11. What data and information do we have that pertains to this strategy?
12. What questions do we need to answer about this strategy?
13. What strategies could be evaluated as alternatives to this strategy?
14. What strategies should be evaluated as complimentary or interdependent to this strategy?
15. What additional information do we need?

CHAT has used this set of questions to characterize four adaptation strategies (Appendix E). CHAT will continue to develop this Hampton-specific resource. It is intended that this resource will facilitate comparison of options and consideration of alternatives.

## 8. Case Study Review

Planning for sea level rise and high tide flooding and storms is occurring in many places. CHAT reviewed and three examples of some more advanced and site-specific planning and efforts: Louisiana's Coastal Master Plan and framework for adaptation, Norfolk's Vision 2100 Plan, and Climate Ready Boston/Boston's Resilient Harbor Initiative.

### A. Louisiana Coastal Master Plan

The Louisiana Coastal Master Plan is a complex plan that offers numerous approaches to addressing vulnerability. CHAT reviewed a portion of the plan and project pertaining to project selection. Louisiana's approach includes a focus on non-structural project types based on future flood depths. The project types are categorized as floodproofing of non-residential structures; elevation of residential structures; and voluntary acquisition of residential properties. The method of selecting a recommended strategy is based on a spatial flood depths dataset and can be applied at the community or regional scale. To determine flood depths, Louisiana utilized a medium scenario for a 100-year flood, 50 years from now and incorporated factors including sea level rise, subsidence, evapotranspiration, storm frequency, and average storm intensity into estimates. The thresholds for floodproofing, elevating, and voluntary acquisition were 1-3 ft, 3-14 ft, and 14 ft, respectively. Implementing a similar approach would require developing a



spatial dataset and determining the flood depth thresholds to keeping water out, living with water, getting out of the water's way.

## B. Norfolk, VA Vision 2100 Plan

Norfolk, VA's approach involves classifying four vision areas based on the number of key citywide assets in the present or future and the risk presented by sea level rise or other recurrent flooding risks. The process for developing vision areas included awareness building, asset mapping, and using sea level rise projections, physical assets, and development pattern information to build visions for these areas. The four visions are: (1) enhancing economic engines, (2) adapting to rising waters, (3) designing new urban centers, and (4) establishing neighborhoods of the future. The plan takes a positive angle by targeting areas for development that emphasizing a vision for a safe, resilient future. This approach can also readily inform a community's plans and regulations, such as the master plan and zoning ordinance.

## C. Climate Ready Boston – Resilient Harbor Initiative

The Resilient Harbor Initiative is part of Boston's ongoing initiative to adapt to climate change. CHAT reviewed mapping and adaptation strategies for South Boston and an open space concept that aims to protect coastal communities by creating resilient, accessible, and open space, along with prepared buildings and infrastructure. Boston's approach uses a 40" sea level rise in an annual change storm event scenario. A probable future storm flood extents map was developed to show how the area of the 100-year floodplain changes over time and what flood pathways develop. The City uses information about the timing of impacts to inform the phasing of recommendations and near-, mid-, and long-term actions.

## D. CHAT Take-Aways

Take-aways from the case studies:

- A common thread across all case studies is mapping out the extent of the future 100-year floodplain.
- The Norfolk plan offers a positive and easy to understand approach.
- The Climate Ready Boston plan identifies where projects could take place.
- The time scale component of the Climate Ready Boston Plan is helpful.
- The flood depth-based recommendation strategy (LA approach) could be more straightforward to apply in Hampton.

## 9. Mapping Flood Vulnerability

CHAT developed a map set that consolidates existing data and includes new information identified during CHAT meetings. The maps contain the following information:

- Areas that have been identified in the past as vulnerable (repetitive loss, SHEA survey data, Hazard Mitigation Plan data)
- Physical attributes that contribute to vulnerability (ie location within a floodplain or low-lying area)
- Assets and critical facilities
- Sea level rise scenarios, including a 1.7 foot slr layer that serves a proxy for today's approximately 10-11 foot high tide
- Water infrastructure
- Water resource features identified in the Land Conservation Plan for NH's Coastal Watersheds update
- Conservation land
- Vulnerable locations identified by CHAT

Of the approximately 30 vulnerable locations that CHAT members identified, 90% were located within the 100-year flood plain. The most prevalent cause of flooding in vulnerable locations was the combination of high tide and storm surge. Streets followed by homes were most frequently cited as the type of asset that floods. CHAT members noted that in approximately 10% of locations that flooded, the flooding caused other areas to become inaccessible.

The maps are intended to provide a more comprehensive picture of flood vulnerability in order to help identify appropriate adaptation strategies, prioritize adaptation strategies, inform vulnerable property owners of future risk, identify potential flood storage land, and understand the interconnectivity between natural systems. While further analysis of the maps will be required to realize these objectives, in the interim, CHAT has created set of maps and a new data layer and attribute table with information about the type of flooding that has occurred in the past. The base maps that CHAT has contributed to provide a starting point for undergoing a more in-depth analysis of vulnerability now and in the future. This information could be used to develop guidance on potential adaptation strategies based on a variety of factors such as:

- Timing, or when a location is projected to be inundate
- Flood characteristics, such as frequency or event that results in flooding
- Location of flooding and impacts such as road closures.

Copies of the maps generated for CHAT and the flood locations and attributes identified by CHAT are included in Appendix F. Additional analysis of the lots and development within FEMA flood zones is underway.

## 10. Topics and Issues of Interest to CHAT

CHAT members identified a number of topics and issues of interest throughout the year. These are displayed below:

Category	Topics & Issues
Funding / Financing	<ul style="list-style-type: none"> <li>• Funding, in general</li> <li>• Hazard Mitigation Grant Program</li> <li>• Transportation Alternative Program (TAP) funds</li> <li>• CIP offset/ rainy day fund</li> <li>• Impact fees</li> <li>• Capital reserve fund to capture surplus funds at end of year to be used to for match</li> <li>• Clean Water State Revolving Fund (CWSRF) Loan Program</li> <li>• Coastal Program</li> </ul>
Financial Incentives	<ul style="list-style-type: none"> <li>• 79-E</li> <li>• Community Rating System status</li> </ul>
Financial Impacts	<ul style="list-style-type: none"> <li>• Cost of constructing seawalls to protect town</li> <li>• Property values</li> <li>• Impact of changing property values and development on Town's revenue</li> <li>• Ability to finance homes in future</li> <li>• Identify banks to meeting to discuss loans and mortgages</li> <li>• Cost of flood insurance</li> <li>• FEMA statistics for cost benefit (raising homes, etc)</li> </ul>
Regulatory	<ul style="list-style-type: none"> <li>• Shoreland urban exemption</li> <li>• Flood vulnerability overlay</li> <li>• No more development</li> </ul>
Science, Best Practices, and Physical conditions	<ul style="list-style-type: none"> <li>• Resilient tidal crossings and culvert maintenance responsibilities (NHDES, NHDOT)</li> <li>• Sinking/subsidence</li> <li>• Identify 'pinch points', get public involved with identifying those places</li> </ul>

Emergency Management	<ul style="list-style-type: none"> <li>• Evacuation planning</li> <li>• Is a subcommittee needed?</li> </ul>
Planning	<ul style="list-style-type: none"> <li>• Relocation – where would people go?</li> <li>• Coastal hazards master plan chapter</li> <li>• Are there temporary adaptation strategies that the town can offer for the short-term while working on permanent strategies?</li> <li>• Transparency and sharing why certain proposals won't work</li> <li>• Problem of the Town building critical infrastructure (fire station, pump station on Church St) in at-risk locations</li> </ul>
Real Estate Market & Development	<ul style="list-style-type: none"> <li>• Insurance industry</li> <li>• Disclosures</li> <li>• Year-round vs seasonal homes and residents</li> <li>• Continued development in vulnerable areas</li> </ul>
Social / Community Impacts	<ul style="list-style-type: none"> <li>• Changes to neighborhoods associated with adaptation</li> <li>• Equity, who can adapt</li> <li>• Social ties to home</li> <li>• What would Hampton be without the beach</li> </ul>
Communication	<ul style="list-style-type: none"> <li>• How to get the word out to residents</li> <li>• Messaging</li> <li>• Complexity of issue</li> </ul>

## 11. Concerns That Have Emerged

Among the concerns that have emerged during CHAT discussions in 2019, there were several reoccurring themes. These include:

- Who is responsible? What does the Town do versus what are residents responsible for?
- How do we determine what to do?
- How to grapple with the need for a systematic, comprehensive approach to adaptation. For example, if residents invest in elevating their homes, will the Town elevate their streets?
- Balancing the need for a comprehensive approach with the desire for action and quick fixes.
- Understanding and addressing flood issues through engineering studies and solutions is costly and takes time, but people want answers now.
- Individuals' knowledge and opinions differ.
- Flooding is a complex issue physically, but there are also deep social and emotional implications associated with addressing the issue.
- How to best engage with the public, including both concern about the potential impacts of allowing public attendance and participation at meetings and the public outcry about flooding.

## 12. Barriers to Adaptation

Identifying, addressing, and overcoming barriers to adaptation is critical for implementation. The financial cost of adaptation is frequently cited as the reason that strategies are not implemented. While paying for adaptation is a key component, there are a range of other real and perceived barriers to adaptation that must be addressed. Part of the process of adaptation will require determining how to and who can best address these and other barriers that emerge. When asked about barriers to adaptation at the individual and community scale, CHAT members identified the following :

- Cost
- People not always showing up
- People need a way to get involved
- Responsibility of the citizen
- How to frame the issue of responsibility
- Education on budget
- How to expand network
- Advocacy campaign vs civic engagement 101
- Consistent messaging, a common goal to rally around
- Attending a BOS meeting is not the way people want to get engaged
- Have an organizer/leader
- Not everyone can vote
- Social and cultural values
- Changes to neighborhoods
- Inequity – who has resources to adapt

Barriers to change can be classified into four categories:

- 1) Social and cultural
- 2) Institutional and governance
- 3) Resource
- 4) Physical or natural barriers

- Fear
- Complexity of flooding
- Desire for a quick fix
- Political hurdles
- Lack of awareness of the issue and of possible solutions
- Can require/result in significant life changes
- Need commitment of regional and local authorities.

## 13. Outreach, Communication, and Education

### A. Communication Venues

CHAT has identified several venues by which to communicate with residents. These include:

- Friends of Hampton Beach website
- Village Precinct Facebook page
- HamptonBeach.org
- Facebook: Nick Bridle, Friends of Hampton
- Town website updates
- Creative opportunities with vision chapter of Master Plan
- Submit photos of adaptation examples
- Channel 22 video about local government
- Present at HBVD meetings, which are televised on Channel 22

### B. Engagement Approaches

Potential approaches for engaging with residents:

- Strategy session to talk about the options.
- Hold a focus group of people who are not coming to CHAT meetings every month to run concept and ideas by them in order to assess whether the general public will understand the issues.

### C. Residents' Interests

Interests and questions expressed by residents:

- Some residents have expressed interest in having the streets raised or blocking them with snow, which stops the water from coming down the street during winter months.

- Will the harbor dredging will alleviate any flooding?
- Neighborhood residents are curious what's happening with the harbor dredging and the grant for West of Ashworth and Kings Highway neighborhoods.

#### D. Communication to Date

CHAT members have provided updates at their respective board, committee, department, stakeholder group meetings with the objective of achieving two-way communication about flood issues, interests, needs, and opportunities.

Written updates were provided to CHAT to share with their respective departments and boards. CHAT members received feedback that the Planning Board was excited about the group and their objectives and that the Conservation Commission was interested in seeing the output of the mapping exercise. The budget committee asked why Seabrook wasn't participating and whether resilience planning should be done on a more regional scale.

Additionally, members have provided updates about CHAT to the Board of Selectmen.

### 14. Tools, Guidance, and Resources

#### A. New Hampshire Coastal Flood Risk Summary Part II: Guidance for Using Scientific Projections

The New Hampshire Coastal Flood Risk Science and Technical Advisory Panel prepared guidance to help decision makers assess and incorporate best available projections for relative sea-level rise (RSLR), coastal storms, RSLR-induced groundwater rise, and extreme precipitation to inform land use planning and decision making. CHAT reviewed the guidance document's seven steps for evaluating risk and accounting for sea-level rise in project design and decisions (below). CHAT then used the guidance to evaluate a site plan for development at a location in Hampton with identified flood vulnerability. In doing so, CHAT became acquainted with the New Hampshire Sea-Level Rise, Storm Surge, and Groundwater Rise Mapper.

Step 1: Define Project Type, Location, and Timeframes

Step 2: Determine Project Risk Tolerance

Step 3: Assess and Consider Relative Sea-Level Rise

Step 4: Assess and Consider Coastal Storms

Step 5: Assess and Consider LSLR-Induced Groundwater Rise

Step 6: Assess and Consider Extreme Precipitation and Freshwater Flooding

Step 7: Assess Cumulative Vulnerability and Evaluate Possible Actions and Consequences

#### B. Resources

A working list of resources, links, and presentations is included in Appendix G.

### 15. Next Steps

#### A. Developing Recommendations

- Target audience / stakeholder
- Geographic extent

- Timeframe
- Types of recommendations
  - Research/ Studies (data collection, modeling, case study analysis, etc.)
  - Project (mapping, Master Plan Chapter recommendation such as SLR projection)
  - Program development (HMGP, adaptation program)
  - Policy/ Practice (ie utilize guidance, expedited permitting process, step by step guide for permitting)
  - Regulatory (what are developers required to do, prohibit development in certain areas, overlay district etc)
  - Funding
  - Adaptation strategies (Structural, Planning and Zoning, Financing)

## B. Recommendations for CHAT

- What is CHAT's role?
  - Outreach
- Can CHAT address any of these barriers?
- What can each CHAT member ask their respective board, committee, department to support/recommend?

## Appendix A CHAT Members 2019

<b>Member</b>	<b>Affiliation</b>
Bob Ladd	Hampton Beach Village Precinct
Bryan Provencal <sup>2</sup>	Zoning Board of Adjustment
Deb Bourbeau <sup>4</sup>	Resident
Jay Diener <sup>1</sup>	Seabrook Hamptons Estuary Alliance
Jason Bachand	Planning Department
Jennifer Hale	Public Works Department
Jim Waddell	Board of Selectmen
Mark Olson	Planning Board
Nancy Stiles <sup>3</sup>	Hampton Area Beach Commission
Rayann Dionne <sup>1</sup>	Conservation Commission, Floodplain Coordinator
Steven LaBranche	Budget Committee
Tom Bassett <sup>4</sup>	Resident
<b>Technical Assistance</b>	
Kirsten Howard	NHDES Coastal Program
Nathalie Morison	NHDES Coastal Program
Liz Durfee	EF   Design & Planning, LLC

<sup>1</sup> Administrators and coordinators of CHAT

<sup>2</sup> Bryan Provencal was replaced by Norma Collins in June 2020

<sup>3</sup> Nancy Stiles was replaced by Barbara Kravitz in January 2020

<sup>4</sup> June Black and Steve Belgiorno were designated as alternate resident representatives in January 2020

## Appendix B Summary of Flood Updates (working document)

UPDATE CATEGORY						
ENTITY	OUTREACH & EDUCATION	REGULATORY & POLICY	PLANNING	ENGINEERING	FUNDING	TECHNICAL ASSISTANCE
<b>BOARD OF SELECTMEN</b>						Initiated discussion with Rockingham RPC about administering HMGP
<b>CONSERVATION COMMISSION</b>	Found synergy between tidal wetlands and floodplain ordinance and has started encouraging property owners to consider elevating structures, using natural plantings, and implementing other restoration activities, such as invasive species removal when appropriate	Put forth two 2019 warrant articles to amend the floodplain ordinance to 1) allow people who want to elevate structures to waive height restrictions equivalent to the amount they want to raise up to three feet and 2) to require any substantial improvements to structures (50% or more structure value added) within the 50 foot tidal buffer zone to elevate structures on pilings to allow water to flow through under the structure in a flood  2020 wetland ordinance amendment warrant, will include adding FloodIQ.com				
<b>PLANNING DEPARTMENT</b>	Provided education about purpose of master plan	Collaborates with CC on ordinances	Master Plan Vision and coastal chapters will be developed together; department is building support for another warrant article to fund the full plan update		FFY19 Project of Special Merit- master plan chapter  2019 and 2020 Warrant articles to fund full master plan	
<b>PLANNING BOARD</b>		Has made changes to ordinances in the past to try to address flooding issues (ie impervious cover restrictions), but recognize it's not enough	Initiative coastal hazards and vision chapter of the master plan			
<b>PUBLIC WORKS</b>				Meadow Pond and Ashworth Ave flood study  Study of drainage along roadways and homes in Gentian Ave, Green St., and Kings Highway areas, studies will provide a platform to take the next steps so those affected have choices; working with UNH to deploy 8 flood sensors  DPW presented update about engineering studies, prelim results, and a 5-year plan, 2 additional tidal sensors were installed (there are 8 total	Applied for and received a National Fish and Wildlife Federation Coastal Resilience Grant to take 2-3 alternatives developed as part of the current studies out to preliminary design. 1:1 match is required.  A warrant article has been prepared to fund the next round of monitoring and phases of the study. Plan is to fund design and permitting next year (50/50 match required) and to go after funds	



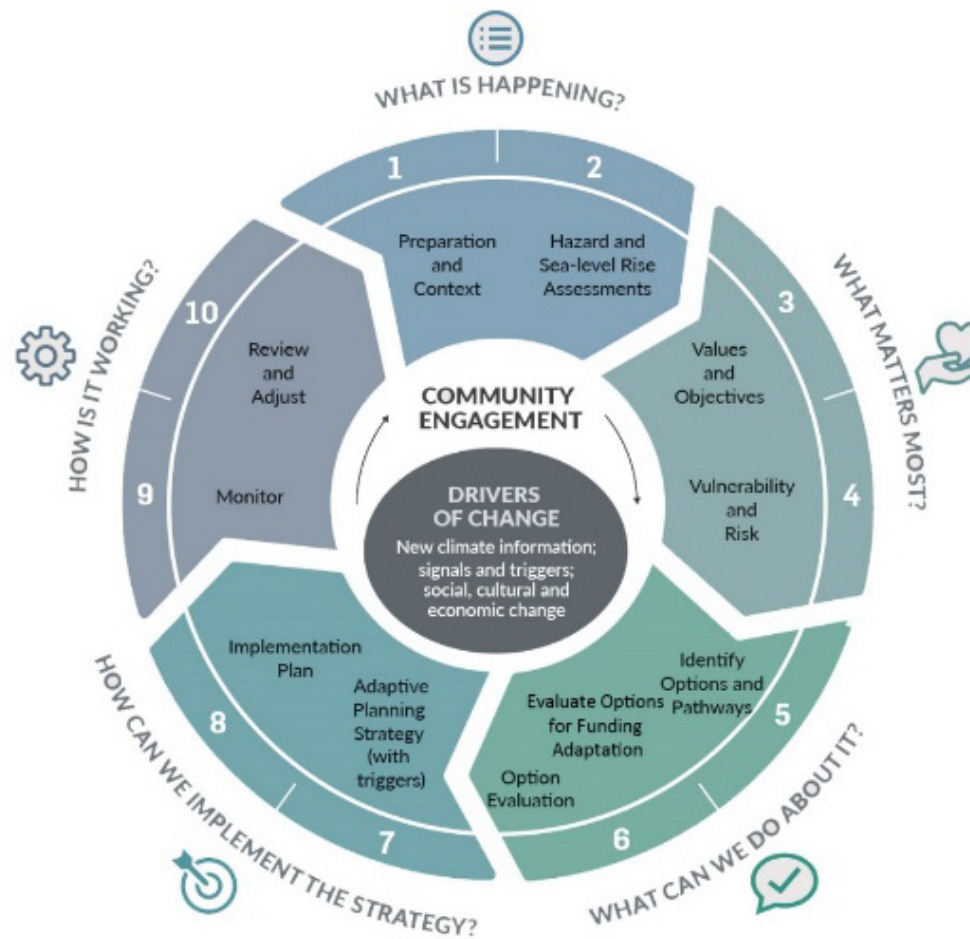
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UPDATE CATEGORY						
ENTITY	OUTREACH & EDUCATION	REGULATORY & POLICY	PLANNING	ENGINEERING	FUNDING	TECHNICAL ASSISTANCE
				between Meadow Pond and the Salt Marsh complex), data will begin to be available Aug 1.  Flood study report due in January.	for construction the following year.	
<b>HAMPTON BEACH AREA COMMISSION (HBAC)</b>			Preparing to update the Hampton Beach Area master plan natural resources chapter, in coordination with town's master plan update			
<b>HAMPTON BEACH VILLAGE DISTRICT (HBVD)</b>	Has available time on Channel 22 that CHAT can use	Encouraging the town to adopt an emergency management committee				
<b>SHEA</b>	Hosts Floodsmart Roundtables				Secured funding from Consensus Building Institute and NH Coastal Program for CHAT	Conducted Situation Assessment of Flooding in Hampton
<b>RESIDENT REPS</b>	Meet and communicate with 60-80 residents through word of mouth and email list  Distribute information to neighborhoods  Attended Floodsmart Roundtable					
<b>COASTAL PROGRAM</b>	Developed and presented on New Hampshire Coastal Flood Risk Summary, Part II: Guidance for Using Scientific Projections		The Coastal Program will be kicking off a project with the Rockingham Planning Commission in October 2019 to conduct a Seacoast Transportation Corridor Vulnerability Assessment; this project will involve NHDOT and all the seven coastal Atlantic communities		Provides funding to SHEA to support CHAT  Administers Project of Special Merit	Staff regularly attend and participate in CHAT meetings  Staff available for presentations  The Coastal Program and UNH Cooperative Extension/NH Sea Grant have also launched the Coastal Landowner Technical Assistance Program (LTAP) and have already visited a few properties in Hampton. Program is free and provides 2 site visits.  Staff participate on NH Silver Jackets team, which brings together federal and state agencies that work on flooding in NH

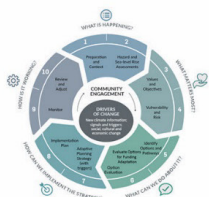
## Appendix C Applying a Coastal Plan Framework to CHAT

New Zealand Coastal Plan Adaptation Framework, modified for CHAT

Source: Adapted from Max Oulton (University of Waikato), and UN-Habitat, 2014



The framework was used as a guide to CHAT's process.



QUESTIONS	What is happening?	What matters most?	What can we do about it?	How can we implement the strategy?	How is it working?
ACTIONS	<ul style="list-style-type: none"><li>• Preparation and context</li><li>• Hazard and sea level rise assessments</li></ul>	<ul style="list-style-type: none"><li>• Values and objectives</li><li>• Vulnerability and risk</li></ul>	<ul style="list-style-type: none"><li>• Identify options and pathways</li><li>• Option evaluation</li></ul>	<ul style="list-style-type: none"><li>• Adaptive planning strategy (with triggers)</li><li>• Implementation plan</li></ul>	<ul style="list-style-type: none"><li>• Monitor</li><li>• Review and adjust</li></ul>
RECENT ACTIVITIES & NEXT STEPS FOR HAMPTON & CHAT	<ul style="list-style-type: none"><li>• Prepare Situation Assessment</li><li>• Implement Engineering Studies</li><li>• Review existing data, studies, and actions</li></ul>	<ul style="list-style-type: none"><li>• Conduct SHEA flood survey</li><li>• Host Floodsmart Roundtable</li><li>• Review engineering study findings</li></ul>	<ul style="list-style-type: none"><li>• Develop comprehensive maps</li><li>• Review case studies on flood adaptation process</li><li>• Learn about types of adaptation strategies</li><li>• Develop process and tools to guide decision making</li><li>• Conduct public outreach and engagement</li><li>• Evaluate options for funding adaptation</li></ul>	<ul style="list-style-type: none"><li>• Develop adaptive planning strategy</li><li>• Create an implementation plan</li><li>• Solicit funding</li><li>• Assign leadership and responsibilities</li><li>• Engage new stakeholders</li></ul>	<ul style="list-style-type: none"><li>• Solicit stakeholder input and feedback</li><li>• Conduct post-implementation evaluation</li><li>• Revise and update plan(s)</li></ul>
	Late 2018 - 2019		Spring 2019 - 2020		
Coastal Hazards & Adaptation Master Plan	October 2019 - March 2021				

## Appendix D CHAT Adaptation Strategy Framework

		Type of Action		
		Structural	Planning and Zoning	Financing
Type of Goal	Keep Water Out/Off	<ul style="list-style-type: none"> <li>Seagrass planting (grant from state, local match)</li> <li>Tide gates at bridge</li> <li>Natural wall, west of Ashworth</li> <li>Maintain and potentially increase height of existing seawall</li> <li>Construction of 1A</li> </ul>	<ul style="list-style-type: none"> <li>Hampton specific flood zones</li> <li>Zoning to prevent new year-round homes</li> </ul>	<ul style="list-style-type: none"> <li>Funding for infrastructure improvements for drainage systems</li> </ul>
	Live With Water	<ul style="list-style-type: none"> <li>Flood storage in parks</li> <li>Wetland restoration</li> </ul>	<ul style="list-style-type: none"> <li>Redevelopment Regulations</li> <li>Hampton specific flood zones</li> <li>Planned life of construction, look at projected sea level rise</li> </ul>	<ul style="list-style-type: none"> <li>Tax Incentives for elevating structures or removing impervious coverage, discount for elevating above FEMA requirements</li> <li>Floodgates, retention ponds, ex from North Carolina</li> </ul>
	Get Out of Water's Way	<ul style="list-style-type: none"> <li>Relocating homes</li> <li>Relocating critical infrastructure (WWTP, etc) from floodplain</li> </ul>	<ul style="list-style-type: none"> <li>Planning for the future of areas that are relocated from</li> </ul>	<ul style="list-style-type: none"> <li>Buyout program – contract, life estate, allows people to stay in home for now but eventually relocate</li> <li>Buyouts that would transfer the parcels to the Town whenever the owners decide to move (as oppose to more common buyout and immediate relocation).</li> </ul>

Strategy	Action Type (Structural, Planning & Zoning, Financing)	Goal (Keep water out/off, Live with water, Get out of water's way	1. In what context is this strategy appropriate? What type of location and attributes do we think this is best suited for? What are some site characteristics?	2. What scale(s) could this strategy be implemented at? (individual property, street, neighborhood, coast, town, region, etc)	3. Does this strategy target a specific type or cause of flooding? (high tide & storm surge, groundwater, precipitation & stormwater)	4. What are the 'no regrets' benefits of this strategy?
<b>Living Shorelines (A)</b>						
<b>Ex. Living Shoreline</b>	Structural	Keep water out/off	Tidal areas, gradually sloping sites, locations that don't received a lot of foot traffic, sites with existing or evidence of past saltmarsh, areas with lower energy wave action	Multiple scales, likely more effective with as length of shoreline increases	High tide and storm surge	Creates habitat, has minimal impact on natural resources, sequesters carbon, utilizes low energy intensive materials, attractive

5. Do we know of any potential negative impacts or attributes of this strategy?	6. What are the maintenance needs of this strategy?	7. What is the lifespan of this strategy?	Strategy	8. Can this strategy be adapted or modified if projections change?	9. Who are the key players that need to be involved?
<b>Living Shorelines (B)</b>					
Effectiveness depends on success of plant installations, can be wiped out in a storm if not well established	Minimal, some planting, invasive species removal, or reinstallation may be required over time	Once established, generally longer than an armored shoreline	<b>Ex. Living Shoreline</b>	Yes, depending on the specific site	Coastal property owners, planning board, conservation commission, NHDES, engineers and designers

10. Do we know any potential funding sources?	11. What data and information do we have that pertains to this strategy?	12. What questions do we need to answer about this strategy?	13. What are alternative strategies that could be evaluated as alternatives to this strategy?	14. What strategies should be evaluated as complimentary or interdependent to this strategy?	15. What additional information do we need?
<b>Living Shorelines ©</b>					
Federal grants (NOAA)	Shoreline structures inventory, marsh migration data, NH Smart Shoreline project	Could an initiative similar to soak up the rain or lake association's lake friendly landscaping serve as a model for a living shoreline program to help homeowners learn about and get living shorelines installed?			Clear path to permitting, some more examples of different types at different scales, evaluation of public interest, specific suitability analysis of site(s)

Strategy	Action Type (Structural, Planning & Zoning, Financing)	Goal (Keep water out/off, Live with water, Get out of water's way	1. In what context is this strategy appropriate? What type of location and attributes do we think this is best suited for? What are some site characteristics?	2. What scale(s) could this strategy be implemented at? (individual property, street, neighborhood, coast, town, region, etc)	3. Does this strategy target a specific type or cause of flooding? (high tide & storm surge, groundwater, precipitation & stormwater)	4. What are the 'no regrets' benefits of this strategy?
<b>Elevating Homes (A)</b>						
<b>Elevating Homes</b>	Structural	Keep water out/off	Located in SFHA, any residential structure, houses that are pre- existing, noncompliant (cinderblocks), already experiencing flooding (buildings/homes), proposed structures	individual property, entire floodplain (through regs)	All types, frequent flooding	Lower flood insurance, more resilient, property protection, value/resale, better views, need to lift high enough, fewer emergency calls



5. Do we know of any potential negative impacts or attributes of this strategy?	6. What are the maintenance needs of this strategy?	7. What is the lifespan of this strategy?	Strategy	8. Can this strategy be adapted or modified if projections change?	9. Who are the key players that need to be involved?
<b>Elevating Homes (B)</b>					
change in social structure/neighborhood, creates nuisance habitat (open underneath), increase in assessed value, potential for people to request tax abatements, have to go up stairs to go inside/reduces accessibility, views and impacts on neighbors, needs to be holistic, access for emergency services, false sense of security, potential exposure to wind/water, cost/potential not to work, could create wind tunnels, challenge with funding, only certain demographics can afford it/social equity	Potential increased maintenance of foundation	Dependent on road elevation/SLR	<b>Elevating Homes</b>	Would be difficult to adapt	Coastal property owners, planning board, conservation commission, NHDES, engineers and designers

10. Do we know any potential funding sources?	11. What data and information do we have that pertains to this strategy?	12. What questions do we need to answer about this strategy?	13. What are alternative strategies that could be evaluated as alternatives to this strategy?	14. What strategies should be evaluated as complimentary or interdependent to this strategy?	15. What additional information do we need?
<b>Elevating Homes (C)</b>					
79E, property owner, HMG, NFIP cost of compliance	SLR projections, existing homes/buildings that have been elevated, FEMA, local survey data on interest	How does interdependence with other adaptation/actions such as road elevations play out? will soil support raising the building?			Methods of building homes, are you creating another problem or increasing vulnerability (during storms), cost and savings over time, cost-benefit, when you want to sell, social implications, change to physical appearance, where does the strategy make the most sense, potential risk over a period of time, prevention vs cure more politically popular

Strategy	Action Type (Structural, Planning & Zoning, Financing)	Goal (Keep water out/off, Live with water, Get out of water's way	1. In what context is this strategy appropriate? What type of location and attributes do we think this is best suited for? What are some site characteristics?	2. What scale(s) could this strategy be implemented at? (individual property, street, neighborhood, coast, town, region, etc)	3. Does this strategy target a specific type or cause of flooding? (high tide & storm surge, groundwater, precipitation & stormwater)	4. What are the 'no regrets' benefits of this strategy?
<b>Relocating homes and planning for future of a buyout area (A)</b>						
<b>Relocating homes and planning for future of a buyout area</b>	planning, financing	get out of water's way	Areas that are directly or indirectly vulnerable to flooding / repeated flooding / area currently vulnerable / areas to become inaccessible due to road closers. Areas where groups of property owners are interested in relocating.	Individual property and neighborhood	all	Minimize risk of loss of life or injury, minimize risk of damage to property and assets

5. Do we know of any potential negative impacts or attributes of this strategy?	6. What are the maintenance needs of this strategy?	7. What is the lifespan of this strategy?	Strategy	8. Can this strategy be adapted or modified if projections change?	9. Who are the key players that need to be involved?
<b>Relocating homes and planning for future of a buyout area (B)</b>					
Social impacts to neighborhood, undetermined economic impacts to town and state, untested in new hampshire, complex and requires thoughtful and comprehensive program development	Need to develop a plan for future for areas that are relocated from	ongoing	<b>Relocating homes/buyout</b>	buyout area could be expanded	municipal officials, planners, coastal scientists, landscape architects, residents, state

10. Do we know any potential funding sources?	11. What data and information do we have that pertains to this strategy?	12. What questions do we need to answer about this strategy?	13. What are alternative strategies that could be evaluated as alternatives to this strategy?	14. What strategies should be evaluated as complimentary or interdependent to this strategy?	15. What additional information do we need?
<b>Relocating homes and planning for future of a buyout area (C)</b>					
FEMA	Survey data expressing some interest in the concept, maps and GIS data that can be used to identify potential relocation zones	Is there interest from municipal officials and the state in developing a program? Where would the relocated residents move to (receiving area)? How can the relocation zones be reenvisioned to maximize public benefits? What are the implications for the town's tax base?		Restrictions on redevelopment	

Strategy	Action Type (Structural, Planning & Zoning, Financing)	Goal (Keep water out/off, Live with water, Get out of water's way	1. In what context is this strategy appropriate? What type of location and attributes do we think this is best suited for? What are some site characteristics?	2. What scale(s) could this strategy be implemented at? (individual property, street, neighborhood, coast, town, region, etc)	3. Does this strategy target a specific type or cause of flooding? (high tide & storm surge, groundwater, precipitation & stormwater)	4. What are the 'no regrets' benefits of this strategy?
<b>Flood vulnerability overlay district (A)</b>						
<b>Flood vulnerability overlay district</b>	planning and zoning	get out of water's way	Overlay (floodplain, wet areas, coastal)	town	depends on specifics - could be multiple	better protection of natural resources

5. Do we know of any potential negative impacts or attributes of this strategy?	6. What are the maintenance needs of this strategy?	7. What is the lifespan of this strategy?	Strategy	8. Can this strategy be adapted or modified if projections change?	9. Who are the key players that need to be involved?
<b>Flood vulnerability overlay district (B)</b>					
could be perceived as overly restrictive, may limit development and reduce tax base, need comparison	Review of ordinance every few years	Potential to be amended annually	<b>Flood vulnerability overlay district</b>	Yes, but not instantaneously, need a town vote for an ordinance	Planners, wetland and coastal scientists

10. Do we know any potential funding sources?	11. What data and information do we have that pertains to this strategy?	12. What questions do we need to answer about this strategy?	13. What are alternative strategies that could be evaluated as alternatives to this strategy?	14. What strategies should be evaluated as complimentary or interdependent to this strategy?	15. What additional information do we need?
<b>Flood vulnerability overlay district (C)</b>					
Coastal Program	Maps that identify vulnerable areas, floodplain and wetland, building permits		Required freeboard, impact fee, more stringent site plan review standards, incentive for developing out of vulnerable areas, restrictions on redevelopment	Buyout program, assistance to homeowners, compensation for lost value	Assessment of tax revenue associated with properties that would no longer be developable, evaluation of what existing properties would fall in the overlay

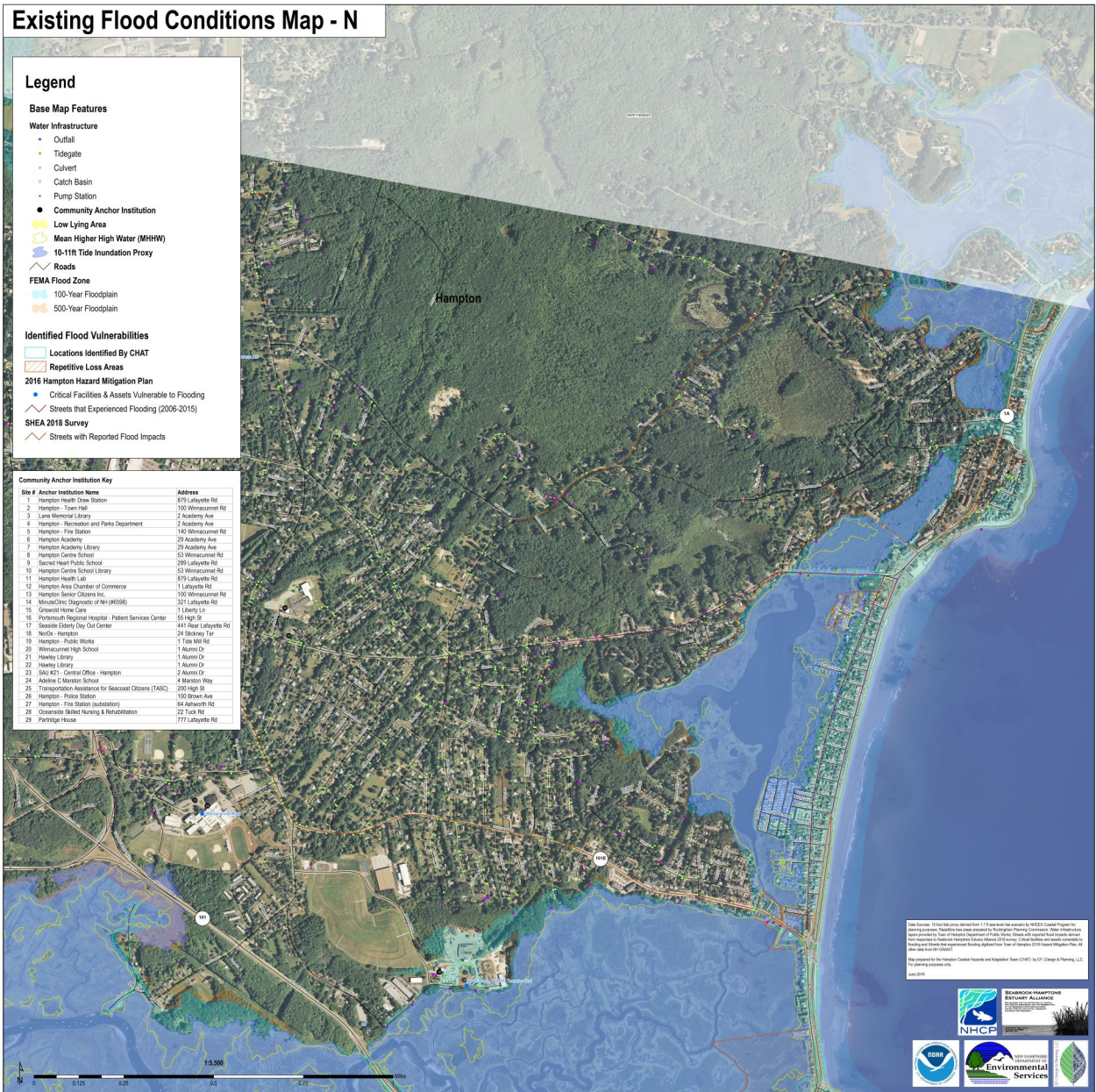


# Appendix F Attribute Table from Vulnerability Mapping Exercise & Map Set

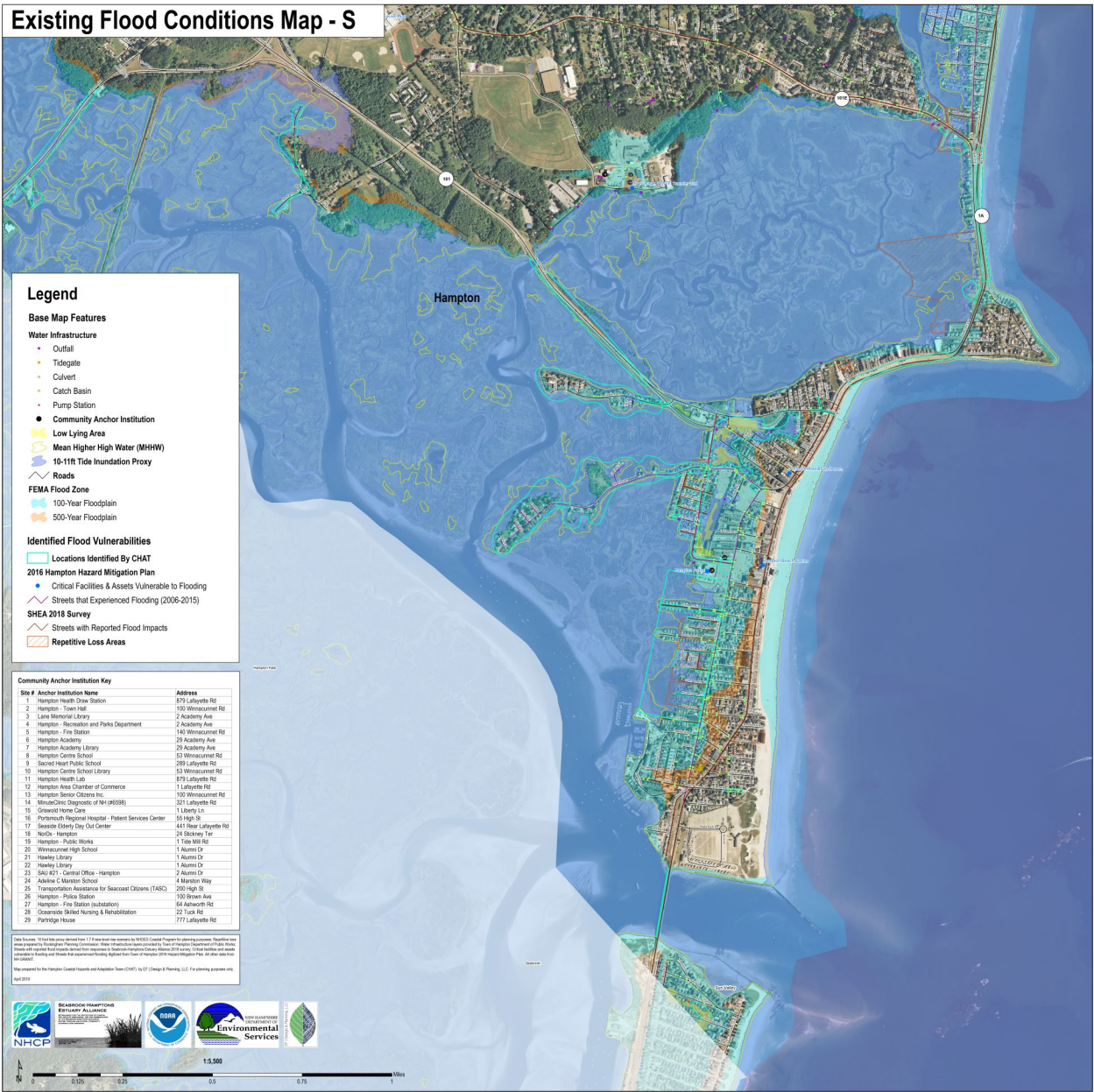
Map & Label	Location	Location is Within...				Flooding Occurs Here During...					The Types of Assets that Flood Are...							Notes
		100 yr floodplain	500 yr floodplain	MHHW	10-11 ft tide	Rain	Avg High Tide	Extreme High Tide	Storm	High Tide + Storm	Street	Culvert/bridge	Home	Business	Asset	Natural Area	Other	
1A	Ocean Blvd								Y	Y	Y							
1B	Crossover Rd + Cole Rd								Y	Y	Y							Sand berm at beach created ramp for water
1	Glade Path	Y			Y						Y							
1	Island Path	Y			Y						Y							Limits access to west Island Path
1	Island Path	Y			Y						Y							
1	Brown Ave Neighborhood	Y			Y						Y		Y					
1	Auburn + Perkins Ave Neighborhood	Y			Y						Y		Y					
1	Manchester St	Y			Y						Y		Y					
1	Dover Ave										Y							
1G	Fire Station	Y									Y				Fire Stn 2		Park @ Police	
1F	Ashworth + Island Path Structure	Y																Building w/ flat roof causes runoff
1	Riverview Ter	Y			Y						Y		Y					
1	Hobson Ave	Y			Y						Y		Y	Y				
1	Ashworth Ave	Y	Y								Y							Portions in 500yr near N St
1C/2C	Ocean Blvd, Church + Cutler	Y							Y	Y	Y							
1D/2N	Winnicunnet + Ocean, Eel Creek	Y			Y	Y				Y	Y	Y	Y					Erosion, flooding causes other areas to become inaccessible
1E	North of Boars Head	Y			Y	Y					Y		Y					In Repetitive Loss Area
1H/2M	High St	Y		Y	Y	Y		Y	Y	Y	Y	Y	Y				Pump Stn, driveway	Flooding causes other areas to become inaccessible
1I	Culvert at Winnecunnet	Y		Y	Y							Y						Undersized
1J	Green, Meadow Pond, Gentian	?		Y	Y	Y		Y	Y	Y	Y		Y					Garages, yards flood; in winter turns to ice, can't get out
1K	Kings Hwy					Y			Y		Y							
1L	Kings Hwy					Y			Y		Y							
2A	Plymouth + Woodstock	Y				Y							Y				basement	
2B	Sewer, Sun Valley line, force main	Y					Y	Y	Y	Y		Y				Y	sand erosion	
2C	West side of Ashworth	Y			Y			Y	Y	Y	Y	Y	Y	Y	Y			Flooding causes other areas to become inaccessible
D	West of Brown Ave	Y			Y			Y	Y	Y	Y	Y	Y					Flooding causes other areas to become inaccessible
2G/H	Brown Ave Tide Gates	Y						Y		Y						Y		
2E	Island Path	Y			Y						Y		Y					Flooding causes other areas to become inaccessible
2F	Glade Path	Y			Y						Y		Y					Flooding causes other areas to become inaccessible
2I	5 Lafayette Rd/East side Rt 1	Y		Y		Y		Y						Y				
2J	Landing Rd Marina	Y	Y					Y	Y	Y	Y	Y		Y	Boat Ramp		Boat Ramp	

## Appendix F Attribute Table from Vulnerability Mapping Exercise & Map Set

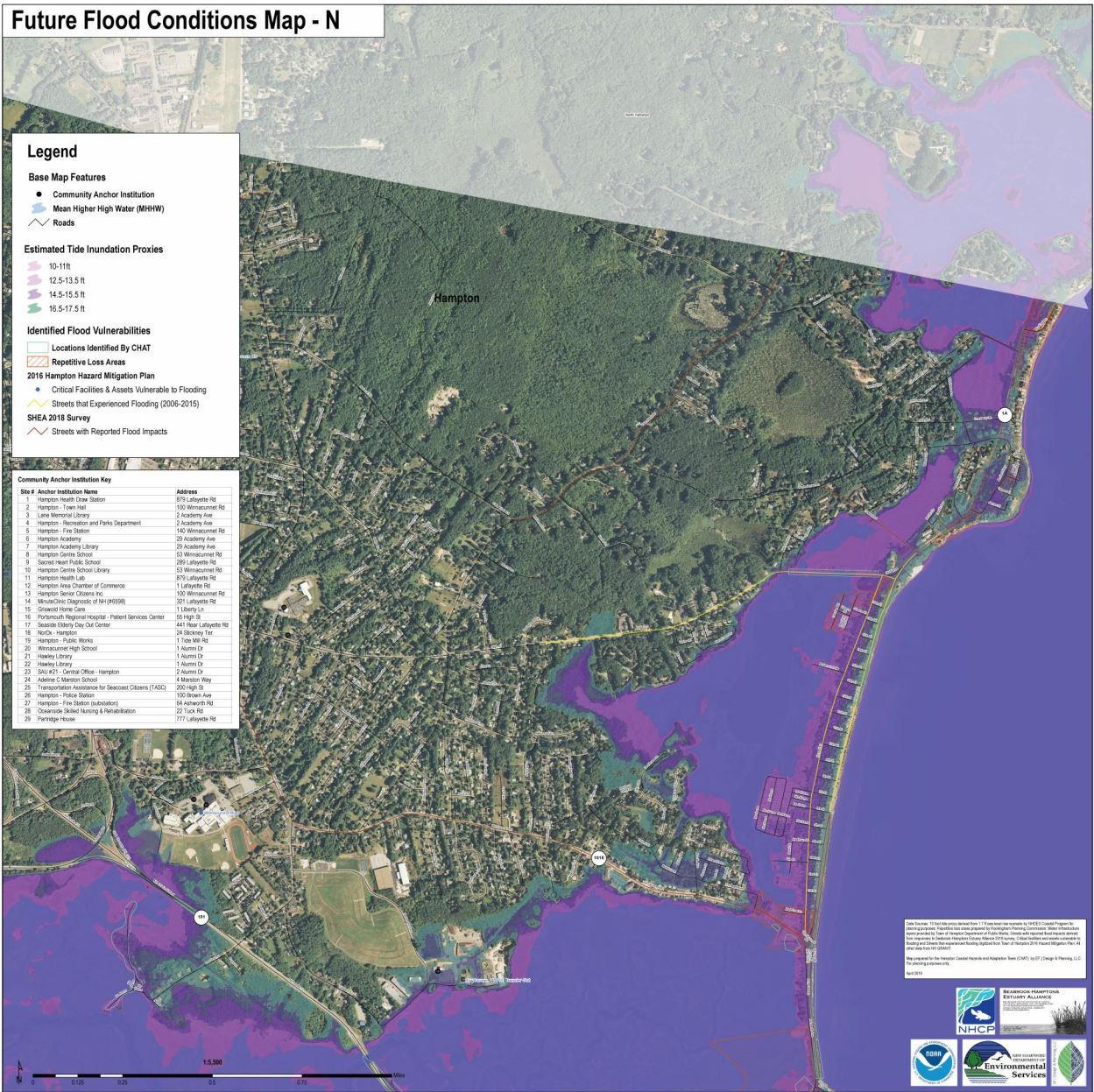
Map & Label	Location	Location is Within...				Flooding Occurs Here During...					The Types of Assets that Flood Are...							Notes
		100 yr floodplain	500 yr floodplain	MHHW	10-11 ft tide	Rain	Avg High Tide	Extreme High Tide	Storm	High Tide + Storm	Street	Culvert/bridge	Home	Business	Asset	Natural Area	Other	
2K	Route 1	Y		Y				Y		Y	Y						State Road	Flooding causes other areas to become inaccessible
2L	Route 101	Y	Y		Y						Y	Y						Floods in winter due to ice buildup, no regular flood, inaccessibility





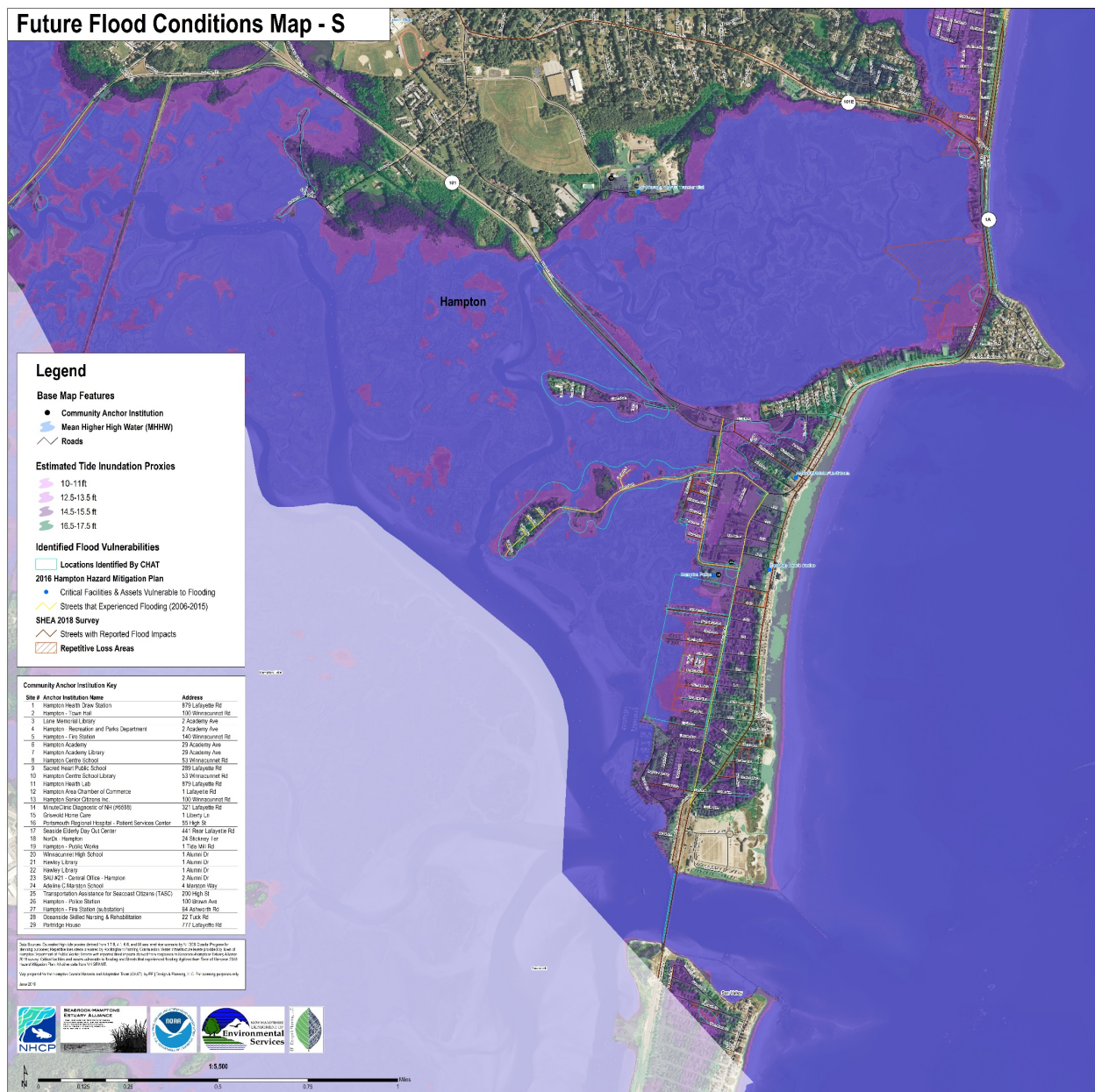








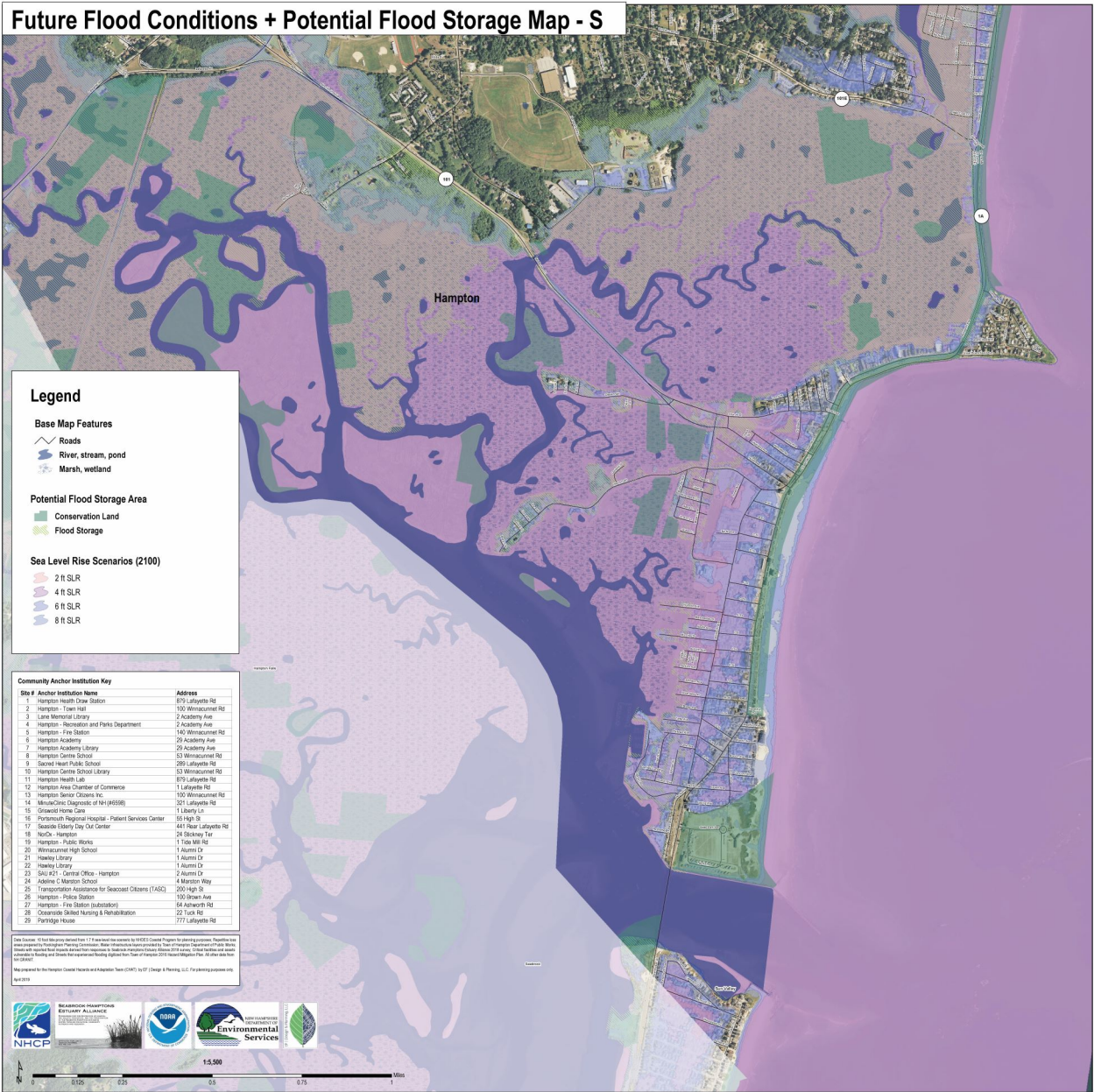
### Future Flood Conditions Map - S













## Appendix G: Working Resource List

- a. Flood Forum USA: <https://anthropocenealliance.org/floodforumusa/>
- b. New Hampshire Coastal Risk and Hazards Commission: [www.nhcrhc.org](http://www.nhcrhc.org)
- c. NHCRHC Science Fact Sheet: <http://www.nhcrhc.org/wp-content/uploads/2014-STAP-report-summary.pdf>
- d. Website to map property risks: <https://floodiq.com/>
- e. Coastal Flooding 101 & Hampton's Vulnerability: <https://drive.google.com/open?id=1jQy8GNNXAeDTEhzWhDzfg6RI-pPopWgn>
- f. Tides to Storms: <https://www.therpc.org/regional-community-planning/climate-change/tides-storms>
- g. New England Interstate Water Pollution Control Commission (NEIWPCC) has developed standards for elevating critical components of WWTP 2-3' above base flood elevation: <http://neiwpcc.org/wp-content/uploads/2017/10/9-20-2016-NEIWPCC-Extreme-Weather-Guide-for-web.pdf>
- h. Link to NWS hydrologic forecast for Hampton: <https://water.weather.gov/ahps2/hydrograph.php?wfo=gyx&gage=hpmn3>
- i. Landowner Technical Assistance program: <https://www.des.nh.gov/media/pr/2019/20190503-coastal-program.htm>
- j. FEMA Hazard Mitigation Assistance grants presentation to BOS (*link to be added*)
- k. Alyson Eberhart from UNH Cooperative Extension/NH Sea Grant is developing a mobile application for citizen scientists to collect waypoint and map the geographic extent of high tide flooding
- l. Deb's photos of the Salisbury wall. Available here: <https://drive.google.com/open?id=1ehNZEM06xhbdT-utB2E3aDsJ3Ar7owNB>
- m. SHEA Flood Situation Assessment: [http://shea4nh.org/wp-content/uploads/2019/08/SHEA\\_SituationAssessment\\_Final.pdf](http://shea4nh.org/wp-content/uploads/2019/08/SHEA_SituationAssessment_Final.pdf)
- n. SHEA Flood Situation Assessment Best Practices