



# Summary and Recommendations Report for the Town of Kittery, ME | Maine Flood Resilience Checklist

WORKSHOP DATES: Workshop #1 – Monday, February 10<sup>th</sup>; Workshop #2 – Monday, February 24<sup>th</sup>, 2020

WORKSHOP LOCATION: Kittery Community Center

FACILITATOR: Abbie Sherwin, Senior & Coastal Planner, Southern Maine Planning and Development Commission (SMPDC)

NOTE-TAKERS: UNH students, Abbie Sherwin

PARTICIPANTS: *See Attachment 1*

ATTACHMENTS: **1:** Workshop Participant List | **2:** Flood Maps | **3:** Flood Resilience Checklist Results

---

## SUMMARY

In February 2020, The Town of Kittery completed the *Maine Flood Resilience Checklist (FRC)*, a non-regulatory assessment tool developed by the Maine Coastal Program to assist coastal communities with examining local flood risk, evaluating vulnerability to flood hazards, and identifying specific actions for enhancing community-wide flood resilience. The process entailed two workshops during which Town staff, members of the Kittery Climate Adaptation Committee (CAC), and other relevant representatives from the community participated in a facilitated discussion about local flood hazards, community resilience, and adaptation planning. The Town’s FRC results are included in this memo as Attachment 3.

The first workshop began with a facilitated discussion about what resilience means to the Town of Kittery, what the Town hoped to gain from undertaking the FRC process, and an overview of sea level rise information, including the primary drivers contributing to increased water levels, historical rates of sea level rise based on local tide gauge data, and projected sea levels over the next 80 years for the coast of Maine. Data from the Portland tide gauge shows that sea level has risen 7.5 inches since 1912 at a rate of roughly 0.07 inches per year overall, with an accelerated rate of rise of 0.12 inches per year since 1990. Based on current best available science, the Maine Geological Survey indicates that the coast of Maine can reasonably expect to experience between one and two feet of rise by 2050 and four to six feet of rise by 2100, but that extreme projections indicate up to almost 11 feet of rise by 2100.

Workshop participants posed the question of how much sea level rise the Town should plan for by certain years/time frames. In response, it was noted that while there is scientific consensus that sea level rise is occurring and there is agreement of likely ranges of sea level rise scenarios based on global conditions and greenhouse gas emissions, there is uncertainty associated with exactly how much seas will rise by when. The amount of rise depends primarily on the rate of future carbon dioxide emissions and future climate change, while the speed of rise depends mostly on the rate of land-based ice melting. Consequently, there is a need for municipal decision-making to consider a likely range of levels and evaluate potential sea level rise conditions and impacts based on the intended ‘lifespan’ of decisions and projects on an individual basis as well as based on the risk tolerance of specific infrastructure and assets.

For example, an emergency services facility or road leading to such a facility would both have a low risk tolerance because they are vital for public health and safety and flooding to either one, even if for a short period of time, could result in major and impactful disruptions to public well-being. Additionally, it is important that any adaptation strategies and planning initiatives Kittery proceeds with are flexible to allow for future changes with local conditions and updated sea level rise projections.

To frame further workshop discussions, assist with completion of the Checklist questions, and provide participants with a better understanding of the Town's



vulnerabilities, participants viewed and discussed maps of the Town showing inundations associated with sea level rise scenarios of 6.1, 8.8, and 10.9 feet, which were selected by Town staff and CAC members, as well as maps depicting inundation associated with a category 2 hurricane and 1.6 and 3.9 feet of sea level rise. Those sea level rise values reference the predicted high tide associated with the scenarios and do not incorporate surge that would occur with coastal storm events. Consequently, Town staff and CAC members chose to examine the 6.1, 8.8, and 10.9 feet sea level rise scenarios as a way to capture and illustrate possible future conditions representative of the combination of sea level rise with added storm surge on top.

Examination of the maps revealed that there are several areas in Kittery of particular concern for flooding, including residential neighborhoods, key and heavily traveled road segments, and business areas (see Attachment 2). Notably, the Portsmouth Naval Shipyard (PNSY), a vital military installation of local, regional, and national significance and major contributor to the local and regional economy and labor force, as well as Town road segments leading to it are vulnerable to sea level rise. Additional areas vulnerable to flooding from sea level rise include Fort Foster; Admiralty Village neighborhood; Wood Island; sections of Seapoint, Chauncey Creek, and Payne Roads; Whipple Road in the area of PNSY Gate 2; the Spruce Creek area near the outlet shopping center; Kittery Water District land in the northwest area of Town; Seapoint Beach; southeastern side of Gerrish Island; the Rachel Carson National Wildlife Refuge, and the section of Pepperrell Road between Chauncey Creek and Deerings Pond. Portions of the Town's emergency evacuations routes are also vulnerable to coastal flooding and sea level rise.

Kittery has already experienced flood-related impacts and damage during coastal storm events, including localized flooding of roadways and private properties. Public assets, such as the trails around Fort Foster, have been especially impacted by storm-related erosion and flooding, requiring extensive repairs. The Town faces increasing risk from flooding due to climate change and coastal homes, municipal infrastructure, and natural resources will continue to be exposed to intensifying and more

frequent storms in the future. Even the more conservative intermediate projections of sea level rise (*e.g.*, 1.6 feet and 3.9 feet) translate to inundation of low-lying coastal roads and neighborhoods during regular high tide. An examination of potential impacts associated with storm surge and greater increases in sea level, such as 6.1 feet, reveal that substantially more of the Town's infrastructure assets, roads, and neighborhoods are at risk of being inundated.

While Kittery is in the initial stages of considering and planning for increases in storm surge and rates of sea level rise, the Town has already undertaken significant steps to position itself for thoughtful and effective planning and action. It has established a Climate Adaptation Committee with active membership, joined with neighboring communities to form the Southern Maine Regional Sustainability and Resilience Program, and undertaken critical planning exercises, such as the PNSY Joint Land Use Study and the FRC process. Kittery has a valuable opportunity to identify and implement pivotal planning, policies, and strategies today that will reduce the Town's vulnerability and protect its natural, social, and built assets in the future as local threats of coastal flood hazards become more severe. Several such planning initiatives and actions for the Town to consider were identified during FRC workshop discussions and are listed below.

## Action Items

### Regulatory and Land Use Strategies

- Update the shoreland zoning layers and boundary lines on the Town GIS.
- The Town is required to update its floodplain ordinance in the near future to reflect adoption of the new Flood Insurance Rate Map (FIRM), issued by FEMA, which presents a timely opportunity to incorporate flood risk reduction measures that exceed the minimum federal and state standards for floodplain management. Consider modifying and strengthening the Town's floodplain ordinance through the following measures:
  - adopt higher freeboard requirements (*e.g.*, 3 feet) for development in areas subject to existing and potential future flood hazards based on projected water depths associated with sea level rise, storm surge, and increased precipitation
  - revise and adopt a regulatory floodplain map that includes both the FEMA-designated 100-year floodplain and areas vulnerable to sea level rise and storm surge and apply floodplain ordinance development requirements to those areas
  - limit or prohibit new development in the regulatory floodplain
  - establish specialized development standards to reduce flood vulnerabilities in areas subject to inundation from sea level rise and storm surge
  - amend the definitions of 'substantial damage' and 'substantial improvement' to specify that damage/improvement costs in relation to structure value are cumulative and considered over the life of a structure or over an extended period of time, not merely as one-time repair or improvement projects.
- Enhance the Town's existing land use regulations and policies that encourage and/or require the use of low impact development and green infrastructure approaches for stormwater management and consider developing advanced requirements for properties located in areas

vulnerable to flooding, storm surge, and sea level rise (see UNH Stormwater Center resources for guidance: <https://www.unh.edu/unhsc/>).

- Develop land use regulations that prohibit rebuilding or issuing building permits for residential properties that are repeatedly damaged by flooding from storms or are in areas subject to future flood hazards, erosion, or marsh migration. The Town could consider developing a threshold that determines whether the property is prohibited from rebuilding, such as if the damage from the storm is greater than 50 percent of total property value.
- Establish a sea level rise/storm surge overall zoning district to encompass areas vulnerable to flooding and develop accompanying regulations to ensure new development and redevelopment are flood resilient.
  - Zone vulnerable areas as Resource Protection under Shoreland Zoning.
- Utilize the work that Rachel Carson National Wildlife Refuge, Wells Reserve, and the U.S. Fish and Wildlife Service have completed regarding marsh migration to identify areas of potential future marsh migration and apply and/or develop land use regulations or other mechanisms to conserve and protect those areas from future development and redevelopment.
- Amend the Town's shoreland zoning ordinance and map to account for areas that will likely be inundated by certain sea level rise scenarios and storm surge. Consider establishing the boundary line delineating resources to which shoreland zoning regulations apply at the inland boundary of those inundation scenarios
  - Consider increasing the minimum lot size in coastal areas to reduce development and redevelopment within areas vulnerable to sea level rise and storm surge. Ensure that dimensional standards, including setbacks, do not encourage or allow larger structures to be built on the larger lot sizes.
  - Revise the Town's existing shoreland zoning ordinance to apply to marshes smaller than 10 acres in size and strengthen protections for salt marshes and vegetative buffers.
- Consider encouraging property owners to willingly implement flood risk reduction practices on their property (e.g., voluntary elevation of structure above a specified flood level, stormwater retention/treatment, etc.).
- Establish a policy and/or plan of action to expedite post-disaster permitting and inspection processes for structure repair, demolition, and rebuilding while ensuring that reconstruction and redevelopment are resilient and flood vulnerability of properties is reduced.
- Consider developing and adopting a septic pump out ordinance to ensure septic systems, especially those in areas vulnerable to flooding, function properly and to minimize potential detrimental impacts to water quality and the environment. Also consider amending ordinances to prohibit, or allow with more stringent environmental restrictions, septic systems in areas vulnerable to flooding or encourage adaptation practices to protect from storm and flooding impacts.
- Amend cluster development ordinance regulations to require open space development in flood prone areas and conservation of areas vulnerable to flooding and sea level rise as open space.
- Revise ordinances to require or encourage developers to use a more restrictive storm frequency (e.g., 24-hour rainfall of a 30-year storm event, etc.) for stormwater management and design standards.
- Consider implementing an impact fee or other fee-based program to support resiliency and adaptation projects in areas vulnerable to coastal flood hazards.

## Policy Strategies

- Develop a shared vision of ‘community resilience’ for the Town of Kittery to guide municipal planning, policies, and actions across Town departments, Boards, and Committees.
- Identify and adopt a sea level rise scenario, or scenarios, for the Town to plan for and to inform municipal decision-making (*see New Hampshire Coastal Flood Risk reports for guidance: <https://www.des.nh.gov/organization/divisions/water/wmb/coastal/flood-risk-summary.htm>*).
- Establish a municipal fund or grant program to support coastal adaptation and resiliency initiatives.
- Develop and implement a standardized, cross-departmental protocol for documenting local flood impacts and related information. The protocol should establish criteria regarding what storm events and impacts trigger documentation. Documented information could include the location, cause, duration, depth, and date of flooding, resulting damage and other impacts, photographs, and response and repair activities. Consider integrating the documented information in the Town GIS.
  - Utilize the Town’s drone to capture photographs and data regarding flooding and damage during and after storm events and King Tide events.
- Consider installing high water mark signs that show storm of record, 100-yr event, and sea level rise/storm surge scenarios. These signs would be posted in publicly visible and prominent locations to communicate possible flooding scenarios and galvanize public awareness (*see the Town of York and City of Portland for examples*).
- Develop an all-hazards mitigation plan in coordination with York County Emergency Management Agency (EMA).
- Establish and incorporate resilience criteria and future flood hazard information into the Town’s Capital Improvement Plan (CIP) for municipal infrastructure and facilities.
- Develop and adopt a formal policy requiring all municipal projects to consider, and mitigate to the greatest extent practicable, existing and potential future impacts of coastal flooding, storm surge, sea level rise, and coastal erosion/shoreline change. Future impacts should be based upon the project’s anticipated useful life cycle, risk tolerance, and sea level risk scenarios identified by the Town’s planning horizons.
- Consider participating in FEMA’s Community Rating System (CRS) program to enhance the Town’s flood resilience and provide a cost savings to residents that carry federally backed flood insurance.
- Develop and implement a formal protocol for documenting and tracking maintenance, repair, and upgrade activities and associated costs related to flooding impacts to municipal infrastructure and facilities.
- Ensure the Town’s post-disaster waste management plan addresses the handling and storage of harbor and marina debris (*e.g., boats*).
- Consider creating an economic development plan that addresses climate change and incorporates information about existing and potential future flood hazards.
- Prioritize frequently flooded areas or those subject to inundation from sea level rise and storm surge for acquisition, easements, and/or open space preservation. Partner with the Kittery Land Trust and other conservation organizations.

- Inform property owners and prospective buyers of flood risks associated with the 100-year storm event to their property. Consider informing property owners and prospective buyers of sea level rise vulnerability and consider developing and adopting a hazard disclosure policy for informing property owners, residents, and prospective property buyers of risks from flooding, sea level rise, and storm surge.

#### Future Studies and Information Needs

- Obtain surveyed elevations of evacuation routes, critical roadway bridges, low-lying roads, piers, low-lying areas in Admiralty Village, Foreside area, Wood Island, brownfield and superfund sites, and all critical infrastructure and facilities.
  - Critical roadway bridges: Route 95, Route 1, Route 103 around Spruce Creek, and the culvert at Chauncey Creek.
  - Low-lying roads: Payne Road, Braveboat Harbor Road, Route 103 near PNSY Gate 2, Water District building.
  - Piers: Pepperrell Cove, Government Street Wharf.
- Assess vulnerability of existing evacuation routes to coastal flooding and sea level rise. Revise routes as necessary and/or pursue alternative adaptation and mitigation measures such as increasing the elevation of road segments vulnerable to flooding.
- Conduct vulnerability assessments for municipal buildings and infrastructure to assess impacts of sea level rise and coastal flooding.
  - Consider pursuing this as part of the Regional Sustainability and Resilience Program housed within SMPDC.
- Conduct an analysis of private properties (*i.e.* homes and businesses) at risk from existing flood hazards and future sea level rise, quantify the value of properties impacted, and assess the impact of those properties on the municipal tax base.
  - Consider pursuing this as part of the Regional Sustainability and Resilience Program housed within SMPDC.
- Assess insurance coverage within the Town by comparing the number of properties within the special flood hazard area (SFHA) (*i.e.* regulatory floodplain) with the number of flood insurance policies through the National Flood Insurance Program. If coverage is insufficient, undertake education and outreach efforts to inform residents about flood risk and availability of federally backed flood insurance. Partner with the Maine Floodplain Management Program and SMPDC to gather and assess data and undertake outreach efforts.
- Model potential impacts of sea level rise on groundwater rise and assess vulnerability of drinking water supply to climate change.
  - Consider pursuing this as part of the Regional Sustainability and Resilience Program housed within SMPDC.
- If possible, gather data about the location and elevation of septic systems within areas of Town vulnerable to coastal flooding and assess potential impacts of sea level rise and associated groundwater rise on septic systems.

- Coordinate with PNSY to conduct a joint detailed sea level rise vulnerability assessment of the Shipyard and associated areas within Kittery and coordinate on resilience, adaptation, and mitigation planning and implementation initiatives.
- Identify areas within Town that could potentially support future marsh migration and explore the possibility of a 'blue carbon' market, building off of the existing work of the Rachel Carson National Wildlife Refuge, Wells Reserve, and the Maine Natural Areas Program.
- Conduct a buildout analysis of the Town based on existing and/or planned zoning and land use regulations and incorporate sea level rise and coastal flooding in analysis (*see the York River Study: <http://www.yorkrivermaine.org/study-documents/>*).
- Conduct a study to better understand how increased stormwater from more intense and frequent precipitation events will interact with storm surge and sea level rise and the resulting flooding impacts.

### Information Sharing

- Produce and post a map of the Town depicting one sea level rise scenario in Town hall with embedded "post it" notes of existing vulnerabilities. Ask residents who visit Town Hall to comment on additional vulnerabilities and what the Town should do to address vulnerabilities.
- Add flood hazard information (*e.g.*, inundation associated with different scenarios of sea level rise and storm surge) as layers to Town's online GIS system to way to increase awareness of local flood vulnerability among Town staff, elected officials, and the general public.
- Increase information sharing and communications with private companies/owners and operators of key vulnerable infrastructure and facilities.
- Actively participate in the Southern Maine Regional Sustainability and Resilience Program to build stronger regional collaboration, leverage resources, and accomplish initiatives that enhance Kittery's coastal resilience.
- Document, continue, and expand upon existing efforts regarding flood hazard and disaster education and outreach activities tailored for the school-age population and general public.
- Partner with PNSY to implement action items identified in the 2020 Joint Land Use Study (JLUS) Final Report ([http://www.kitteryme.gov/sites/kitteryme/files/uploads/jlus\\_final\\_report.pdf](http://www.kitteryme.gov/sites/kitteryme/files/uploads/jlus_final_report.pdf)) and ensure flooding and sea level rise are considered and addressed in all implementation projects.

## Attachment 1: Workshop Participant List

<b>Name</b>	<b>Title</b>
Kendra Amaral	Town Manager
Dave Rich	Public Works Commissioner
Jessa Kellogg	Public Works Inspector / Shoreland Resource Officer
Craig Alfis	Code Enforcement Officer, Assistant Fire Chief
Tim Babkirk	Sewer District Superintendent
Robert Richter	Police Chief
Adam Causey	Director of Planning and Development
John Brosnihan	Harbormaster
Judy Spiller	Town Council, Chair / Climate Adaptation Committee
Matt Brock	Town Council, Vice Chair
Cameron Wake	Climate Adaptation Committee, Co-chair
Lise Laurin	Climate Adaptation Committee
Steven Hall	Climate Adaptation Committee / Conservation Commission
Nanci Lovitt	Climate Adaptation Committee
Kristina DeMarco	Climate Adaptation Committee
John Duffy	Climate Adaptation Committee
Ron Ledgett	Climate Adaptation Committee
Ken Fellows	Kittery Land Trust
Jackie Johnston	Portsmouth Naval Shipyard, Community Liaison

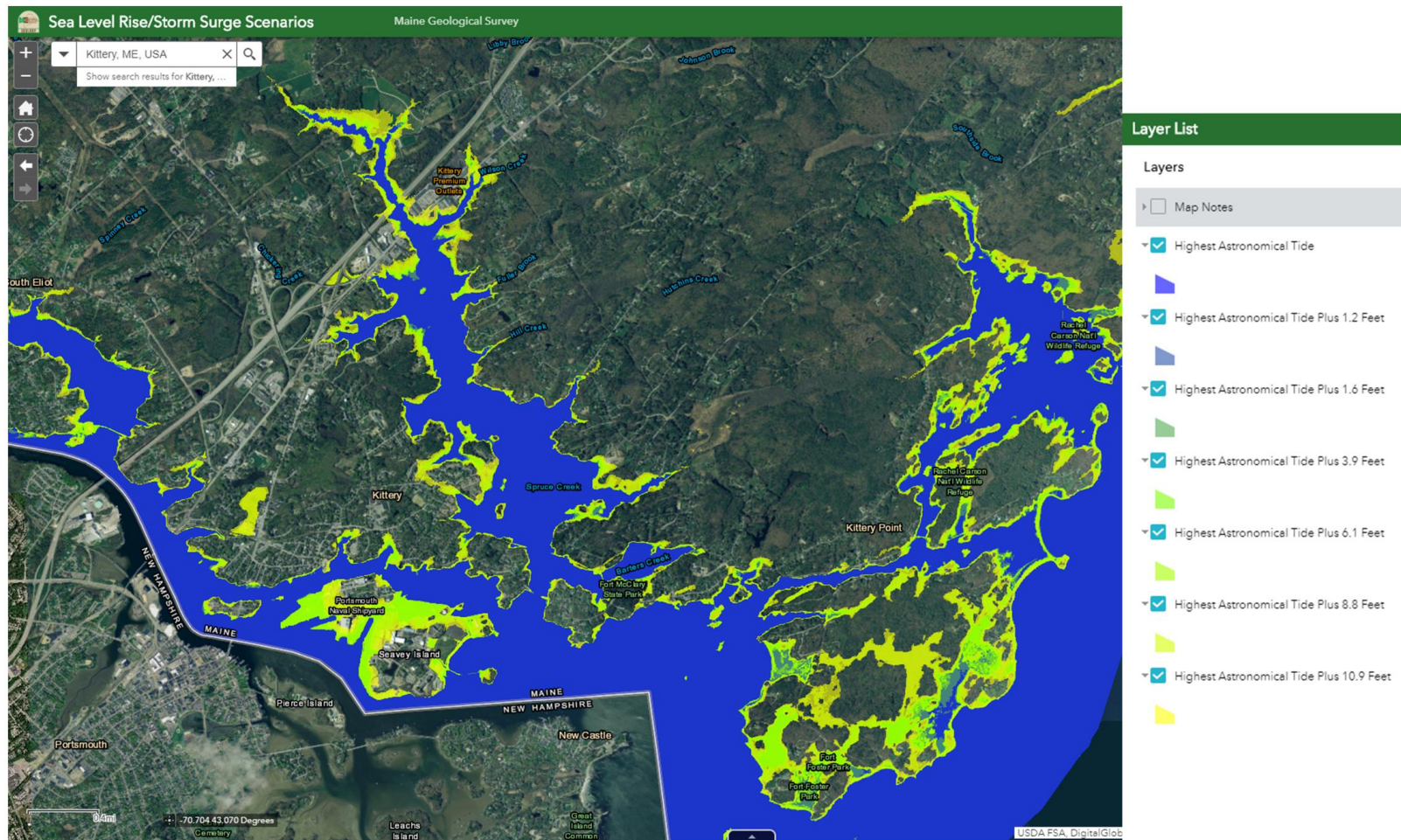


## Attachment 2: Flood Maps

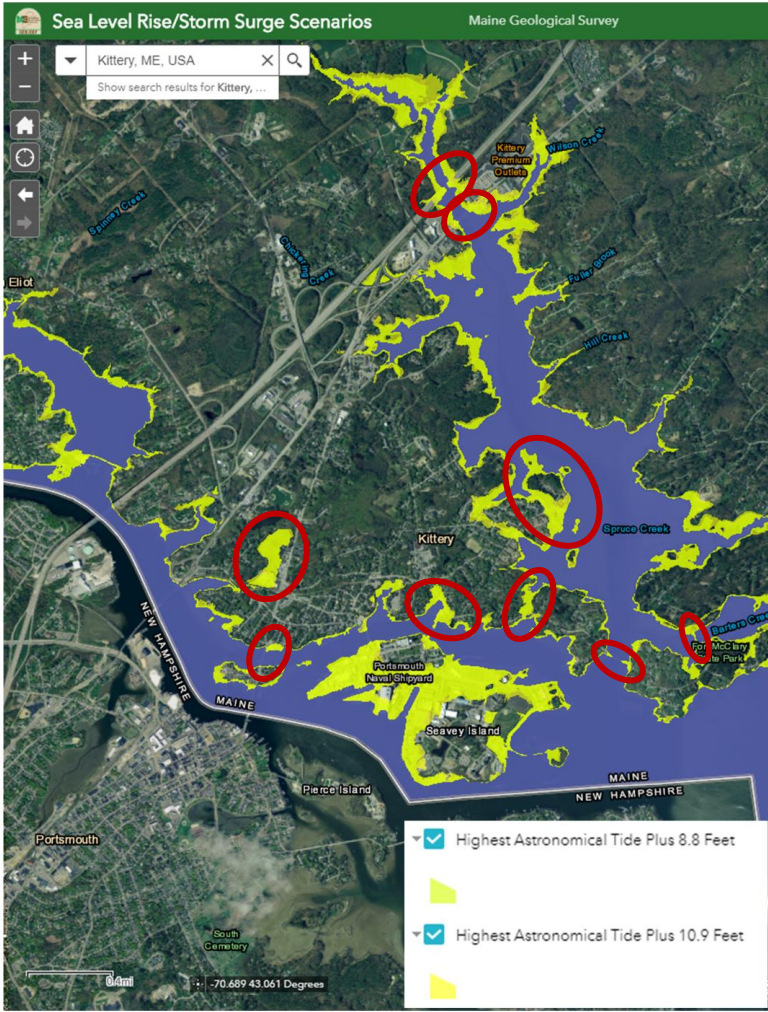
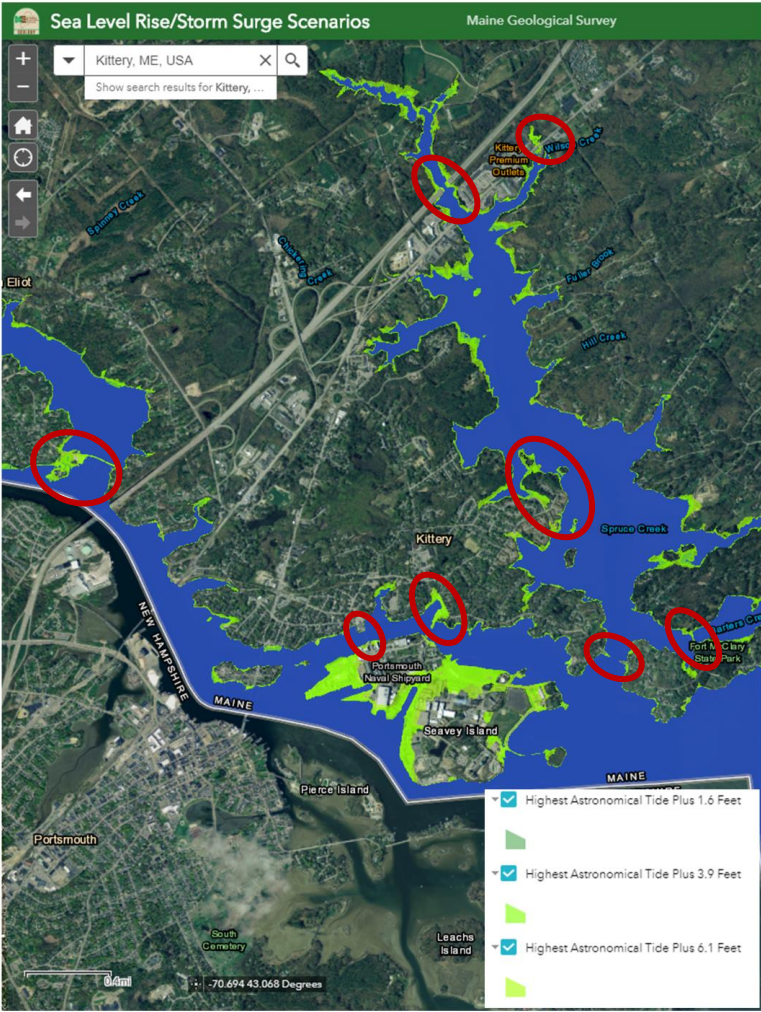
Map Source: Maine Geological Survey Sea Level Rise / Storm Surge viewer: [https://www.maine.gov/dacf/mgs/hazards/slr\\_ss/index.shtml](https://www.maine.gov/dacf/mgs/hazards/slr_ss/index.shtml)

Note: Red circles indicate areas of concern or significance circled by participants during the workshops.

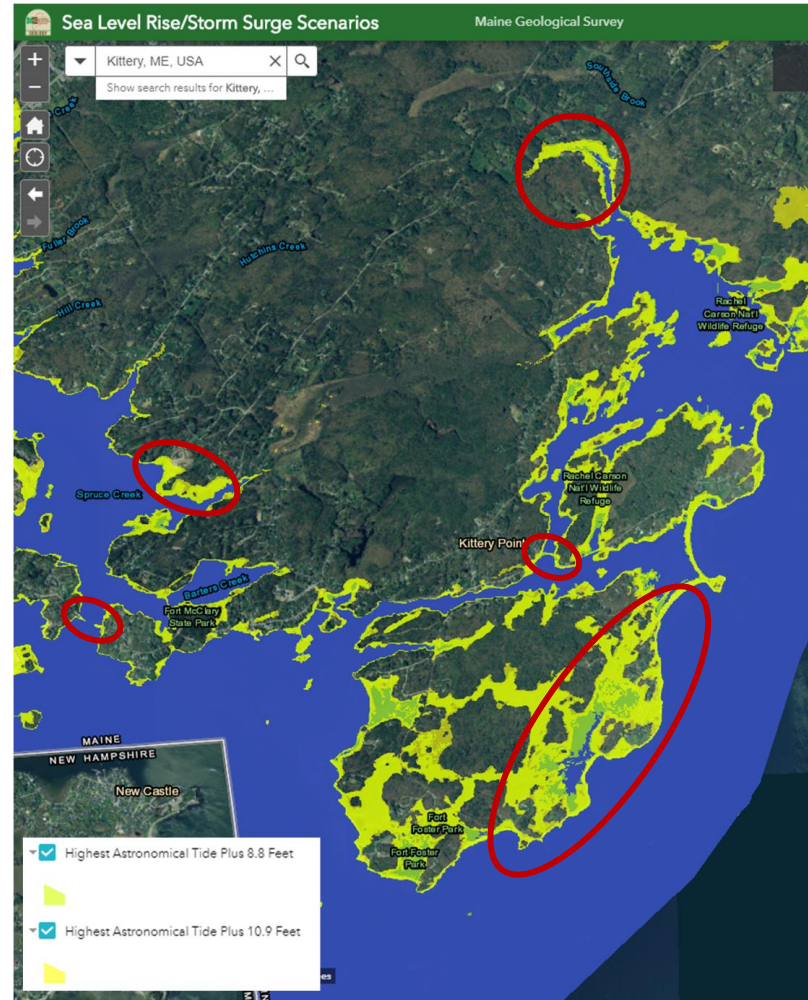
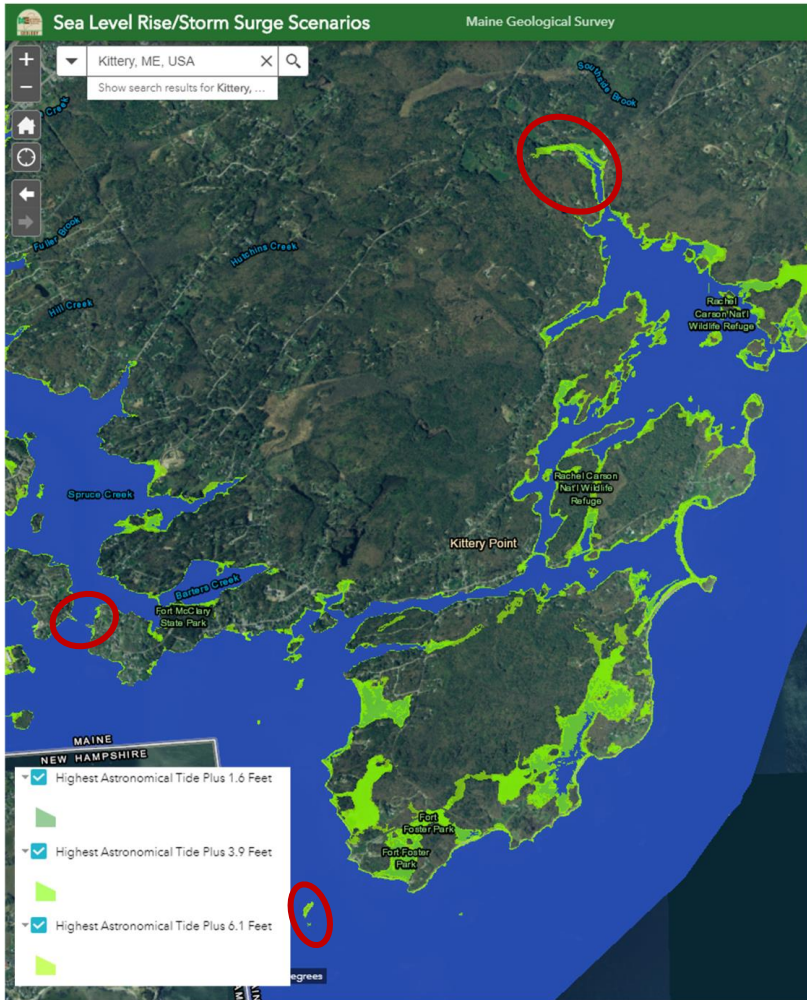
### Highest Astronomical Tide (HAT) + 1.6, 3.9, 6.1, 8.8, & 10.9 ft of Sea Level Rise



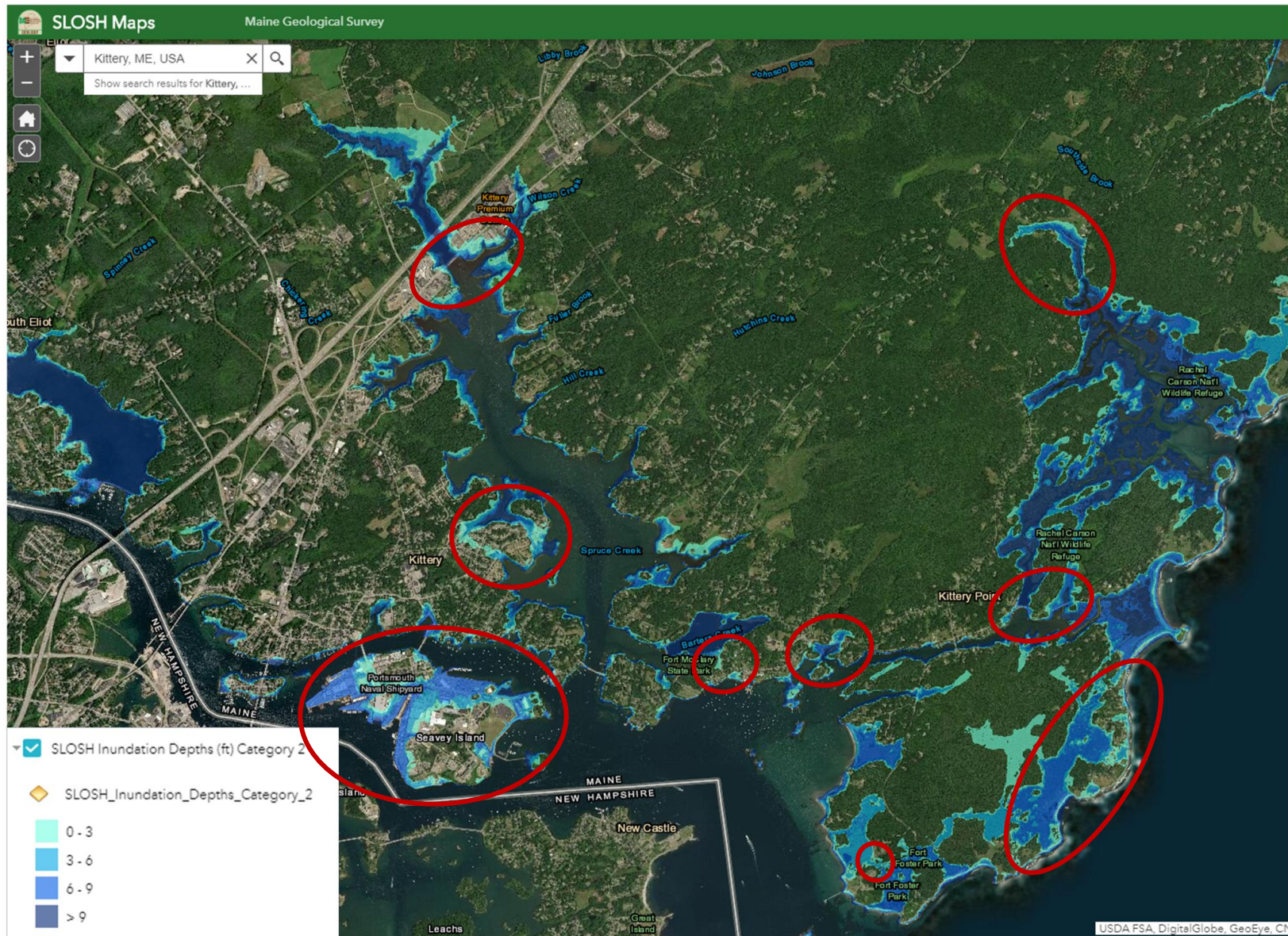
# Sea Level Rise: Shipyard & Admiralty Village



# Sea Level Rise: Kittery Point & Payne Road



# Category 2 Hurricane Inundation



## Attachment 3: Flood Resilience Checklist Results

Risk and Vulnerability	A	B	Notes
1 (a) Has your community identified and documented the historical geographic extent and impacts and (b) considered the potential future extent and impacts of the following coastal hazards?			
• Coastal and nuisance flooding	Y	Y	Only for municipal infrastructure. Extent of potential flooding modeled and mapped through the FEMA FIRM appeal process, but information about impacts is somewhat incomplete. Past flooding events that impacted roads should be documented in police logs. If the event is anticipated
• Storm surge	Y	Y	Only for municipal infrastructure.
• Sea level rise	Y	N	Only for municipal infrastructure.
• Coastal erosion and/or shoreline change	N	N	Only for municipal infrastructure. Volunteers with the Maine Healthy Beaches Program, along with staff from the Maine Geological Survey (MGS), conduct beach profiles on a regular basis; MGS has created maps with the profile data showing shoreline change over time.
2 Are potential sea level rise, hurricane, and storm surge inundation scenarios determined for your community?	Y		
3 Does your community have GIS mapping and analysis capabilities or access to GIS services?	Y		
4 Has the potential future extent of coastal hazards been identified, mapped, and considered in your community's planning?	N		
5 Has your community adopted a surveyed or GIS-based boundary delineating the highest annual tide (HAT) line for Shoreland Zoning?	Y		Yes, but the GIS-based boundary needs to be updated.
6 Does your community document and archive the following information related to flooding, storms, and erosion?			Town staff document some of the noted information, but there is no formal policy to do so or guidance regarding the type of event or impact that triggers documentation.
• Geographic extent of impacts	Y		Information is documented if there is a flooding event that impacts roads and transportation access, primarily because the police department is dispatched if roads are flooded.
• Photographs of impacts	Y		
• Water levels	N		Water level of Pepperrell Cove was just recently surveyed; PNSY is trying to reestablish the tide gauge at Seavey Island.
• Relative location of damage	Y		Information is documented by the Town if the damage is the result of a storm event that is designated as a FEMA event.
• Date of damage	Y		
• Damage type	Y		
• Cause of damage	N		
• Damage costs	N		The information has only been documented for damage to public infrastructure, not private property.
• Repetitive loss properties, as defined by the National Flood Insurance Program	-		
7 Has your community conducted vulnerability assessments of the following categories based on (a) existing and (b) potential future conditions?			
• Critical facilities	N	N	Town looked at vulnerability of the transfer station, but no other facilities.
• Critical infrastructure	N	N	DPW completed an assessment for culverts 1 to 3 feet in diameter; assessments have not been conducted for other infrastructure
• Coastal properties (public and private)	N	N	
• Society and the economy (local population, historical and cultural resources, downtown areas, business districts, tourism areas, etc.)	N	N	
• Natural Environment	N	N	
8 Does your community (a) conduct assessments and evaluations of local flood hazards and associated risks and, if so, (b) is that information shared with the following relevant individuals, groups, and programs?			
• Planning staff	Y	Y	
• Code enforcement	Y	Y	

Risk and Vulnerability		A	B	Notes
	• Public works	Y	Y	
	• Emergency managers and first responders	Y	Y	
	• Elected officials	-	-	If an event requires emergency response by the Town, elected officials are informed and information about the event and impacts are shared with them.
	• Municipal budget personnel	Y	Y	
	• Chamber of Commerce / business community	N	N	A means for the Town to share flood hazard information with the business community exists, but the Town has not yet shared that information.
	• Municipal commissions	N	N	
	• Community members	N	N	
	• Regional Planning Organization	Y	Y	
	• State programs and agencies (MPAP, MFMP, MGS, MEMA)	Y	Y	
9	(a) Are coastal storm and flood hazard frequencies and durations established for your community and (b) has your community determined what an acceptable level of risk is with respect to those hazards?	Y	N	The Town should continue discussions about coastal flood hazard impacts and related risk tolerance of specific community areas, infrastructure, and assets to sea level rise and storm surge.
10	Does your community have working relationships with technical resources such as government programs, universities, or professionals that provide assistance with flood hazards, risk, vulnerability, and resiliency?	Y		Yes, very strong working relationships exist.
	Y	20	9	
	N	13	11	
	-	2	1	

Infrastructure	A	B	Notes
1 Does your community have a detailed inventory, including elevations, of the following critical facilities and infrastructure that includes information about the location of assets in relation to (a) existing and (b) potential future flood hazard areas?			
• Wastewater treatment and transport system (plant, pipes, and pump stations)	Y	N	Wastewater system is mapped with GIS, including elevations of system components, but the GIS layer has not been overlaid with flood hazard layers to assess vulnerability.
• Stormwater system	Y	N	
• Water treatment and transport system (plant, pipes, and pump stations) and drinking water wells	Y	Y	The Town only has an inventory of some system components, as public water is not a municipal utility, it is owned and operated by the Kittery Water District; the Town has information about the location of private wells in property files.
• Power grid (substations)	N	N	
• Energy network (oil, natural gas, etc.)	N	N	
• Public roads	Y	N	
• Evacuation routes	Y	N	
• Culverts	Y	N	
• Bridges	Y	N	
• Dams	N	N	
• Piers or wharves	Y	N	
• Railway infrastructure	Y	N	
• Town/City Hall	Y	N	
• Critical record storage building(s)	Y	N	
• Police station(s)	Y	N	
• Fire station(s)	Y	N	
• Public works facilities	Y	N	
• Emergency operation center(s)	Y	N	
• Communications office(s)	Y	N	
• School(s)	Y	N	
• Hospitals, urgent care facilities, and health centers (e.g., nursing homes)	Y	N	
• Emergency shelters	Y	N	
• Transportation centers (e.g., bus station, airport, etc.)	-	-	
• Facility of regional or local significance (e.g., harbor, marina, commercial dock, etc.)	N	N	Portsmouth Naval Shipyard (PNSY) is a critical facility of local, regional, and state significance. Reports suggest that PNSY officials are assessing sea level rise impacts to the facility.
• Gas and diesel tanks at marinas/working waterfronts	N	N	
2 Do the following critical infrastructure and facilities experience problems associated with flooding?			
• Wastewater treatment and transport system (plant, pipes, and pump stations)	Y		Wastewater treatment lines have been impacted
• Stormwater system	Y		Culverts and other stormwater infrastructure have been impacted, particularly on Payne Road, Seapoint Road, and Chauncey Creek Road.
• Water treatment and transport system (plant, pipes, and pump stations) and drinking water wells	-		Unknown by workshop participants, water treatment infrastructure is owned and operated by a non-municipal entity, Kittery Water District.
• Power grid (substations)	N		
• Energy network (oil, natural gas, etc.)	N		
• Public roads	Y		
• Evacuation routes	Y		
• Culverts	Y		
• Bridges	N		
• Dams	Y		The Spinney Creek dam, which is physically located in the Town of Eliot, has flooded out in the past.
• Piers or wharves	Y		Two public piers in Kittery Point have had flooding issues.
• Railway infrastructure	N		
• Facility of regional or local significance (e.g., harbor, marina, commercial dock, etc.)	Y		PNSY is looking into existing flooding issues.
• Gas and diesel tanks at marinas/working waterfronts	N		

Infrastructure	A	B	Notes
3 (a) Are maps or GIS used to show the location and accessibility of critical infrastructure and facilities in relation to flood hazard areas <sup>4</sup> and (b) is that information publicly available?	Y	N	The Town's Flood Insurance Rate Map (FIRM) issued by FEMA are very outdated; in recent years, FEMA published updated preliminary FIRMs for all of York County, but Kittery is one of several towns that have appealed the updated FIRMs; the appeal was rejected by FEMA, so Kittery is pushing Letters of Map Revisions in an attempt to reduce the number of private properties identified as being within the regulatory floodplain, or to effectively 'remove' properties from the regulatory floodplain.
4 Are there plans and backup systems in place for critical infrastructure and facilities to ensure continuation of function and services during and after flood hazard events?	Y		All municipal emergency response/management buildings have generators.
5 Has your community assessed or considered the amount of time that would be needed to return damaged infrastructure and facilities to a functional condition post-hazard event?	N		Certain aspects of this have been partially addressed through the Town's emergency management plans.
6 (a) Do critical infrastructure and facilities' maintenance plans and budgets account for adaptation/mitigation actions and (b) post-hazard repairs and cleanup?	N	Y	This depends on the individual facility, the budget for harbor-related infrastructure includes funds for post-event repairs; for other infrastructure, the Town has reserve funds, but they are for a number of things, not just storm damage repair.
7 (a) Are maintenance, repair, and upgrade activities and associated costs for infrastructure and facilities documented and tracked? (b) Are costs associated with flooding identified, documented, and tracked?	Y	N	
8 Do capital improvement plans for critical infrastructure and facilities consider (a) existing and (b) potential future flood hazards?	N	N	The CIP does not address flooding apart from section on harbors.
9 Has your community discussed at what point it will stop repairing and upgrading existing critical infrastructure and facilities to withstand flooding?	N		
10 (a) Do community plans include recommendations for abandonment, relocation, or adaptation/protection of critical infrastructure and facilities located in flood hazard areas? (b) Have funding opportunities or mechanisms to implement those actions been identified?	N	N	The Town has had some discussions about adapting/upgrading culverts on Payne Road and Seapoint Road to deal with existing flooding issues. After Fort Foster was damaged by a coastal storm, there was some discussion among residents about when the Town should stop repairing the trail around the fort, but no decisions were made.
11 Are critical infrastructure and facilities that are located in flood hazard areas <sup>5</sup> elevated or floodproofed to at least the 0.2% chance (i.e., 500-year) flood or 3 feet above the 1% chance (i.e., 100-year) base flood elevation?	?		Workshop participants did not know the answer to this question.
12 When planning new critical infrastructure and facilities, does your community consider existing and potential future impacts of the following coastal hazards?			
• Coastal and nuisance flooding	Y		
• Storm surge	Y		
• Sea level rise	Y		The new pier at Pepperell Cove took potential future sea level rise into account and was elevated as a result.
• Coastal erosion and/or shoreline change	Y		
Y		34	2
N		15	27
-		2	1



Community Planning		A	B	Notes
1	Does your community have a shared vision of 'community resilience'?	N		There is no town vision, but individual departments have ideas about what resilience means to and for them, although it is not always able to be acted on or integrated into departmental actions and planning
2	Does your community have plans that address the following?			
	• Coastal hazards	N		
	o Coastal and nuisance flooding	N		
	o Storm surge	N		
	o Sea level rise	N		
	o Coastal erosion and/or shoreline change	N		
	• Adaptation and mitigation strategies and actions addressing coastal hazards	N		
	• Community resilience and specific strategies and actions to increase resilience	N		The Town's Capital Improvement Plan includes some general information about resilience, but no specific resilience-related projects.
	• Open space preservation and management	N		The Town has a master plan for its athletic fields and a management plan for Fort Foster, which are open spaces. The Town also has identified and prioritized areas in town for conservation.
	• Beach management	N		
	• Floodplain management	N		Floodplain management is only addressed via the Town's floodplain ordinance.
3	Does your community have the following personnel on staff or on retainer?			
	• Professional planner	Y		
	• Code enforcement officer	Y		
	• Certified Floodplain Manager (CFM®)	N		
	• Building inspector	Y		
	• Engineer	Y		Engineer on retainer
	• Public works director	Y		
	• Plumbing inspector	Y		
	• Emergency manager	Y		
4	Does your community's floodplain ordinance exceed minimum State standards?	N		
5	Does your community's floodplain ordinance apply to flood hazard areas that extend (a) vertically and (b) horizontally beyond those identified as the Special Flood Hazard Area (SFHA) or 100-year floodplain depicted on your community's Flood Insurance Rate Map (FIRM)?	N	N	Some areas of the SFHA have a 100-foot setback applied to them through the Town's Shoreland Zoning Ordinance
6	Do your community's land use regulations limit development in areas subject to (a) existing and (b) potential future flood hazards?	Y	N	The primary land use regulation for limiting development in flood-prone areas is the floodplain ordinance, but it is based on a Flood Insurance Rate Map that was published in 1984 and is severely out of date.

Community Planning		A	B	Notes
7	Does your community have policies that limit public investment in areas vulnerable to (a) existing and (b) potential future flood hazards?	N	N	There is no formal policy in place for this, but the Capital Improvement Plan takes a long-term look at projects, including some climate change considerations.
8	Are frequently flooded areas in your community zoned or planned for open space or prioritized for acquisition or easements?	N		
9	Has your community conducted a build-out analysis based on land use regulations?	Y		Build-out analyses have been conducted for certain areas of town, including the Foreside, mixed-use neighborhood, and the portion of town within the York River Watershed
	Have the results been compared to the spatial extent of (a) existing and (b) potential future flood hazard areas?	Y	N	
10	Do your community's land use regulations encourage the use of green infrastructure approaches for stormwater management?	N		Only to the extent that the State regulations (Chapter 500) encourage those practices; green infrastructure/low impact development practices are encouraged, but not required, for the mixed-use neighborhood located off of the highway.
11	(a) Does your community offer economic incentives (e.g., development fee waivers) for property owners that willingly implement flood risk reduction practices on their property (e.g., freeboard outside of regulatory floodplain, elevating structure above minimum freeboard requirement, etc.)? (b) If so, are the incentives advertised?	N	N	
12	Does your community have a comprehensive plan?	Y		Recently updated.
13	Does your community have a MEMA- and FEMA-approved hazard mitigation plan that addresses preparedness for (a) existing and (b) potential future flood hazards?	N	N	The Town does not have its own hazard mitigation plan, but the York County plan is required to have town-specific information in it.
	Does the plan appear in the county hazard mitigation plan?	Y		
14	Does your community have a hazard/disaster education and outreach plan?	N		The Town only has a plan for fire hazards.
	• Community plan	N		
	• School plan	N		
15	Are clearly marked signs placed throughout your community indicating the following and does your community provide related information to residents and businesses prior to a possible flood event?			The Town advertises this information when there is a disaster event.
	• Evacuation routes	Y		
	• Evacuation pick-up locations	N		
	• Shelter locations for people and for pets/farm animals	N		
16	Are high water mark, storm surge, and/or potential future flood elevation signs posted in your community in publicly visible areas?	N		There is a tide level reference stick at Chauncy Creek, but it does not include any information about historical high water levels.
17	(a) Does your community participate in flood hazard reduction programs (e.g., National Flood Insurance Program (NFIP), FEMA's Community Rating System (CRS), etc.)? (b) If so, is your community in good standing with those programs?	Y	Y	The Town is in good standing with the NFIP, but does not participate in the CRS program.
18	Is your community designated as StormReady by the National Weather Service?	N		

Community Planning		A	B	Notes
19	Has your community adopted the most recent Maine Uniform Building and Energy Code (MUBEC)?	Y		
20	Does your community have a local hazard disclosure policy requiring hazard disclosure by real estate agents, private sellers, and/or by municipal officials for properties located in (a) the FEMA-designated regulatory floodplain and/or (b) other flood hazard areas (e.g., storm surge, sea level rise, etc.)?	N	N	
21	Does your community have a disaster response and recovery plan that includes short- and long-term actions and policies and identifies personnel responsible for those actions?	Y		
22	Does your community participate in practice drills of emergency response plans?	Y		
23	(a) Does your community have a flood warning plan and (b) a flood warning system?	N	Y	The Town uses E-alerts and social media to warn people about flooding events, and is looking into using reverse 911.
24	Does your community have an emergency communication system to use prior to, during, and after a storm event or natural disaster (e.g., reverse 911 call system for landlines, IPAWS for cell phones)?	N		The Town is currently looking into using reverse 911.
25	Does your community have an emergency evacuation plan that identifies populations needing evacuation assistance and mechanisms for providing that assistance?	Y		Residents can apply for assistance on the Fire Department's webpage, but it requires people to actively sign-up on their own. When there is a large storm/disaster event, Central Maine Power (CMP) coordinates with the Town.
	Does the plan account for seasonal population variability?	N		
26	Does your community have mutual aid agreements with neighboring communities for hazards and disaster preparation, response, and recovery?	Y		
27	Does your community have a plan for acquiring and disseminating response and recovery equipment and materials (generators, food, water, etc.)?	Y		
28	Does your community have a post-disaster waste management and debris removal plan that has been reviewed by MEDEP, MEMA, and FEMA?	?		York County has reviewed the Town's debris management plan, but workshop participants were unsure if DEP has reviewed it; they were also unsure if the plan identifies a debris storage site. Workshop participants discussed the need to address the storage and handling of harbor/marina-related storm debris such as boats.
29	Does your community budget for local disaster response and recovery funds (not from State or federal agencies)?	N		
30	Are mechanisms in place for your community to solicit and receive external funds for disaster response and recovery?	Y		
31	Does your community have an established line of credit to ensure capital flow post-disaster?	Y		
32	Does your community track storm/hazard recovery and cleanup expenses?	Y		
	Does the tracking method comply with FEMA and MEMA requirements for disaster recovery funding programs (e.g., 2D Statement of Damages Road Tracker form)?	Y		

Community Planning		A	B	Notes
33	Does your community have a plan to address and expedite permitting and inspection processes associated with post-disaster repairs while ensuring that reconstruction and redevelopment are resilient and directed away from flood hazard areas?	N		
	Y	17	2	
	N	18	6	
	-	0	0	

Social and Economic Vulnerability		A	B	Notes
1	Has your community identified and assessed the following traditionally vulnerable populations located in areas vulnerable to (a) existing and (b) potential future flood hazards and considered them in flood hazard risk, preparedness, and response activities?			
	• Elderly population	N	N	
	• Households below the poverty level	N	N	
	• Residents without vehicle access	N	N	
	• Disabled individuals	N	N	
	• Non-native English speakers	N	N	
	• Service industry/tourism-based workers	N	N	
	• Homeless population	N	N	
	• Working waterfront workers	N	N	The Harbor Master has a list of working waterfront workers.
	• Other local vulnerable population	N	N	
2	Has your community determined total property value within areas subject to (a) existing and (b) potential future flood hazards?	Y	N	
3	Has your community assessed the financial impacts and subsequent impacts to the tax base of (a) existing and (b) potential future flood hazards to the following?			
	• Infrastructure	N	N	
	• Facilities	N	N	
	• Public property	N	N	
	• Commercial private property	N	N	
	• Residential private property	N	N	
4	Has your community assessed the level of flood insurance coverage in flood hazard areas?	N		
5	(a) Has your community assessed trends in the relative size and age of the permanent resident population and seasonal visiting population and (b) predicted future trends and impacts?	Y	Y	
6	Does your community conduct education and outreach to ensure community members and businesses are aware of hazard risks, warning procedures, and evacuations plans?	N		
	Are education and outreach materials prepared in the major languages spoken by residents and visitors?	N		
7	Is there strong participation among residents in social networks and citizen organizations (e.g., volunteer organizations, faith-based organizations, and civic groups) in your community?	Y		There are a number of citizen organizations and networks with robust participation, including Spruce Creek Association, Kittery Community FaceBook page, the Kittery Land Trust, and mooring holders.
8	Is your community served by an active Community Emergency Response Team (CERT)?	N		
9	Has your community analyzed commuting patterns to identify the extent to which the local economy is dependent on the workforce traveling into and out of your community and how (a) existing and (b) potential future flood hazards could impact that transport?	Y	Y	Several assessments of commuting patterns have been completed, but the impact of future flood hazards on commuting has not really been considered.
10	Has your community identified strategies for protecting or relocating culturally or historically significant artifacts/structures located in (a) existing and/or (b) potential future flood hazard areas?	N	N	The Comprehensive Plan should have included a list of cultural and historic resources, but it somehow got lost; the Naval Museum might have the list.

Social and Economic Vulnerability		A	B	Notes
11	Is the economic base of your community diversified beyond tourism, maritime industries, and fisheries?	N		
12	Does your community encourage businesses located in flood hazard areas to prepare continuity of operations plans?	N		
13	Does your community encourage businesses located in flood hazard areas to purchase flood insurance?	N		
14	Does your community have business-supported groups (e.g., Chamber of Commerce) that assist local businesses with assessing vulnerability, flood hazard preparation, and hazard mitigation and adaptation?	Y		The Town is a member of the York Chamber of Commerce and the Town Manager is on the Board of the organization, but flood hazards have not been a topic the organization has addressed.
15	Does your community encourage local businesses to register as approved vendors for federal post-disaster procurement processes?	N		There are some small businesses in town that might be good candidates for registering as approved vendors.
16	Does your community have an economic development plan or strategy that addresses (a) existing and/or (b) potential future flood hazards?	N	N	
	Y	3	1	
	N	7	2	
	-	0	0	

Natural Environment		A	B	Notes
1	(a) Are the following natural resource areas within your community identified and mapped and (b) has your community conserved or developed a plan to conserve or restore them?			
	• Dunes and beaches	Y	N	
	• Wetlands	Y	Y	The Spruce Creek plan includes some information about restoration; the Town has a wetland mitigation fund, established by ordinance, for land conservation; the Kittery Land Trust, Conservation Commission, and Rachel Carson National Wildlife Refuge have mapped areas and identified conservation priorities.
	• Coastal and wetland buffers and adjacent uplands	Y	Y	
	• Natural areas of significance	Y	Y	
	• Coastal Barrier Resources System (CBRS)	-	-	
2	Are potential conservation efforts, easements, and land acquisitions assessed for (a) existing and (b) potential future flood impacts and long-term ability to provide beneficial functions?	N	N	The Town does not do so, but the Kittery Land Trust assesses property and potential property for flood hazards.
3	Does your community prioritize repetitive loss properties for acquisition and conversion to open space?	N		Workshop participants did not think there were any repetitive loss properties in Kittery.
4	Does your community have local ordinances to protect the following from development or disturbance that are more protective than State regulations?			
	• Dunes and beaches	N		The Town has an ordinance that prohibits removal of things from beaches
	• Wetlands	Y		The Town's ordinances differentiate between wetlands differently than State regulations and also include greater setback and buffer length requirements than the State minimum standards.
	• Coastal and wetland buffers	Y		
	• Bluffs	N		
	• Flood hazard areas	N		
	• Erosion hazard areas	N		
	• Natural areas of significance	N		
	• Coastal Barrier Resources System (CBRS)	-		
5	Has potential future marsh migration been analyzed, considered, and addressed in your community's planning and land use decisions?	N		The Kittery Land Trust has preserved upland areas in the Brave Boat Harbor headwaters.
6	Has your community assessed impacts (e.g., saltwater intrusion) of (a) existing and (b) potential future flood hazards and sea level rise to public and private drinking water supplies?	N	N	
	Is there a plan in place to protect supplies?	N	N	The Kittery Water District was not represented at the workshops,
7	Does your community have a plan and process in place to ensure septic systems located in environmentally sensitive and flood hazard areas are routinely inspected and functioning properly?	N		The Town has a map of septic located within the MS4 area, as required by the MS4 General Permit.
8	Does your community prohibit, or allow with more stringent environmental restrictions, septic systems in flood hazard and coastal areas or encourage adaptation practices to protect from storm and flood impacts?	N		The Town does not allow first-time septic variances.
9	(a) Are the following sites located within flood hazard areas in your community? (b) If so, are there plans and policies in place to mitigate flood hazard impacts and protect human and environmental health?			
	• Brownfields	Y	N	
	• Superfund sites	Y	?	There is a Superfund site at the Portsmouth Naval Shipyard, but the Town does not know what plans and/or policies exist to protect against flood hazards.
	• Landfills	N	N	
	• Tailings ponds and mining waste sites	?	?	Workshop participants did not know if there are any in Kittery.
10	Are environmental protection measures, strategies, and priorities integrated in your community's comprehensive and hazard mitigation plans?	Y		

Natural Environment		A	B	Notes
11	Do your community's post-storm recovery plans ensure protection of environmentally sensitive or significant areas (e.g., dune systems)?	Y		The Town invested in significant repairs stemming from coastal storm damage at Fort Foster.
	Y	10	3	
	N	13	6	
	-	2	1	