



COASTAL RESILIENCE ORDINANCE REVIEW

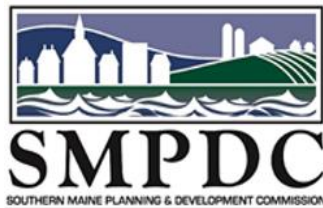
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COASTAL RESILIENCE ORDINANCE REVIEW

A SUMMARY REPORT ON EXISTING LOCAL COASTAL RESILIENCE MEASURES IN VINALHAVEN,
SOUTH PORTLAND, TREMONT, WELLS, and KITTEERY, MAINE

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Front cover: storm surge in Wells on September 23, 2020. Credit: A. Sherwin

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GLOSSARY

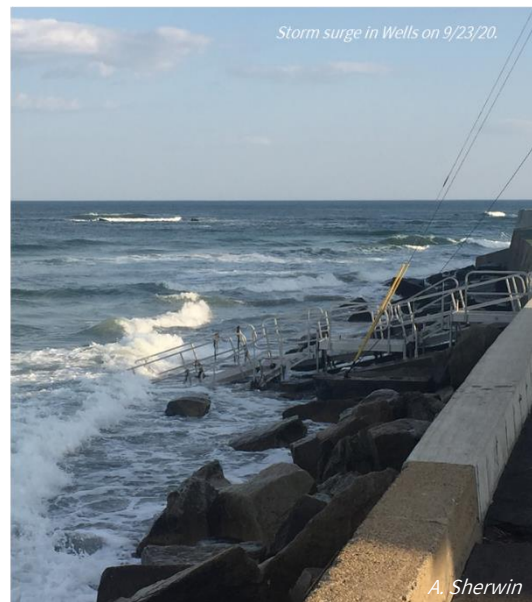
- Aquifer:** “One or more strata of rock or sediment that is saturated and sufficiently permeable to yield economically significant quantities of water to wells or springs. An aquifer includes any geologic material that is currently used or could be used as a source of water (for drinking or other purposes) ...” (Source: U.S. Environmental Protection Agency)
- Base Flood Elevation (BFE):** The elevation of surface water resulting from a flood that has a 1% chance of equaling or exceeding that level in any given year (FEMA National Flood Insurance Program).
- Climate Change:** Changes in average weather conditions that persist over multiple decades or longer. Climate change encompasses both increases and decreases in temperature, as well as shifts in precipitation, changing risk of certain types of severe weather events, and changes to other features of the climate system.
- Comprehensive Plan:** Comprehensive plan: "Comprehensive plan" or “plan” means a document or interrelated documents developed by a community in accordance with the procedural provisions of 30-A M.R.S.A. §4324, the substantive requirements of 30-A M.R.S.A. §4326, and contain the required elements identified in section 2 of chapter 208 ‘Comprehensive Plan Review Criteria Rule.
- Erosion:** The process by which wave action, wind, and storm surges remove sediment from beaches, dunes, bluffs, and headlands. Once removed from the shore, the sediment can be carried away into the coastal lagoons, deposited on the back of coastal barriers, or swept offshore; often, the sediment will not return to the shoreline.
- Flood Insurance Rate Map (FIRM):** Official map of a community on which FEMA has delineated the Special Flood Hazard Areas (SFHAs), the Base Flood Elevations (BFEs) and the risk premium zones applicable to the community.
- Overlay District:** “...a type of zoning district that is superimposed over the underlying ‘base’ zoning districts in order to protect a particular resource or guide development within a special area.” (Environmental Law and Policy Center)
- Resilience:** The capability to anticipate, prepare for, respond to, and recover from significant multi-hazard threats with minimum damage to social well-being, the economy, and the environment.
- Saltwater Intrusion:** The process of saltwater migrating landward into freshwater aquifers. This can be caused by groundwater pumping and can pose a threat to drinking water sources. Sea-level rise, in combination with increased groundwater pumping can increase saltwater intrusion in groundwater aquifers. Saltwater intrusion into groundwater aquifers can increase treatment costs for drinking water facilities or render groundwater wells unusable (U.S. Environmental Protection Agency).
- Sea Level Rise:** This term refers to the increase in the level of the world’s oceans and is largely attributed to two major causes: 1) thermal expansion of warmer waters and 2) increased melting of land-based ice, including glaciers and ice sheets (Source: National Oceanic and Atmospheric Administration).
- Source Water Protection Area:** The area of land which contributes water, either through surface water or groundwater, to a drinking water supply. This water supply, or source water, is threatened by human activities and natural sources of pollution within this area (Source: U.S. Environmental Protection Agency).
- Special Flood Hazard Area (SFHA):** An area identified by the US Federal Emergency Management Agency as an area with a special flood or mudflow, and/or flood related erosion hazard, as shown on a flood hazard boundary map or flood insurance rate map (FIRM). The SFHA is the area where the National Flood Insurance Program's (NFIP's) and municipality’s floodplain management regulations must be enforced and the area where the mandatory purchase of flood insurance applies.
- Storm Surge:** An abnormal rise of water generated by a storm, over and above the predicted astronomical tides. Storm surge should not be confused with storm tide, which is defined as the water level rise due to the combination of storm surge and the astronomical tide.
- Wellhead Protection Area:** The surface and subsurface area surrounding a water well or wellfield, supplying a public water system, through which contaminants are reasonably likely to move toward and reach such water well or wellfield (Source: U.S. Environmental Protection Agency).
- Zoning:** A regulatory tool that defines geographic zones in a municipality and outlines rules for property use in each zone.

BACKGROUND

In 2020, FB Environmental Associates (FBE), Southern Maine Planning and Development Commission (SMPDC), and the Towns of Vinalhaven, Kittery, Wells, Tremont, and the City of South Portland partnered to develop a model coastal resilience ordinance for Maine’s coastal communities to enhance resilience and adaptation planning as part of a project funded by the Coastal Communities Grant Program of the Maine Coastal Program and Municipal Planning Assistance Program. The project team and partner municipalities established a working group for the collaborative development of a model coastal resilience ordinance based on the identified needs and goals of the municipalities. The model ordinance will provide a menu of options that municipalities can implement and tailor to their individual risks, vulnerabilities, and needs to protect their built infrastructure, citizens, and natural environments. The project engages one city and four towns that are representative of communities along the Maine coast, and their varied social demographics, geography, and exposure to coastal risks. Collaboration among communities from such varied locations along the coast will enable integration of a diversity of coastal issues that communities need to prepare for and adapt to the onset of climate change. The mixed composition of coastal municipalities will ensure that the model ordinance reflects the unique and complex vulnerabilities faced by these communities.

The overarching goals of this project are to collect, evaluate and share information on coastal resilience among decision makers at the municipal and state levels, and to provide education and outreach regarding mitigating and adapting to hazards along the coast of Maine.

- 1** *Review of existing ordinances, plans, and policy documents in each of the partner communities to identify opportunities for enhanced coastal resilience measures.*
- 2** *Review the findings and recommendations of the Maine Climate Council and research climate change adaptation and resilience ordinances that exist elsewhere in the United States to inform the development of a model coastal resilience ordinance for Maine communities.*
- 3** *Collaboratively develop model coastal ordinance language and menu of resilience options with the working group through interactive workshops.*
- 4** *Conduct outreach efforts on the model ordinance to coastal Maine municipalities, regional planning entities, and state programs.*



Climate change is a cross cutting issue that is affecting communities and natural resources across the United States. In the Gulf of Maine, waters are warming faster than 99 percent of the world’s oceans, and sea level is fluctuating greatly due to changes in the strength of the Gulf Stream and seasonal wind patterns. The rate of sea level rise varies geographically along the Maine coast due to local geology and topography, with Portland experiencing 0.12 inches of sea level rise per year and Bar Harbor witnessing 0.11 inches of sea level rise per year. Since record keeping began in Portland in 1912, sea level rise has increased by 7.5 inches. As the seas rise, high tides cause more frequent flooding of coastal municipalities’ roads, infrastructure, and properties. An estimated 198 miles of Maine’s roads and over 1,200 homes are vulnerable to increased coastal flooding. Coastal areas are

also experiencing intense precipitation events that may be associated with storms and warming waters of the Atlantic Ocean. The combination of rising seas and extreme weather events threaten coastal communities with more flooding, storm surge, and coastal erosion.

Many local communities have taken important steps to begin addressing climate change impacts, but many others are looking for support in these efforts. To help cities, towns and their residents mitigate the effects of climate change, and prepare for impacts such as sea level rise, storm surge, and coastal flooding, this project will develop a model coastal resilience ordinance to reduce risk. Additionally, the development of regulatory tools, such as ordinances is an identified priority, and has been highlighted in the 2020 State Climate Action Plan.

Maine has a unique and diverse coastal geography along its expansive coastline. The coast is home to more than 34 percent of the state's total population located in 105 coastal communities and 15 year-round island communities, and home to important industries, such as fishing, lobstering, and tourism. Coastal hazards currently facing Maine's communities, the threats and risk of which will intensify with future climate change, include coastal flooding; storm surge; sea level rise; more intense and frequent storms; shoreline change, including erosion of beaches, bluffs, and dunes; marsh migration, saltwater intrusion from rising seas; groundwater rise caused by sea level rise; stormwater impacts to water quality. While all faced with similar coastal hazards, coastal communities will experience different impacts and challenges based on their geographies, conditions, and economies. Southern Maine municipalities often have low-lying built infrastructure, and natural resources that are at risk to sea level rise, storm surge, coastal erosion, and flooding. The region is home to the state's largest population centers, includes ecologically and economically significant marshes, wetlands, sandy beaches, and ocean waters that drive tourism within the region and state, and continues to face intense development and redevelopment pressure. Climate change impacts threaten tourism and coastal towns' economies due to property loss, beach erosion, marsh degradation, declining water quality, and infrastructure damage. These threats can be mitigated through regulatory action that protects both built infrastructure and the natural environment.

In the Midcoast and Downeast regions of the state, the coastline is notably different from southern Maine and is marked primarily by rocky shorelines, bluffs, and some sandy beaches interspersed within, long, narrow coastal peninsulas connected to the mainland by sometimes few and low-lying roadways, and coastal islands. While the geophysical characteristics differ from the State's southern coast, the region's municipalities are similarly threatened by climate change impacts, such as sea level rise, storm surge, coastal erosion, and flooding.

Maine municipalities have been determined and resourceful in their efforts to address vulnerabilities with the onset of climate change. Cities and towns like South Portland, Vinalhaven, Tremont, Kittery, and Wells recognize the threat of climate change. South Portland, Kittery, Vinalhaven, and Wells have completed the Maine Flood Resilience Checklist and have been leading on adaptation efforts to address climate risks. Kittery has also established a Climate Adaptation Committee to offer paths forward that make the town more resilient in the face of risks associated with warming temperatures and rising seas. South Portland is a leader on climate adaptation, as it has developed its One Climate Future Plan in collaboration with the City of Portland to jointly tackle climate risks and prepare for change. Although substantial work has been done in these and other coastal municipalities to identify areas of vulnerability, considerably more work must be done to prepare communities for increased risk associated with climate change. In particular, there are no existing model resiliency ordinances in Maine that municipalities can look to for guidance in their resiliency and adaptation efforts. This is particularly challenging for the many coastal communities that do not have sufficient financial resources to hire a sustainability coordinator or municipal staff to focus primarily on developing strategies to mitigate climate risks.

PURPOSE OF THIS DOCUMENT

This report reviews and summarizes existing plans, policies, and land use regulations that pertain to coastal resilience in the coastal Maine municipalities of Vinalhaven, South Portland, Tremont, Wells and Kittery. It also highlights ordinances, plans, policy measures, and land use provisions that address and promote coastal resilience from elsewhere in the country that could serve as examples for Maine coastal communities to enhance their resilience. In addition, it provides project municipalities with specific recommendations for improving local coastal resilience through land use planning, regulatory strategies, and policy measures.

Maine is a home rule state, meaning municipalities have the authority to enact and enforce their own land use regulations and policies. As such, individual municipalities can adopt unique regulations and procedures governing local land use. As emphasized in Maine's newly published State Climate Action Plan, home rule governance in a climate context means that municipal governments have the authority and responsibility for planning and implementing most activities for community resilience (in Maine's unorganized territories, the state's Land Use Planning Commission serves the planning function). Many of the tools that communities utilize are delegated to municipalities through state statutes, particularly the land use tools used to reduce future flood risk. These tools include comprehensive planning, zoning, land use planning, and floodplain management ordinances. Most of Maine's planning laws and tools were established in the previous century and, with a few exceptions, were not designed with climate change in mind. Some were intended to give communities the ability to manage growth and development proactively, others were intended to safeguard water quality and other environmental priorities. Floodplain management regulations, for example, were intended specifically to reduce flood risk but did not anticipate sea level rise or increasing precipitation trends.

While municipalities have the authority and flexibility to adopt and enforce land use regulations and policies, implementation of regulatory strategies that address climate change has been slow to take hold in Maine communities. Further, many of the widely utilized state laws and tools that municipal regulations are based on often have definitions and language that are inconsistent or outdated and only account for historical information and conditions, not for climate change. Improving State and municipal laws and tools to consider climate hazards; contain more consistent and scientifically sound definitions; provide more utility to communities for building climate resilience; decrease the burden on applicants, permitting staff, and planning boards and code enforcement officers; modernize the regulatory review process for activities related to climate resilience; and support new development and economic activity in areas less vulnerable to climate impacts.

For this report and subject analysis, the project team conducted a comprehensive review of ordinances and land use regulations in place within each of the five participating communities. Municipalities have the flexibility to organize and categorize those regulations in different ways within their municipal code of ordinances. For example, one town might have its shoreland zoning regulations embedded within its zoning ordinance while another town might have a shoreland zoning ordinance that is entirely separate from its zoning ordinance. Such differences in the organizational structure of land use regulations makes a comparison of multiple towns somewhat challenging. For each of the project's five municipalities, the team reviewed municipal regulatory provisions and planning documents.

METHODS

ORDINANCE REVIEW

The project team used municipal websites to assemble and review zoning and land use ordinances and regulations, comprehensive plans, and other municipal plans that inform response to climate change and coastal hazards from each of the five project municipalities. The team reviewed ordinances, such as zoning ordinances, land use ordinances, site plan regulations, subdivision regulations, comprehensive plans, and other plans highlighted in Tables 1 and 2 to identify and document specific provisions, standards, and guidelines contained within each that relate to coastal resilience, specifically to coastal hazard resilience. The findings of that review are summarized and presented in Tables 1 and 2 of this report. The team analyzed findings of the ordinance review to develop key recommendations for increasing coastal resilience through land use ordinances.

Zoning ordinances were reviewed to assess provisions regarding shoreland zoning, site plans, subdivision ordinances, and floodplain ordinances. Any regulations that directly or indirectly addressed climate change and coastal hazards (*e.g.*, harbor protection overlay districts, or resilience overlay districts), or provided good opportunities for integrating climate considerations, were also included in the review. Tables 1 and 2 provide an easy-to-reference summary of the documents reviewed.

Zoning and land use ordinances often work hand in hand with municipal comprehensive plans. As development projects are reviewed by municipal planning boards through site plan review and subdivision processes, planners and planning boards assess the compatibility of the projects with furtherance of goals in the comprehensive plan. Further, in Maine, municipal zoning must be consistent with the community's comprehensive plan. Therefore, municipal comprehensive plans were included in this review for any statements of municipalities' intentions regarding coastal resilience, climate change, and adaptation and mitigation measures. Further, the team assessed comprehensive plan language to determine if there are opportunities for municipalities to strengthen coastal resilience through those planning documents.

Other municipal plans that were reviewed include: parks and recreational plans; open space plans; vulnerability assessments; climate-specific plans, such as South Portland's One Climate Future Plan; and Maine Flood Resilience Checklist summary reports, depending on whether the municipality had the relevant document. Example language pertaining to coastal resilience from project towns' comprehensive plans are summarized in Table 3. The project team also conducted a review of land use strategies, ordinances, plans, and policies designed to address coastal hazards and build coastal resilience from elsewhere in the country. The results of that review are summarized in Tables 4-7.

GAP ANALYSIS

As part of the ordinance review, the project team assessed opportunities for integrating resilience measures into existing ordinances as well as the creation of new resilience-based ordinances designed to address Maine's coastal hazards and vulnerability to such hazards. The team identified the project municipalities that have specific coastal resilience policies, overlay districts, plans, ordinances, and/or regulations and then assessed the comprehensiveness of those documents and regulations to identify exemplary language as well as gaps between policy and regulatory language of other municipalities included in the review. Results from this analysis appear in the results section under the sub-headers for each municipality.

ORDINANCE REVIEW RESULTS

An easy-to-reference summary of the ordinance review results is provided by Tables 1 and 2. Example language pertaining to coastal resilience from project towns’ comprehensive plans are summarized in Table 3. Detailed results (including municipality-specific recommendations) are organized into sections for each municipality.

Table 1. Ordinance review for land use and zoning regulations. Color key: green represents the provision is present; white represents the provision is not present; yellow represents the provision is in progress or underway.

Land Use and Zoning Regulations						
Subcategory	Provision	Kittery	Vinalhaven	So. Portland	Tremont	Wells
Floodplain Management Ordinance	Present					
	Advanced substantial development / improvement threshold					
	Applies to areas outside of SFHA on FIRM?					
	Advanced septic provisions					
Septic Ordinance	Pump out and/or periodic inspection required					
Shoreland Zoning Ordinance	Applicability beyond state requirements					
	Subdistricts for special considerations					
	Wetlands					
Stormwater Management	Wetland Protection Ordinance					
	Marsh migration considered and/or mentioned					
	Low Impact Development (LID) requirements and/or standards					
Subdivision Ordinance	Standards for post-construction stormwater management					
	Advanced requirements via Site Plan Review					
District	Cluster, Open Space					
Resilience Overlay Zone	Harbor Overlay District, Shipyard District, Harbor Shoreland District, Harbor Zoning District, or Wellhead Protection Overlay District					
	Present					
Aquifer Protection Ordinance / District	Present					
Budget and expenditure policies	Limit/prohibit municipal funds for development in existing/potential/future flood hazard areas, unless expressly for adaptation/resilience measures					
Capital Improvement Planning	Integrate resilience into capital planning					

Table 2. Review of plans and committees. Color key: green represents the provision is present; white represents the provision is not present; yellow represents the provision is in progress or underway.

Plans and Committees								
Category	Subcategory	Provision	Kittery	Vinalhaven	So. Portland	Tremont	Wells	
Plan	Comprehensive Plan	Sea level rise chapter/section	Green	White	Green	White	Yellow	
		Climate change chapter/section	Green	White	Green	White	Yellow	
		Coastal hazard chapter/section	Green	White	White	White	Yellow	
		Drinking water resources	Green	Green	White	Green	Green	
		Freshwater recharge areas	White	Green	Green	Green	Green	
		Utilizes Beginning with Habitat data	White	Green	Green	Yellow	Green	
		Sensitive areas and habitat	Green	White	White	White	Green	
		Coastal wetland preservation	*	Green	Green	Green	Green	
	Vulnerability Assessment		Green	Green	Green	White	Yellow	
	Parks & Recreation Plan		Green	White	White	White	White	
	Flood Resilience Checklist		Green	Green	Green	Green	Green	
	Hazard Mitigation Plan	Present		Green	Green	Green	Green	Green
		Integration of hazard mitigation plan and comprehensive plan		White	White	White	White	White
Integration of coastal resilience in hazard mitigation plan			White	Green	White	White	White	
Municipal hazard mitigation plan			White	White	Green	White	White	
Committee	Sea Level Rise		Green	Green	White	White	White	
	Emergency Management		White	Green	Green	White	White	
	Water Resource Protection		Green	White	Green	White	White	
	Sustainability		Green	White	Green	White	White	

* = marsh migration considered

Table 3. Comprehensive Plan language for coastal resilience. The language is taken from the currently adopted Comprehensive Plans for each project municipality. Note that the information cited for Wells is from the Town’s currently approved plan, which was adopted in 2005. The Town undertook an update of its Plan from 2014 to 2016, but it was not considered for adoption by the Town. The ‘14 - ‘16 unapproved plan does include language about climate and coastal issues, but that language is not included in this summary.

Resilience Topic	Language	Municipality
Coastal Flooding & Sea Level Rise	Establish short-, medium- and long-term plans to address the effects of climate change, including increased storm frequency and strength, coastal erosion and rising ocean levels, and transition of both public and private energy consumption to low and zero impact method.	Kittery
	Review and Update the Town's Emergency Plan in case of extreme storm conditions. Update rainfall tables to account for more frequent and more severe storms.	Kittery
	Emphasis on coastal flooding as a concern; highlight dunes (such as those at Willard Beach) as a means of preventing coastal flooding.	South Portland
	Waterfront development should develop designs to be compatible with projected sea-level rise and to protect property from storm induced damage.	South Portland
	A two-foot tide increase would have the greatest impacts the Knightville/Mill Creek neighborhood, Ferry Village, the area near Veterans Bridge, and the area near Elm St on the Fore River. About 60 buildings would be impacted, to varying degrees. The 2012 Comprehensive Plan states that the City is also in the process of assessing the implications of possible future sea-level rise. This includes the implications for the City’s infrastructure. Some improvements may need to be made to address these potential impacts. While some of these costs may be included in normal improvements, there may be additional costs for elevating and/or floodproofing City facilities that are susceptible to an increased risk of flooding and storm damage.	South Portland
	Discourage growth and new development in coastal areas where, because of coastal storms, flooding, landslides, or sea level rise, it is hazardous to human health and safety.	Tremont
	Section L.6 discusses the development constraints that various parts of town face. For example, the islands and the lake watersheds are particularly vulnerable for environmental reasons. The villages of Bernard and Bass Harbor face problems with ground water quality. These constraints must be considered in formulating future development plans for the town. Another issue is projected sea level rise due to global climate change.	Tremont
	Discourage new public and private investment in the floodplain area that would encourage growth.	Wells
	Develop notification process warning of flooding and storm events.	Vinalhaven
	Adapting to sea level rise, especially on Main Street, is a priority. Town infrastructure, including roads, sidewalks, and sewer, water, and stormwater systems, will be redesigned, elevated, and improved to provide more resiliency to flooding and sea level rise. Property owners with buildings at risk of flooding will be encouraged to implement flood-proofing measures and to consider raising their buildings as needed in the future. The Town will also join with property owners to pursue a revision of the FEMA flood zone map to reduce flood insurance costs in the Downtown area and encourage more investment and economic development. (Downtown Master Plan)	Vinalhaven
Natural Resources	Protect and preserve critical open spaces for passive recreation, scenic value, and preservation of coastal (saltwater) wetlands, freshwater wetlands, vernal pools and other types of plant and wildlife habitats.	Kittery
	Restore and maintain the quality of our fresh, marine, and estuarine waters to allow for the broadest possible diversity of public and private uses.	Tremont

Resilience Topic	Language	Municipality
	Ensure protection of high value wetlands including vernal pools, through regulatory and non-regulatory implementation programs and place high value on these resources when designating growth and rural areas in Wells.	Wells
	Enhance the Town's programs for protecting sensitive, natural resources through regulatory and non-regulatory mechanisms.	Wells
	Develop land use controls that encourage these areas to be protected and permanently set aside as land development occurs.	Wells
	Maintain and protect the physical quality of the beach systems through activities such as cleaning, stabilization, and sand replenishment.	Wells

VINALHAVEN

Ordinances:

- ✓ Has a floodplain management ordinance with a freeboard requirement of BFE + 1 foot for specified buildings, such as residential, non-residential, and manufactured homes. The freeboard requirement does not exceed minimum state standards.
- ✓ Vinalhaven's Land Use Ordinance
 - Has a septic discharge provision, especially in the shoreland zone.
 - Details how stormwater should be managed and minimized. The ordinance takes into consideration low impact development.
 - Has specific design, construction, and maintenance requirements for roads and driveways to protect water resources.
 - Includes provisions for site plan review, such as controlling building sites, placement of structures, and seeks to conserve shore cover.
- ✓ Has private wastewater disposal requirements in a Septic Pump Out Ordinance.
- ✓ Has conducted an inventory of public access to natural resources, and residents are interested in having more public access to the shore.
- ✓ Vinalhaven is working with GMRI to increase environmental literacy, to develop a coastal training curriculum with the goal of building community capacity in rural municipalities to make community-informed adaptation planning.
- ✓ Vinalhaven is also working with GMRI and South Portland to create a space for dialogue and sharing so communities can learn with and from each other regarding coastal resilience and preparedness strategies.

The Vinalhaven Comprehensive Plan was approved in 2013. The Comprehensive Plan highlights that the subdivision ordinance could be strengthened to fit the needs of Vinalhaven and to better protect rural spaces. The Comprehensive Plan also details how the use of cluster (conservation) subdivisions can preserve habitats by setting aside ecologically sensitive but developable land into permanent conservation.

While Vinalhaven does not have a municipal Hazard Mitigation Plan, it was included in the Knox County Hazard Mitigation Plan of 2012. Vinalhaven has also completed the Maine Flood Resilience Checklist. Additionally, in 2016 to 2017 Ransom Consulting conducted an assessment of flooding and sea level rise. The assessment thoroughly

discusses coastal flooding concerns and presents adaptation options for the Town under the three categories of accommodate, protect, and retreat. Several of their “protect” recommendations included elevating low-lying areas of Main Street, elevating buildings on Main Street, installing a Tide Gate at the Carvers Pond Inlet, and Planning modifications at the Ferry Terminal to accommodate higher water levels.

Recommendations:

1. In the floodplain management ordinance, Vinalhaven could consider including additional freeboard requirements to more than one-foot above BFE. Apply provisions of floodplain management ordinance to areas outside of SFHA on FIRM. Consider accounting for cumulative improvement costs in the definition of substantial improvement and damage.
2. Consider participating in the Community Rating System program to reduce flood risk and flood insurance costs for property owners and the municipality.
3. Include action items and plans regarding flood mitigation and addressing sea level rise in the Comprehensive Plan.
4. Consider a wetland protection ordinance.
4. Consider overlay districts to improve coastal resilience, such as establishing a coastal hazard overlay zoning district, based on adopted sea level rise scenarios, and accompanying development standards to ensure new and redevelopment in areas vulnerable to storm surge and sea level rise are resilient.
5. Implement policies to protect water resources for long-term stability and supply.
6. While Vinalhaven has identified capital actions on how to mitigate flooding and sea level rise, the Town should consider integrating resilience explicitly into the Capital Improvement Plan.
7. Incorporate future precipitation projections in land use regulations and amend ordinances to require the use of more robust storm frequencies (*e.g.*, 24-hour rainfall of a 30-year storm event) for stormwater management and design standards.
8. 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 for all development and redevelopment projects requiring site plan review.
9. Consider how to integrate resilience principles on a project-by-project basis.
10. Strengthen Comprehensive Plan by including a chapter on sea level rise, detailing plans on how to address climate change impacts (*e.g.*, saltwater intrusion to aquifers and marsh migration) and protecting sensitive areas and habitats.
11. Consider establishing a water resource protection committee.

SOUTH PORTLAND

Ordinances:

- ✓ Floodplain management ordinance restricts or prohibits development that is dangerous to health, safety and property due to water or erosion hazards. It also requires that uses vulnerable to floods, including facilitating uses, be protected against flood damage at the time of initial construction.

- ✓ South Portland's Shoreland Zoning Ordinance meets the minimum State requirements for buffers in areas near wetlands and water bodies and requires the lowest floor elevation of buildings to be at least one foot above the 100-year flood level, flood of record.
- ✓ The City's Shoreland Resource Protection Overlay Subdistrict provides enhanced protections for wetlands than the Mandatory Shoreland Zoning Act (MSZA). The subdistrict also protects FEMA boundaries, parcels of more than 2 acres with sustained 20 percent slopes; parcels of more than 2 acres of the 3 triggers for wetlands but are not shoreland freshwater or coastal wetlands as otherwise defined; land areas along rivers subject to severe bank erosion, undercutting, or riverbed movement, and lands adjacent to tidal waters. The State has also worked with South Portland in developing its stream protection overlay standards as well as setback standards for different stream watershed districts and coastal areas. The City has more restrictive permitted uses, impervious area overages, and review and approval authority.
- ✓ Stormwater management ordinance that requires low impact development, and details standards for post-construction stormwater management.
- ✓ In South Portland's site plan review, the City states that impacts to be considered include traffic generation, parking area, utilization of City services; stormwater runoff; or noise odors, or other annoying or dangerous emissions detectable at lot boundaries.
- ✓ South Portland has energy and water use benchmarking ordinances.
- ✓ South Portland has a wetland protection ordinance and has performance standards with respect to activities adjacent to freshwater wetlands. The City's freshwater wetlands protection standards go above and beyond the State requirements for wetlands protection.
- ✓ Has identified areas of public access to the shore, beaches, and other natural areas.
- ✓ South Portland has developed an Integrated Water Resources Management Plan in collaboration with Portland that determines the best ways to prioritize spending with respect to wastewater and stormwater infrastructure and water quality protection.
- ✓ South Portland has undertaken a climate change education effort. For example, 90 participants attended one of three book discussion group meetings after receiving and reading free copies of a climate change book that the local library was able to obtain. It is continuing with education efforts including the High-Water Mark Project with the US Army Corps of Engineers and Preparing for Coastal Flooding with GMRI. This effort is funded through the Coastal Community Grant, from NOAA to the Maine Coastal Program.

South Portland's Comprehensive Plan was approved in 2012 and amended in 2019 to include the Open Space Plan. The Comprehensive Plan mentions climate change often and discusses the importance of open space in mitigating climate change. It does not discuss natural and water resources, and the threats to them. Additionally, while the Plan considers wetlands, it does not mention marsh migration. The Comprehensive Plan currently lacks discussion of drinking water resources and their long-term protection.

South Portland has been working with the City of Portland on preparing for climate change through its One Climate Future initiative. One Climate Future plans for climate change impacts and includes a vulnerability assessment that identifies hazards due to climate change, as well as economic, social, and infrastructure exposures and risk.

In addition, South Portland has conducted a municipal vulnerability assessment, and has an "All Hazards Emergency Plan" that includes discussion of hurricanes, flooding, severe winter storms, mutual aid agreement, hazardous materials events. South Portland has additionally sought to assess coastal hazards by completing the

Maine Flood Resilience Checklist. In Table 1, South Portland is shown as having capital improvement planning that integrates resiliency, due to the City's adopted sea level rise scenarios from the One Climate Future plan. It is noted that South Portland has yet to make a capital planning decision based on those adopted scenarios. South Portland's Capital Investment Plan has dedicated \$75,000 to fund the One Climate Future plan developed by South Portland and Portland, but the TIF language needs to be amended in order for that funding to be utilized. The CIP states that every year one or more of the projects proposed for the capital improvements plan will be a sustainability or resilience project.

South Portland has several committees tasked with improving resilience and addressing climate change impacts, including: a Waste Reduction Committee, Land Care Advisory Committee, Water Resource Protection Committee, Emergency Management Committee and a forthcoming One Climate Future Committee. Recently, the South Portland City Council included a budget increase for a new Sustainable Transportation Coordinator position.

The City is considering creating resilience overlay districts so that all new buildings and developed sites would help to minimize the collective impact of climate hazards from sea level rise, more intense storms, and higher temperatures, as well as to protect and strengthen community and ecosystem assets that contribute to resilience. This would involve two tiers – high and medium risk – with greater or lesser zoning restrictions. The City is also participating in Maine Silver Jackets dynamic flood inundation modeling project. The project will produce future floodplain maps to be overlain with building and infrastructure footprints and facilitate climate-resilient planning, such as the development of a resilience overlay district.

Recommendations:

1. In the floodplain management ordinance, South Portland could consider including a freeboard requirement of more than one-foot above BFE and applying the provisions of floodplain management ordinance to areas outside of SFHA on FIRM to address sea level rise.
2. Consider participating in the Community Rating System program to reduce flood risk and flood insurance costs for property owners and the municipality.
3. Consider "cluster" development to preserve open space, protect water resources, and minimize environmental impacts. Ensure that preserved open space includes areas subject to existing and potential future hazards, such as sea level rise.
4. Consider integrating All Hazards Mitigation Plan into Comprehensive Plan.
5. Identify important freshwater recharge areas.
6. Identify all open space areas that may serve as buffers to climate change impacts (such as flooding) and see if they may be used for nature-based climate solutions to mitigate those effects.
7. Develop a septic pump-out and inspection ordinance to ensure protection of coastal water quality and natural resources.
8. Continuing developing action items and plans regarding flood mitigation and addressing sea level rise in the Comprehensive Plan.
9. Consider adding chapters on coastal hazards, sensitive areas, and wetland preservation to the Comprehensive Plan.
12. Implement policies to protect water resources for long-term stability and supply.
13. Consider implementing an impact fee or other fee-based program to support resiliency and adaptation projects in areas vulnerable to coastal flood hazards.

14. Revise the City's existing wetland preservation ordinance to apply to both freshwater marshes and salt marshes and strengthen protections for salt marshes and associated upland buffers.

TREMONT

Ordinances:

- ✓ Has a floodplain management ordinance that requires BFE + 1 foot for specified buildings, such as residential, non-residential, and manufactured homes. The freeboard requirement does not exceed minimum state standards. The Town requires new construction and improvements to implement proactive measures to mitigate flooding impacts (such as consideration of flood-resistant materials, base elevation, etc.).
- ✓ Tremont's Shoreland Zoning Ordinance is under the Town's Land Use Ordinance and includes the minimum State standards for buffers and setbacks near a great river or pond, and coastal or freshwater wetlands. The ordinance includes different designations for commercial fishery and maritime activity, residential, and resource protection shoreland zone.
- ✓ Tremont's zoning ordinance has measures for stormwater management but does not reference low impact development requirements. There is emphasis on vegetation for infiltration purposes.
- ✓ The Town's Land Use Ordinance states that one purpose of the ordinance is to "conserve shore cover, freshwater and coastal wetlands" but there is no explicit wetland ordinance.

Tremont's Comprehensive Plan was approved in 2011. Section 5 of the Comprehensive Plan discusses drinking water resources, detailing that residents view water quality as a concern. The Town continues to monitor mercury levels in Tremont freshwater due to bioaccumulation in fish (as a possibility); and some private wells are failing and have drinking water quality concerns. Tremont's Comprehensive Plan has a map showing the public water supply source water protection area, defined as the "area that contributes recharge water to a surface water intake or public water supply well." Additionally, its Comprehensive Plan refers to wetlands protection measures.

Tremont has assessed public access to the shore, which is discussed in the Comprehensive Plan. Public access is a concern among residents as they must compete with seasonal visitors for parking. The Plan states that more strategies are needed to increase and protect public access. Tremont's Comprehensive Plan references a policy to discourage development in sea level rise and flood-prone areas. The municipal Comprehensive Plan does not include a chapter on climate change, sensitive areas, or coastal hazards.

Tremont does not have a municipal vulnerability assessment, though it is part of the Hancock County Hazard Mitigation Plan. Tremont does not have a parks and recreational plan, nor has it completed the Maine Flood Resilience Checklist.

Recommendations:

1. Consider developing a wetland protection ordinance.
2. While Tremont does not have a septic pump out ordinance, it does have specific septic rules for holding tanks and setbacks. Consider developing a septic pump-out and inspection ordinance to ensure protection of coastal water quality and natural resources.

3. Reduce impact of subdivisions by clustering development or considering development impacts on open space.
4. Consider how to integrate resilience principles on a project-by-project basis.
5. Strengthen Comprehensive Plan by integrating the hazard mitigation plan, and aspects of coastal resilience.
6. Include resiliency and climate change adaptation action items in the Town's Capital Investment Plan.
7. Establish committees focused on resilience and adaptation, such as a Sea Level Rise committee, or Water Resource Protection committee.
8. Consider participating in the Community Rating System program to reduce flood risk and flood insurance costs for property owners and the municipality.
9. In the floodplain management ordinance, Tremont could consider including freeboard recommendations that require more than one-foot above BFE, consider adding septic provisions. Apply provisions of floodplain management ordinance to areas outside of SFHA on FIRM.
10. Consider adding chapters on coastal hazards, sensitive areas, climate change, and wetland preservation to the Comprehensive Plan. Suggest using the sea level rise scenarios recommended by the Maine Climate Council Scientific and Technical Subcommittee.
11. Implement policies to protect water resources for long-term stability and supply.
12. Assess impacts from coastal hazards, such as storms, hurricanes, and tidal events.
13. Establish a coastal hazard overlay zoning district, based on adopted sea level rise scenarios, and accompanying development standards to ensure new and redevelopment in areas vulnerable to storm surge and sea level rise are resilient.
15. Evaluate the vulnerability of Harbor and Town infrastructure to extreme wave impacts and storm surge, as well as sea level rise and coastal flooding. Also assess and prepare for climate impacts that may compound certain social and economic vulnerabilities.
16. Increase and protect public access to shore for both residents and seasonal visitors.

WELLS

Ordinances:

- ✓ Wells' floodplain management ordinance has a more restrictive threshold for what qualifies as a substantial improvement or substantial damage. The definitions require the 'substantial' determination to account for costs cumulatively over a 10-year period rather than a one-time event, thus lowering the threshold at which renovation and repair activities must comply with floodplain development standards.
- ✓ The Town requires a stormwater management plan for all subdivisions, not just those development projects that trigger DEP requirements for such plans.
- ✓ Cluster development is allowed in all zoning districts where residential use is permitted and is allowed for development other than just subdivisions. If development is a cluster subdivision, all areas located within the Aquifer Protection or Shoreland Overlay Districts shall be dedicated as open space.

- ✓ Has a Harbor Zoning District for the purpose of providing areas for commercial and recreational marine uses, aquaculture, environmental research, recreational activities and cultural activities and has a harbor ordinance regulating use and management of the harbor area.
- ✓ Has an aquifer protection ordinance that includes stormwater management measures for aquifer recharge areas and a groundwater protection ordinance that identifies specific groundwater protection areas and provides tailored protections for each area.
- ✓ Has a piping plover ordinance to protect habitat.

Wells' current Comprehensive Plan is from 2005 and the Town is currently in the process of undertaking an update to the Plan. While the Town embarked on the development of a new Plan from 2014 to 2016, the Comprehensive Plan Re-Write Committee at the time (2014-2016) did not vote to move forward with the Plan and, therefore, it could not be considered for adoption by the Town.

The Town has participated in several efforts to assess and plan for sea level rise, storm surge, and climate change and is a member of a six-town Regional Sustainability and Resilience Program. Wells sought to comprehensively assess its vulnerability to coastal flood hazards by completing the Maine Flood Resilience Checklist. Additionally, the Town is participating in two ongoing grant projects aimed at evaluating socio-economic impacts of current and future coastal flooding, assessing local vulnerabilities, and developing tailored adaptation and resilience strategies through land use and policy measures. The Town has also undertaken a marsh walk feasibility study, supported advanced flood modeling for coastal York County by Ransom Engineering, and participated in the New England Climate Adaptation Project with MIT to assess local climate change risks, identify key challenges and opportunities for adaptation, and test the use of role-play simulations as a means to educate the public about climate change threats and to help communities explore ways of decreasing their vulnerability and enhancing their resilience to climate change impacts.

Recommendations:

1. Amend the floodplain management ordinance to require additional freeboard beyond the state minimum of one foot. Consider requiring structures in the V-zone to be constructed on piers or pilings.
2. Consider resuming participation in the Community Rating System program to reduce flood risk and flood insurance costs for property owners and the municipality.
3. Develop a septic pump-out and inspection ordinance to ensure protection of coastal water quality and natural resources.
4. Reconsider the allowance of reduced structure setbacks from wetlands, which currently allows the reduction to the average of the setbacks of structures within 200 feet of the proposed structure on lots abutting wetlands. In areas along the ocean side of Moody and Wells Beaches and Drakes Island where there is no seawall, consider increasing the setback for structures from the current distance of 20 feet from a theoretical line extrapolated from existing adjacent seawalls.
5. Develop a wetland protection ordinance that requires wetland impact assessment for development projects and enact and enforce policies that preserve, protect, and restore wetlands, including those smaller than the 10-acre threshold used for shoreland zoning.
6. Enhance the Town's existing land use regulations and policies by encouraging and/or requiring the use of low impact development and green infrastructure approaches for stormwater management for all development and redevelopment projects requiring site plan review.

7. Establish a coastal hazard overlay zoning district, based on adopted sea level rise scenarios, and accompanying development standards to ensure new and redevelopment in areas vulnerable to storm surge and sea level rise are resilient.
8. Incorporate goals, policies, and strategies related to addressing coastal hazards in the Town's Comprehensive Plan update. Include information about coastal flooding, marsh migration, up-to-date projections of sea level rise, and findings from the coastal flooding vulnerability assessment recently completed for the Town.

KITTERY

Ordinances:

- ✓ Kittery has a wetlands conservation ordinance that is more protective of wetlands than the state minimum requirements. Applies to all wetlands other than freshwater wetlands smaller than 501 square feet in total size.
- ✓ The Town is in the process of amending its land use ordinance to require low impact development (LID) for commercial land uses.
- ✓ Kittery has post-construction stormwater management standards, a requirement for MS4 communities.
- ✓ The Town has a Conservation Zone to preserve and protect natural environmental areas, conservation lands, parks and other areas for water quality, habitat, and aesthetic beauty. The Conservation Zone includes but is not limited to the Rachel Carson Wildlife Preserve, Town Forest, state and local parklands, and land with conservation easements that prohibit development in perpetuity.
- ✓ Cluster development is allowed in most residential zones except for the Residential - Village zone. They are not allowed in Mixed Use-Neighborhood, MU - Badgers Island, MU - Foreside, or Mixed-Use zones, even though the cluster development zoning article (Article 11) specifies that it is for cluster residential and cluster mixed use.
- ✓ Kittery has greater setbacks (100 feet) from shore, tributary streams, fresh and saltwater wetlands than the required State minimum.

Kittery's Comprehensive Plan includes an entire section devoted to coastal community resilience. Further, one of the listed strategies is to review and revise Town codes to account for the impacts of sea level rise and climate adaptation, providing the enabling foundation for adoption of regulatory and policy actions to make the Town more climate resilient. While the Plan's coastal resilience section discusses several coastal hazards, it does not directly address coastal erosion and/or shoreline change. Although it does not explicitly address marsh migration, the Plan cites the need to protect coastal wetland areas by prioritizing them for open space acquisition in partnership with the Kittery Land Trust.

The Town has recently undertaken several initiatives to evaluate and plan for coastal hazards, including completing the Maine Flood Resilience Checklist in 2020 and participating in an EDA grant-funded project assessing the economic and social vulnerabilities associated with sea level rise and coastal flood events. A UNH Sustainability fellow developed hazard assessment maps with different flooding/sea level rise scenarios and planning recommendations for the Town. The Spruce Creek Watershed Management Plan outlines measures to improve and protect water quality through land use and stormwater management approaches.

Recommendations:

1. Amend the floodplain management ordinance to require additional freeboard beyond the state minimum of one foot. Consider requiring structures in the V-zone to be constructed on piers or pilings. Consider accounting for cumulative improvement costs in the definition of substantial improvement and damage.
2. Establish a coastal hazard overlay zoning district, based on adopted sea level rise scenarios, and accompanying development standards to ensure new and redevelopment in areas vulnerable to storm surge and sea level rise are resilient.
3. Incorporate future precipitation projections in land use regulations and amend ordinances to require the use of more robust storm frequencies (e.g., 24-hour rainfall of a 30-year storm event) for stormwater management and design standards.
4. 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 for all development and redevelopment projects requiring site plan review.
5. Enact a pesticide and fertilizer ordinance.
6. Adopt a septic inspection and pump out ordinance to ensure septic systems, especially those in areas vulnerable to current and future flooding, function properly and to minimize potential detrimental impacts to water quality and the environment.
7. Consider amending the cluster development provisions to allow cluster development in mixed use areas.
8. Develop a wellhead protection overlay district.
9. Update the Comprehensive Plan with updated sea level rise projections. Suggest using the sea level rise scenarios recommended by the Maine Climate Council Scientific and Technical Subcommittee.

UNITED STATES EXAMPLES

This section details examples of coastal resilience strategies from around the United States that provide insight into the model ordinance being developed through this project. Tables 4 through 7 present regulatory, policy, and funding approaches used by other localities to enhance coastal resilience. Examples are categorized based on the coastal hazard they most directly address and include coastal overlay districts, advanced floodplain management provisions, hazard- and resource-based setbacks, and development review requirements. For each example, the tables include a summary description, the type of strategy (e.g., zoning, policy, planning, *etc.*) where the example is utilized, and what secondary hazards it addresses.

Municipalities seeking to address climate impacts and make their communities more resilient to climate change should consider how climate change may affect natural resources, people, property, and infrastructure in planning and environmental review documents, and use this analysis to inform resource management decisions and land use requirements. Additionally, changes in both long-term average conditions and the range of variability of climate change and its effects on sea levels, precipitation, and temperatures, including changes in frequency and magnitude of extreme weather events, should be accounted for.



Clam Shell Alley in Vinalhaven, ME during a King Tide in March 2020. © Jack Sullivan

Table 4. COASTAL FLOODING

STRATEGY	SUBHAZARD	TOWN / CITY	STATE	STRATEGY TYPE	DESCRIPTION
Coastal resilience overlay zone	Sea Level Rise	Sandwich Falmouth Harwich	MA	Regulatory (Zoning)	Zoning district designated by coastal hazard risk and vulnerability for the purpose of applying development standards and performance measures to reduce risk and enhance resilience.
Prohibition of expansion of existing structures or increase in impervious surface in VE zone	Sea Level Rise, Precipitation & Stormwater, Storm Surge	Chatham	MA	Regulatory (Zoning)	Floodplain District: 5. Prohibited Uses- The following uses and activities are prohibited in the VE Zone. a. Addition, alteration or reconstruction of an existing structure that results in an increase in building footprint. b. Repair of a substantially damaged existing structure which results in an increase in building footprint. c. Any increase in impervious surface on a residential lot. This may include, but is not limited to, swimming pools, tennis/basketball courts and retaining walls.
Floodable open space areas	Sea Level Rise, Precipitation & Stormwater	Beverly	MA	Planning (Mitigation & Adaptation Project)	The Chubbs Brook Drainage Project involved a playground and park area designed to be floodable during storm events. The primary element of the project was to build flood storage areas near a wetland. The second phase was to line drainage pipes and replace a culvert to expand the previous storage capacities.
Coastal Resilience Strategies for Dorchester	Sea Level Rise, Precipitation & Stormwater, Storm Surge	Dorchester - Boston	MA	Planning (Policy and Strategy Document)	Plan outlining near-term and long-term risk reduction solutions for coastal flooding and sea level rise specific to Dorchester's diverse shoreline and population.
Coastal Resilience Strategies for Downtown Boston and North End	Sea Level Rise, Storm Surge	Boston	MA	Planning (Policy and Strategy Document)	Plan that lays-out district-scale strategies to protect Boston's downtown and North End neighborhoods from coastal flooding and sea-level rise. The strategies were developed through a multi-stakeholder planning process and build off of previous coastal resilience planning for the City.
Freeboard	Sea Level Rise, Precipitation & Stormwater, Storm Surge	Saco	ME	Regulatory (Zoning)	Requirement of floodplain management ordinance to elevate structures in floodplain, or flood hazard area, 3 feet above base flood elevation. The ordinance includes a provision for variances to be granted for maximum height standards for certain projects.
Beach overlay zoning district with incentives for new and redevelopment that can withstand and	Sea Level Rise, Storm Surge	Hull	MA	Regulatory (Zoning)	The purpose of the Nantasket Beach Overlay District is to stimulate mixed use redevelopment of commercial and multi-family property at scales and densities appropriate for an historic beachfront community to revitalize the economy and help balance the commercial and residential tax base while protecting people,

STRATEGY	SUBHAZARD	TOWN / CITY	STATE	STRATEGY TYPE	DESCRIPTION
stormwater management design that accounts for sea level rise and coastal flooding					property, and resources. Purposes include: Protecting barrier beach and dune systems and their functions in providing storm and flood protection and wildlife habitat; Creating incentives for development that can withstand sea level rise and increased flooding and frequency and intensity of storms caused by climate change, and thereby; protect persons and property from the hazards that may result from unsuitable development in areas subject to flooding, extreme high tides, and rising sea level. Includes incentives for constructing buildings (new & improvements to existing buildings of equal or more than 50% of appraised market value) that are adapted to and resilient to the impacts of climate change on coastal communities in designated floodplain districts. Promotion of ‘green buildings’ as defined in ordinance. Identified green building performance elements include incorporation of on-site retention, detention, and LID treatment of stormwater runoff and on-site and off-site stormwater drainage sized to accommodate effects of SLR, flooding, and increased frequency and intensity of storm events.
Floodplain management ordinance with inclusion of sea level rise	Sea Level Rise, Precipitation & Stormwater, Storm Surge	Hingham	MA	Regulatory (Zoning)	For activities proposed in VE-zones and A-zones, at a minimum, the historic rate of relative sea level rise in Massachusetts of 1 foot per 100 years shall be incorporated into the project design and construction. The commission may also take other credible evidence of projected sea level rise, such as the IPCC, into consideration.
Floodplain overlay district	Sea Level Rise, Storm Surge	Oak Bluffs	MA	Regulatory (Zoning)	The zoning bylaw prohibits new residential development and expansion of existing development in the most hazardous flood zones—those designated as V, VE, or AO zones on FIRM. The bylaw also requires that all new development in less hazardous areas—those designated as A zones on the FIRMs—go through a special permit process to ensure proposed development and redevelopment projects meet design criteria and performance standards that minimize threats to public health and safety and increase the town's capacity to recover after a storm by reducing damage to personal and public property.
Model environmental protection bylaw	Sea Level Rise, Storm Surge,	Wellfleet	MA	Regulatory (Zoning)	Model bylaw that addresses climate change resilience measures, including sea level rise and marsh migration. Includes provisions

STRATEGY	SUBHAZARD	TOWN / CITY	STATE	STRATEGY TYPE	DESCRIPTION
	Marsh Migration				<p>for a 'Transitional Area' of future flooding areas and requirement that relative sea level rise and the landward migration of resource areas in response to relative sea level rise must be incorporated into the design and construction of structures and other activities proposed in 'Land Subject to Flooding or Inundation' area. Also prohibits certain activities in V-zones, including foundations other than open pilings or columns; new or expansion of roads, driveways, or parking lots, or impermeable paving for existing unpaved roads, driveways, or parking lots; and new or proposed expansions of coastal engineering structures. Requires development application reviewing body to consider a project's adaptation to potential climate change impacts. Allows reviewing body to require applicant to design stormwater management components for 500-year flood frequency event period.</p>
<p>Coastal resilience overlay zoning district</p>	<p>Sea Level Rise, Storm Surge</p>	<p>Norfolk</p>	<p>VA</p>	<p>Regulatory (Zoning)</p>	<p>The ordinance establishes a Coastal Resilience Overlay (CRO) zone, where new development and redevelopment will have to comply with new flood resilience requirements, and an Upland Resilience Overlay (URO), designed to encourage new development in areas with lower risk of flooding. The zoning ordinance includes the following innovative practices for fostering more flood resilient urban development: Freeboard - The ordinance requires that construction in the 100-year floodplain be elevated at least 3 feet above the 100-year base flood elevation, and construction in the 500-year (0.2% chance) floodplain, to be elevated or floodproofed to 1.5 feet above the 500-year flood elevation. Also requires development outside of floodplain to be elevated 16 inches above adjacent grade. Coastal Resilience Overlay (CRO) - requirements include the use of permeable surfaces on new parking spaces; stormwater infiltration; maintenance of open space; and limits are set on paved parking spaces that cannot absorb rainwater. Basements are prohibited, and electrical system components must be raised a foot above the finished floor. Landscaping must consist exclusively of salt-tolerant and native species. Upland Resilience Overlay (URO) - applied to areas outside of flood hazard zones, the ordinance includes policies aimed to target redevelopment to create transit-oriented, walkable, and bikeable neighborhoods.</p>

STRATEGY	SUBHAZARD	TOWN / CITY	STATE	STRATEGY TYPE	DESCRIPTION
					Resilience Quotient System - a system whereby developers earn points for adopting different resilient measures that promote flood risk reduction, stormwater management, and energy resilience, among other practices. New developments are required to meet different resilience point values based on the development type (e.g., residential, non-residential, mixed-use) and development size, unless the developer opts to meet specified standards for elevation and drainage. To meet the resilience quotient standards, all development, unless exempted, must go through a site plan review process. Additionally, the ordinance offers an alternative process, where applicants can simply meet a standard set of conditions in-lieu of considering different options available under the point system. The ordinance also includes incentives for extinguishing development rights in the CRO district. Points can be earned in the URO by extinguishing development rights, acquiring open space conservation easements, or restricting densities of development in the CRO.
Hazard disclosure requirement	Precipitation & Stormwater, Storm Surge	CA		Regulatory (State Law)	California real estate agents or individual sellers acting without an agent to disclose whether a property is located within a flood hazard area designated by FEMA.
Coastal flood resilience design guidelines	Sea Level Rise, Precipitation & Stormwater, Storm Surge	Boston	MA	Regulatory (Design Standards)	Coastal resilience design standards for areas vulnerable to flooding and sea level rise

Table 5. COASTAL RESILIENCE

STRATEGY	SUBHAZARD	TOWN / CITY	STATE	STRATEGY TYPE	DESCRIPTION
Transfer of development rights (TDR)	Wetland Conservation, Freshwater Resources, Sea Level Rise, Storm Surge, Precipitation & Stormwater, Coastal Erosion	Falmouth	MA	Policy (Land Use)	Land use mechanism that encourages the permanent removal of development rights in defined "sending districts/areas, allowing those rights to be transferred to defined "receiving" districts/areas. The system relies on market forces to redistribute development potential from vulnerable or sensitive areas toward areas with appropriate infrastructure to accommodate increased development potential. Falmouth adopted one of MA's first TDR Bylaws, which establishes "donor" and "receiving" districts based on a variety of criteria. It is designed to protect coastal ponds and groundwater recharge areas to protect water quality. In addition, it encourages the permanent protection of other important resource land that qualifies for tax relief when owners voluntarily agree to temporary development restrictions. The program can only function as part of a subdivision application and adds a Special Permit requirement. However, this additional requirement is streamlined by having the Planning Board named as the permitting authority for both requirements. Furthermore, incentives are added in the form of density bonuses. Bonuses vary between 20 to 40%, depending on which area is sending and which area is receiving. Example: McKenna Ridge Road Subdivision: The donor parcel was located in the Water Resource Protection District and covered approximately 12.5 acres. Yield calculations developed for the parcel showed that six lots could reasonably be developed under the standard subdivision process. Because the developer was using the TDR Program, he was granted a 20% increase on this base yield value, bringing the yield value up to eight lots. The receiving subdivision was a 16.4-acre parcel just outside the donor district boundary in an area already well developed for residential use. The site plan development process showed that seven lots would have been a reasonable expectation for this parcel under standard zoning provisions. The result was a 15-lot subdivision that used approximately half the space normally required under existing regulations and permanent protection of more than 12 acres of open space in the Water Protection District.
Nature-based adaptation approach	Coastal Erosion	Del Mar	CA	Planning (Mitigation & Adaptation Project)	Adaptation approach that uses beach nourishment, sand management, and flood management. Managed retreat was considered but a decision was made that it was not needed and/or not feasible due to the high cost of acquiring property for open space, and the high risk of legal action if managed retreat is used.

STRATEGY	SUBHAZARD	TOWN / CITY	STATE	STRATEGY TYPE	DESCRIPTION
Climate change training requirement	Sea level rise	RI		Regulatory (State Law)	State law requires that planning board and commission members take six educational trainings regarding ways to make informed choices for supporting resilience to the impacts from climate change.
Rolling easement	Sea Level Rise, Storm Surge, Precipitation & Stormwater, Coastal Erosion	<i>Various</i>		Policy (Land Use)	Several communities around the U.S. have used rolling easement approaches that ensure that wetlands and beaches can migrate inland, as people remove buildings, roads, and other structures from land as it becomes submerged. Rolling easements can preserve beaches and other eroding shores, and public access along the shore as well as to beaches. The approaches can also facilitate landward relocation of roads and other infrastructure; help wetlands migrate inland; and facilitate the inland migration of barrier islands

Table 6. NATURAL RESOURCES

STRATEGY	SUBHAZARD	TOWN / CITY	STATE	STRATEGY TYPE	DESCRIPTION
Local wetland ordinance with flood resilience zones	Wetland Impacts, Marsh Migration, Sea Level Rise	Boston	MA	Regulatory (Zoning)	Establishes a 'Waterfront Area' that will serve as a buffer zone and allow for implementation of the Resilient Boston Harbor Plan and creation of Flood Resilience Zones. Protects isolated vegetated wetlands, vernal pools, and vernal pool habitat, allows Conservation Commission to develop standards for projects in floodplain to ensure resiliency measures are incorporated, and expressly directs the Commission to consider climate change, sea level rise, and climate resiliency.
Land conservation & preservation	Wetland Impacts, Marsh Migration, Sea Level Rise, Storm Surge, Precipitation & Stormwater, Coastal Erosion	<i>Various</i>		Policy (Land Use)	Town, land trust, or private entity purchasing or donating land to limit or prevent development at a site to maintain open space and preserve the functions of the existing natural environment and its resources.
Open space / cluster subdivision	Wetland Conservation	York	ME	Regulatory (Zoning)	Subdivision layout that provides flexibility in development standards, usually through reduced dimensional standards, that results in more open space, shorter road lengths, reduced utility infrastructure length, and sometimes a density bonus than a conventional subdivision layout. In some cases, the open space must be designed first with priority given to important natural resources,

STRATEGY	SUBHAZARD	TOWN / CITY	STATE	STRATEGY TYPE	DESCRIPTION
					water quality protection, recreation opportunities, public access, and areas vulnerable to flooding.
Wetlands protection bylaw	Wetland Impacts, Marsh Migration, Sea Level Rise, Storm Surge	Arlington	VA	Regulatory (Zoning)	Wetlands protection bylaw that specifically highlights climate change resilience and states, “(A) The impacts of climate change can adversely affect each Resource Area’s ability to provide and promote the resource area values protected by the Bylaw.... Resource Areas are critical to building a community’s resilience/adaptation to the impacts of climate change due to their ability to provide for flood control, storm damage prevention, and other Resource Area Values. (B). The Applicant shall, to the extent practicable and applicable as determined solely by the Commission, integrate considerations of adaptation planning into their project to promote climate change resilience so as to protect and promote resource area values into the future. These considerations are especially important in Land Subject to Flooding (floodplain) and Riverfront Area and other Resource Areas which protect the interest of Flood Control and Storm Damage Prevention, including Adjacent Upland Resource Areas. These Resource Areas may be directly impacted by extreme weather events expected to be more prevalent or more intense due to climate change, in surface runoff of pollutants, and in wildlife habitat due to changes in temperature.
Wetlands protection bylaw	Wetland Impacts, Marsh Migration, Sea Level Rise, Storm Surge	Falmouth	MA	Regulatory (Zoning)	Wetlands protection bylaw and wetlands regulations that limit development and redevelopment in flood hazard zones.
Wetland restoration	Marsh Migration, Sea Level Rise, Wetland Conservation	Rye	NH	Planning (Mitigation & Adaptation Project)	Protecting, restoring, and creating salt marsh as a buffer to storm surges and sea level rise to provide natural flood protection.
Thin layer deposition & wetland enhancement	Marsh Migration, Sea Level Rise, Wetland Conservation		RI	Planning (Mitigation & Adaptation Project)	Placement, through spreading and/or spraying, of sediment on marsh surface to increase the elevation of the marsh surface and prevent drowning and dying of marsh vegetation. Helps marsh vegetation better keep pace with rising sea levels.
Coastal Georgia water and wastewater permitting	Sea Level Rise, Saltwater Intrusion, Water Quality		GA	Policy (Land Use)	The Georgia Environmental Protection Division (EPD) has completed a plan to manage the water resources of the state’s coastal region. The “Coastal Georgia Water and Wastewater Permitting Plan for Managing Saltwater Intrusion” is based on the scientific findings of a seven-year study of groundwater use in the 24-county coastal area. The study is called the Sound Science Initiative and was

STRATEGY	SUBHAZARD	TOWN / CITY	STATE	STRATEGY TYPE	DESCRIPTION
plan for managing saltwater intrusion.					done to address the concern that pumping of groundwater in the region is allowing salt water to seep into the Floridan aquifer, a principal source of drinking water.
Countywide coastal management program for conservation and environmental enhancement fund	Sea Level Rise, Storm Surge, Wetland Impacts, Water Quality		FL	Policy (Land Use)	Establishment of Countywide water control, coastal engineering, and coastal wetlands management programs for the purpose of maintaining adequate water levels, flood control, drainage, water conservation, and prevention of saltwater intrusion; for preserving beaches and shorelines; for managing coastal wetland resources; for acquisition of lands by gift, donation, purchase, condemnation or otherwise, as necessary for such programs; and providing for cooperation with federal, State and local agencies and authorities. Environmental Protection, Biscayne Bay and Environs designated aquatic park and conservation area, the Biscayne Bay environmental enhancement trust fund, and the environmentally endangered lands program
Best practices for preventing saltwater intrusion	Sea Level Rise, Saltwater Intrusion, Water Quality	British Columbia		Policy (Land Use)	Best practices to prevent saltwater intrusion, including avoiding drilling of wells near the coastline and avoiding drilling excessively deep wells in proximity to the coastline.
Desalination plant for water utility	Sea Level Rise, Saltwater Intrusion, Water Quality	Tampa Bay	FL	Planning (Mitigation & Adaptation Project)	The local water utility invested in a desalination plant to deliver ‘blended’ water using groundwater, surface water, and desalinated water in anticipation and preparation of saltwater intrusion from sea level rise.

Table 7. SHORELINE CHANGE

STRATEGY	SUBHAZARD	TOWN / CITY	STATE	STRATEGY TYPE	DESCRIPTION
Erosion-based setback	Beach, Dune, & Bluff Erosion	Maui	HI	Policy (Land Use)	Maui’s erosion-based setback is based on the local annual erosion rate multiplied by 50 years (average lifetime of a structure) with an added 25 feet. The municipality has three approaches include restoring and protecting coastal dunes, updating erosion-based shoreline setbacks, and planning for post-disaster reconstruction. The original erosion-based setback rules were adopted in 2003; the update is based on a new statistical methodology for reporting the rate of beach erosion. The new formula would “increase the considered lifetime of a structure by which the erosion rate is multiplied, increase the minimum setback to account for episodic events, and add a buffer for accelerated

STRATEGY	SUBHAZARD	TOWN / CITY	STATE	STRATEGY TYPE	DESCRIPTION
					sea level rise. The formula would increase the setbacks on most parcels compared to the existing setbacks.
Model coastal erosion overlay zone	Beach, Dune, & Bluff Erosion, Sea Level Rise		OR	Regulatory (Zoning)	Model overlay zone to aid local governments in further addressing increasing chronic coastal natural hazards intended to be used in conjunction with risk zone maps. The purpose is to promote the public health, safety, and general welfare by identifying areas that may be subject to chronic coastal natural hazards including ocean flooding, beach and dune erosion, dune accretion, bluff recession, land sliding, and inlet migration; assessing the potential risks to life and property posed by chronic coastal natural hazards, including erosion and earth movement; and minimizing potential public and private risks and losses to life and property due to these chronic hazards through hazard avoidance and development requirements.
Erosion-based setback	Beach, Dune, & Bluff Erosion, Sea Level Rise		NC	Regulatory (Zoning)	Erosion-based setback rule from 1979 that serves as an example for many communities. North Carolina implemented erosion-based setbacks to regulate development on lots created on or after June 1, 1979. The rule states that these lots shall utilize the current erosion rate setback factor in the calculation of the development setback pursuant to 15A NCAC 07H .0304. If application of the current erosion rate setback factor in the calculation of the development setback would preclude the placement of permanent buildings, then the erosion rate in effect at the time that the lot was created may be utilized in the calculation of the development setback, provided that the development.
Erosion-based setback	Beach, Dune, & Bluff Erosion, Sea Level Rise		RI	Regulatory (Zoning)	The Rhode Island Coastal Resources Management Council (CRMC) has approved sweeping changes to the Shoreline Protection section of the Red Book [Section 1.3.1(G)] to provide coastal property owners with alternatives to structural shoreline protection, including nonstructural and hybrid methods.
Beach nourishment	Beach, Dune, & Bluff Erosion, Sea Level Rise	Cape Cod	MA	Planning (Mitigation & Adaptation Project)	The process of adding sediment (sand) to an eroding beach to widen or elevate the beach to maintain or advance the shoreline seaward and/or increase the elevation of the beach. Sediment can be sourced from inland mining, dredging from navigation channels and/or offshore mining.
Hazard disclosure requirement	Beach, Dune, & Bluff Erosion, Sea Level Rise		SC	Regulatory (State Law)	In South Carolina, state law requires sellers of real property to disclose erosion and, where appropriate, coastal risks based on the setback lines most recently adopted by the state’s Department of Health and Environmental Control
Dune restoration	Beach, Dune, & Bluff Erosion, Sea Level Rise	Hampton	NH	Planning (Mitigation & Adaptation Project)	Restoring existing dunes or creating new dunes to protect the shoreline against erosion and flooding.

MAINE'S STATE CLIMATE ACTION PLAN

This section details the findings and recommendations of the recently released State Climate Action Plan, published December 1, 2020, as well as resilience and adaptation strategies that emerged from the Maine Climate Council Working Groups.

In 2019, LD 1679 was signed into State law with bipartisan support to create the Maine Climate Council. Composed of an assembly of scientists, industry leaders, bipartisan local and state officials, and engaged citizens, the Council was charged with developing a four-year Climate Action Plan (CAP) to help Maine achieve its greenhouse gas reduction goals and improve climate resilience of the State's communities, people, economy, and environment. The Council, its six working groups, and Scientific and Technical Subcommittee (STS) developed targeted recommended actions, undertook the first comprehensive scientific and technical assessment of climate change in Maine in a decade, and drafted the groundbreaking four-year CAP. The Council also produced a series of reports examining climate-related vulnerabilities in Maine as well as analyzing the cost-benefit of specific action items recommended by the working groups. Key priorities stemming from the Council related to coastal resilience include protecting water systems from high intensity weather events, emphasizing resilience through land use planning and legal tools, and projecting economic impacts on infrastructure due to sea level rise.

Results of the Climate Council process and CAP that directly relate to municipal coastal resilience are summarized below. The CAP outlines specific goals, strategies, actions, and recommendations for State climate action, including the following:

- The Council recommends the state **commit to manage** for **1.5 feet of relative sea-level rise by 2050**, and **3.9 feet by 2100**. The Council also recommends the state **prepare to manage** for **3 feet of relative sea-level rise by 2050** and **8.8 feet by 2100**.
- *CAP strategy E: Protect Maine's environment and working lands and waters.*
 - Increase by 2030 the total acreage of conserved lands in the state to 30% through voluntary, focused purchases of land and develop specific goals for conserved lands in coastal areas.
- *CAP Strategy F: Build healthy and resilient communities.*
 - Empower local and regional community resilience efforts and provide state leadership for robust technical assistance and funding to communities by 2024 to support local and regional climate-resilience initiatives.
 - Adopt official sea level rise projections, incorporate official state sea-level rise projections into regulations by 2022, and require regular updates to ensure the projections utilize the latest scientific data.
 - Emphasize resilience through land-use planning and legal tools. Develop and implement updated land-use regulations, laws, and practices by 2024 to enhance community resilience to flooding and other climate impacts.
- *Strategy G: Invest in climate-ready infrastructure.*
 - Assess climate vulnerability and provide climate-ready design guidance. Complete a statewide infrastructure-vulnerability assessment by 2023, as well as develop and implement design standards for resilience in infrastructure projects.
 - Establish the State Infrastructure Adaptation Fund and pre-development assistance program in 2021, designed to leverage federal recovery support in the short term, and in the long term to address the significant and ongoing infrastructure adaptation needs.

As part of its efforts to develop a thorough and up-to-date climate assessment for the State, the STS analyzed and compiled information about climate conditions and impacts Maine already experiences and can expect to experience in the future. STS findings include:

- Since 1895, Maine’s statewide annual temperatures have risen by 3.2°F, with coastal areas warming more than the interior of the state.
- Warming is causing Maine to become wetter overall, with statewide **annual precipitation increasing by 6 inches since 1895**. Heavy storms of 2 to 4 inches of precipitation are becoming more frequent, increasing the probability of floods that will erode infrastructure and degrade water quality in ponds, lakes, streams, rivers, and coastal areas.
- Extreme weather conditions in Maine, such as drought and large rain events, are harming agriculture, shellfisheries, and freshwater and coastal ecosystems susceptible to climate change effects.
- Sea levels along Maine’s coast have risen about 1 foot/century (approximately 0.1 inches/year) in the last few decades, after rising at 0.6 to 0.7 feet/century since the early 1900s. About half of the last century’s sea-level rise in Maine has occurred since the early 1990s.
- As Maine’s relative sea level rises, coastal communities and ecosystems will see increased frequency of nuisance flooding, inundation of coastal lowlands with saltwater, erosion, and loss of dry beaches, sand dunes, and other habitats. **A 1.6-foot sea-level rise may submerge 67% of Maine’s coastal sand dunes and reduce the dry beach area by 43%**, which could happen by 2050 or earlier and would have significant impacts on coastal tourism.

The Community Resilience Subgroup of the Community Resilience, Public Health, and Emergency Management Working Group recommended important ways to improve seven statutes or rules which include: Site Location of Development Act (“Site Law”) Regulations and Rules; Stormwater Management and Erosion and Sedimentation Control Regulations and Rules; Comprehensive Planning Statute and Rules; Mandatory Shoreland Zoning Act statute and rules; Floodplain Management Model Ordinance; Land Use Planning Commission regulatory changes; and Natural Resources Protection Act statute and rules. Additionally, the Subgroup recommended authorizing municipalities without zoning to designate a “sea level resilience overlay zone” as a tool to identify areas at risk and plan for permanent inundation. Several suggestions from the Community Resilience Planning Subgroup are:

- Use consistent, scientific definitions across statutes and regulations.
- Align definitions and rules of wetlands and floodplains in Natural Resource Protection Act (NRPA) and Shoreland Zoning statutes where they overlap or are inconsistent.
- Achieve consistency across statutes and rules over what is protected and/or subject to the jurisdiction of each in terms of actions that are exempt or subject to permit by rule with particular focus on culvert replacement.
- In regulations, refer to the highest astronomical tide, rather than the highest annual tide.
- Collaborate with other municipalities, to share responsibilities and responses.
- Ensure efficient delivery of technical assistance and tools to assess vulnerability, design adaptation responses, and support resilience efforts through funding that leverages public dollars.
- Include resilience and mitigation strategies in Comprehensive Economic Development Strategies (CEDS) documents.
- Create a climate chapter in the Comprehensive Plan or develop a resilience plan.

CONCLUSION

There are a suite of land use and planning tools that municipalities can utilize to protect people, property, and natural resources from the impacts of coastal hazards and climate change. Comprehensive Plans are vital planning and policy documents for enhancing a community's coastal resilience. In Maine, a municipality's zoning requirements must be consistent with its Comprehensive Plan. Including specific goals, policies, and strategies related to coastal hazards and resilience in its Comprehensive Plan will enable the municipality to adopt land use regulations that address coastal vulnerabilities.

Overlay districts are zoning tools that apply requirements that go beyond the base zone standards in specific geographic areas and are commonly used to protect specific resources such as groundwater, wetlands, or historic areas through targeted development standards. Coastal hazards, such as storm surge, sea level rise, and erosion, generally apply to discrete geographic areas. This characteristic makes them particularly well-suited for zoning overlays. Once hazard areas are identified and defined, corresponding development standards and land use requirements can be developed to reduce risk in those areas and conserve vital natural resources and habitats. Site plan regulations and subdivision regulations lay out the process by which planning boards approve new development projects and can be used to reduce flood risk to properties, address future potential hazards, and protect natural resources by requiring the development standards and the implementation of best management practices.

Each project community has taken important steps to address climate change impacts and coastal hazards. This report aims to summarize and build on current initiatives in each of the municipalities to strengthen important adaptation and resiliency work that is underway. Additionally, the findings will inform the development of model coastal resilience ordinance language to serve as an example that other municipalities can adopt or modify to diminish risk to their communities and improve the sustainable, long-term planning for natural, built, and social environments along the entire coast of Maine.



Storm surge in Wells on 9/23/20. A. Sherwin

APPENDIX A. RESOURCES

Local Law Provisions for Climate Change Adaptation (Columbia Law School, Sabin Center for Climate Change Law) - Document outlining existing and suggested local law provisions that reflect diverse approaches to adaptation to climate-enhanced flood risk in an effort to: assist the State with drafting model local laws for adaptation; encourage the State to incorporate a broad range of adaptation strategies, including retreat from areas of high flood risk; and assist local governments with implementation of these programs. Provides a collection of useful statutory options—including those that take note of local law provisions enacted by local governments in New York State, as well as relevant state laws enacted in New York and other jurisdictions. Where different local governments have used similar statutory language, this paper only includes one version. Throughout, citations to laws and regulations are hyperlinked for ease of access. The paper is organized into three sections: Permitting Review, Targeted Development Restrictions and Prudent Development, and Protection/Armoring. Those sections follow a brief description of model legislative language that relates to sea level rise.

[https://climate.law.columbia.edu/sites/default/files/content/docs/Gundlach-and-Warren-2016-05-Local-Law-Adaptation%20\(1\).pdf](https://climate.law.columbia.edu/sites/default/files/content/docs/Gundlach-and-Warren-2016-05-Local-Law-Adaptation%20(1).pdf)

Model protocols for climate change impact analysis (Columbia Law School, Sabin Center for Climate Change Law) - Model protocols describing how government agencies and other decision makers can account for the impacts of climate change in environmental impact assessments and related planning documents. The resource contains two protocols, one for the natural resources and one for the built environment. <https://climate.law.columbia.edu/content/model-protocols-climate-change-impact-analysis>

Building Community Resilience with Nature-Based Solutions: A Guide for Local Communities. (FEMA) The key goal of this guide is to help communities identify and engage the staff and resources that can play a role in building resilience with nature-based solutions. The guide includes guidance about planning, implementation, funding strategies, resources, and cost benefits of using nature-based solutions for building resilience. https://www.fema.gov/sites/default/files/2020-08/fema_RiskMAP_nature-based-solutions-guide_2020.pdf

APPENDIX B. KEY LAWS & REGULATORY DOCUMENTS

Erosion and Sedimentation Law: (Title 38, Chapter 3, §420-C) Any activity that involves filling, displacing or exposing soil or other earthen materials shall take measures to prevent unreasonable erosion of soil or sediment beyond the project site or into a protected natural resource as defined in section 480-B. Erosion control measures must be in place before the activity begins. Measures must remain in place and functional until the site is permanently stabilized. Adequate and timely temporary and permanent stabilization measures must be taken, and the site must be maintained to prevent unreasonable erosion and sedimentation.

Floodplain Management: Community participation in the National Flood Insurance Program (NFIP) requires the adoption and enforcement of floodplain management measures that are compliant with 44 CFR Parts 59 through 78 of the NFIP regulations. A floodplain management ordinance must meet the requirements of federal and state floodplain management laws and municipalities may adopt more stringent floodplain management measures.

Groundwater Protection Program: (Title 38, Chapter 3, §§401-404) Declares that the protection of groundwater resources is critical to promote the health, safety, and general welfare of Mainers and identifies sand and gravel aquifers as important public and private resources for drinking water supplies and other industrial, commercial, and agricultural uses. The statute also finds that groundwater resources are endangered by unwise use and land use practices and that DEP provide coordination for the protection of groundwater through existing statutes and regulations.

Growth Management Act: State Act with the purpose of establishing, local comprehensive planning and land use management in Maine municipalities. Encourages municipalities to identify the tools and resources to effectively plan for and manage future development within their jurisdictions with a maximum of local initiative and flexibility and encourages local land use ordinances, tools and policies to be based on local comprehensive plans. **Maine Revised Statutes Annotated (MRSA), Title 30-A** establishes municipal 'home rule' and municipal authority to adopt zoning. A zoning ordinance must be pursuant to and consistent with a comprehensive plan adopted by the municipal legislative body.

Mandatory Shoreland Zoning Act (MSZA): (Title 38, Chapter 3, §§435-449) Requires municipalities to adopt, administer, and enforce local ordinances that regulate land use activities in the shoreland zone. The shoreland zone is comprised of all land areas within 250 feet, horizontal distance, of the normal high-water line of any great pond or river; upland edge of a coastal wetland, including all areas affected by tidal action, and upland edge of defined freshwater wetlands; and all land areas within 75 feet, horizontal distance, of the normal high-water line of certain streams. The purposes of the MSZA are to prevent and control water pollution; protect fish spawning grounds, bird and wildlife habitat; protect buildings and lands from flooding and accelerated erosion; protect archeological and historic resources; protect commercial fishing and maritime industries; protect freshwater and coastal wetlands; control building sites, placement of structures and land uses; conserve shore cover, and visual as well as actual points of access to inland and coastal waters; conserve natural beauty and open space; and anticipate and respond to the impacts of development in shoreland areas.

Natural Resource Protection Act (NRPA): (Title 38, Chapter 3, §§480-A to 480-Z) State Act for protecting natural resources, defined as coastal sand dune systems, coastal wetlands, significant wildlife habitat, fragile mountain areas, freshwater wetlands, great ponds and rivers, streams or brooks. The NRPA recognizes the State significance of these natural resources in terms of their recreational, historical, and environmental value to present and future generations. The Act's intent is to prevent any unreasonable impact to, degradation of or destruction of the resources and to encourage their protection or enhancement and accomplishes the intent through standards and a permitting process for certain activities that occur in, on, or over any protected natural resource area or on land adjacent to any great pond, river, stream or brook, coastal wetland and some freshwater wetlands.

Nonpoint Source Pollution Program: (Title 38, Chapter 3, §§410H - 410K) State law requiring the development of best management practice guidelines to reduce and prevent nonpoint source pollution from development-related activities. The State shall provide guidance and technical assistance to the Office of Community Development and municipalities to support implementation through growth management programs authorized by the growth management laws, Title 30-A, chapter 187, subchapter II and municipal subdivision ordinances.

Safe Drinking Water Act: The federal law administered by the U.S. Environmental Protection Agency (EPA) that protects public drinking water supplies throughout the nation. Originally passed by Congress in 1974, the law was amended in 1986 and 1996. The Safe Drinking Water Act does not regulate private wells serving fewer than 25 individuals.

Site Location of Development Act: (Title 38, Chapter 3, §§481 - 490) Act that regulates the locations chosen for state, municipal, quasi-municipal, educational, charitable, commercial and industrial developments with respect to the natural environment. The Act seeks to protect natural and groundwater resources from pollution and other adverse impacts. The Act applies to developments which occupy land or water areas in excess of 20 acres, involve mining or oil or gas exploration, include structures or subdivisions, or are identified as offshore wind power projects with an aggregate generating capacity of at least 3 MW.

Stormwater Management Law: (Title 28, Chapter 3, §420-D) Standards for stormwater quantity and quality for development projects that have one acre or more of disturbed area. Storm water quality standards for projects with 3 acres or less of impervious surface may address phosphorus, nitrates and suspended solids but may not directly address other dissolved or hazardous materials unless infiltration is proposed.