

CHAPTER 6

State and Municipal Considerations

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6.1 Overview

6.1.1 Chapter Objectives

1. This chapter outlines how CRMC's Coastal Hazard Application Guidance might be applied to other Rhode Island state agencies or to municipal governments. With the development of the CRMC Coastal Hazard Application Guidance, CRMC is actively amending its program to be forward-thinking about coastal resilience and adaptation to coastal risk, and is one of the first coastal regulatory programs in the U.S. to put forward permit requirements that address future risk from storm surge, coastal erosion, and projected sea level rise. CRMC hopes this process will be a model to other state agencies and municipal governments, and programs can be adapted and evolve accordingly.
2. The Shoreline Change SAMP Planning Boundary includes land area exposed to water levels from a modeled 100-year return period storm, similar to 1954's Hurricane Carol, plus seven-feet of sea level rise. Accordingly, the Shoreline Change SAMP Boundary extends inland beyond CRMC's jurisdiction, demonstrating that there is a substantial amount of land area at risk from coastal hazards but outside of CRMC's jurisdiction, and likely outside of currently-mapped FEMA Special Flood Hazard Areas.
3. CRMC has set the stage for risk assessment process in providing STORMTOOLS to each of the 21 municipalities along Rhode Island's coastline. Through development of STORMTOOLS, offering high resolution scenario-based coastal inundation mapping, Rhode Island has provided the ability to assess risk at the individual structure and parcel level for all properties along the coast and within the Shoreline Change SAMP Project Boundary.

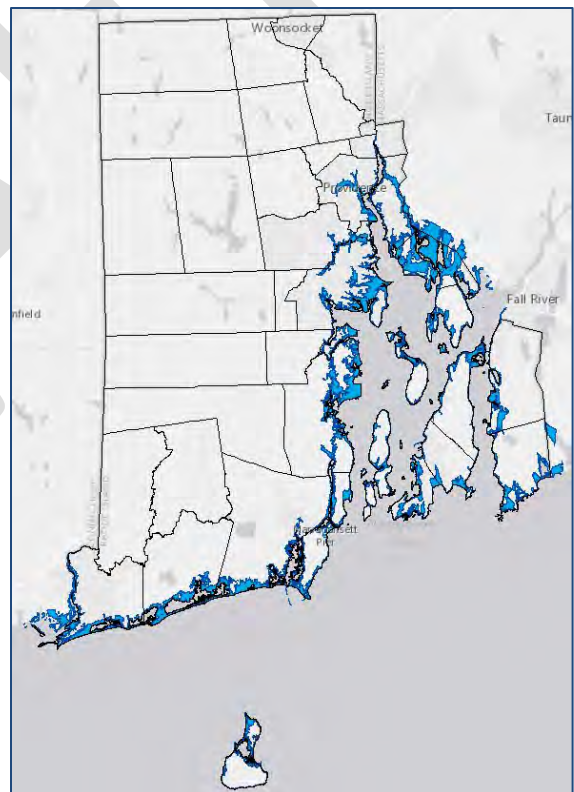


Figure 1. Shoreline Change SAMP Planning Boundary

4. State agencies embarking on state or regionally significant projects will benefit from a process by which they evaluate future conditions to ensure public dollars are spent wisely. Municipal decision makers, including elected officials, staff, and board/commission members, will be making decisions on future use of land within the Shoreline Change SAMP Planning Boundary, and must be aware of current and future risks of flooding across properties along the coast that may not be adequately represented in current flood risk maps.
5. Enacting CRMC's Coastal Hazard Application Guidance serves to educate municipal staff and decision makers, and especially coastal property owners who are considering the long-term viability of their coastal dwelling or development. CRMC's adoption of the five-step application process outlined in Chapter 5 serves as a model for municipalities and could offer the cities and towns protection from development challenges if they choose to follow the state's lead in communicating and assessing coastal risks in their community.
6. As of 2017, municipal board and commission members are required to receive two-hours of training every two years on, "...the effects of development in a flood plain and the effects of sea-level rise..." per RI General Laws 45-22-7. There are several sources of trainings available, but in 2017 Rhode Island launched a series of video training modules called PREP-RI, Providing Resilience Education for Planning in Rhode Island (<http://prep-ri.seagrant.gso.uri.edu/>), that are targeted to municipal volunteer board and commission members. These video modules cover the following topics: Climate Change in Rhode Island, Infrastructure, Stormwater, Flooding, Mapping Tools, and Adaptation.

6.2 Projects of State or Regional Significance

1. CRMC is providing forward-thinking guidance and related regulations, as well as decision support tools to guide responsible development in the coastal zone that addresses current risk from hazards, and anticipates future risk from storms, coastal erosion, and sea level rise. CRMC's Coastal Hazard Application Guidance outlined in Chapter 5 is well-suited for evaluating the risk profile of state-sponsored projects in coastal high risk areas. To ensure that federal, state, and other public funds are applied to projects in a manner that minimizes long-term losses and reflects the intended design life of the project, project coordination among federal and state agencies is strongly encouraged. Coordination and review of site risk from coastal hazards early in the project planning process has shown to be an effective strategy to ensure all relevant considerations are

discussed up front, thus preventing delays due to redesign of projects in later stages of a project's schedule.

2. Throughout the Shoreline Change SAMP effort, CRMC staff consulted on large-infrastructure projects, including transportation and wastewater management, and used STORMTOOLS to illustrate and inform project planning and engineering teams on the coastal forces that are projected to impact the project today and in the future. Because FEMA maps do not adequately illustrate risk from current and future conditions, specifically pertaining to sea level rise, CRMC encourages other state agencies to use STORMTOOLS and the SDE maps for planning and design purposes.
3. CRMC expects to continue the service of bringing the best available coastal risk and hazard information to other state agencies to consult on infrastructure projects in both the current CRMC jurisdiction, and also in the Shoreline Change SAMP planning boundary representing a 100-year return period storm plus 7-feet of sea level rise. Long-term funds for maintenance and management of STORMTOOLS are being sought to ensure this invaluable mapping tool, specific to the state of Rhode Island's 420-miles of coastline, will be available for state agencies and municipalities in the future for project planning and evaluation.
4. For state agencies considering projects in the coastal zone, both currently within CRMC's jurisdiction from the inland edge of the coastal feature, and for projects that lie within the Shoreline Change SAMP boundary (as illustrated in STORMTOOLS' 100-year return period storm plus 7-feet of sea level rise layer), a Pre-Application coordination meeting early in the project planning process with CRMC is required within its jurisdiction. For projects outside of CRMC's jurisdiction, but within the Shoreline Change SAMP project boundary, the state agency leading the project is encouraged to include both the municipality and CRMC staff in early stages of project planning. As an example, considering that resiliency to the impacts of climate change is stated as a "Cost Effectiveness" principle driving the State Transportation Improvement Program¹, and this program is likely to include projects within CRMC's jurisdiction, a coordination meeting with CRMC could help RI Statewide Planning Program staff with site evaluation and selection for projects proposed within the Shoreline Change SAMP Planning Boundary. In addition, the RI Department of Transportation (RIDOT) is encouraged to address shoreline risk in the assessment of projects considered for inclusion in the State Transportation Improvement Program. They could assign specific point criteria for projects that remove risk from direct impact of sea level rise and associated storm

¹ RI Statewide Planning Program. 2015. "An Overview of TIP Guiding Principles: Federal Fiscal Years 2017-2025." <http://www.planning.ri.gov/planning-areas/transportation/tip.php>

surges. In the alternative, the RIDOT could establish a new category of projects entitled: “Coastal Resiliency Projects”. This category would separate out those projects in need of action in the 10 year STIP timeframe to eliminate risk of impact from sea-level rise and storm-surge damage. It would target projects for funding based on the immediacy of the need.

5. In the case of post-storm response and recovery, Section 1.1.14 (Formerly Section 180) of the RICRMP details the procedures for securing Emergency Assents and post-storm permits from CRMC. This section emphasizes the importance of state agencies and municipalities having emergency permitting procedures in place to, “speed appropriate reconstruction and minimize adverse economic and environmental impacts.” (RICRMP 1.1.14.C.2). Procedures for enacting a post-storm moratorium to allow for adequate assessment of damage and potential for rebuilding are outlined, as are a strategy for prioritizing, “...emergency alterations, reconstruction, or replacement of essential public facilities, such as roads, bridges, and public utilities.” (RICRMP 1.1.14.C.4).
6. Communities have expressed concern over the long-term resilience of state and local roads shown to be at risk from coastal hazards, and the ability to fund implementation actions and construction projects.

6.3 Municipal Application of RI CRMC Coastal Hazard Application Guidance

1. RI CRMC’s Coastal Hazard Application Guidance outlined in Chapter 5 of this Shoreline Change SAMP provides a model process that municipalities can voluntarily apply to projects within the flood envelope of the Shoreline Change SAMP Project Boundary, but outside of CRMC’s current jurisdiction.
2. Currently at the municipal level, for land outside of the FEMA-defined Special Flood Hazard Area (SFHA), there are no flood-related regulations that exist to guide development for land projected to be inundated as a result of future sea level rise. Outside of CRMC’s jurisdiction, the municipality has jurisdiction for land development within the Shoreline Change SAMP Boundary. By using STORMTOOLS, municipalities can apply the best available mapping tools provided by the state of Rhode Island, and apply these tools to advise applicants as to whether proposed developments are designed to adequately address future risk, thus overcoming the identified limitations of the existing FEMA Flood Insurance Rate Maps (FIRMS).

3. In order for municipalities to implement the five-step CRMC Coastal Hazard Application Guidance, and follow the state's lead in evaluating coastal development projects for their exposure to coastal risks, adequate staffing and changes to local site plan application procedures will be needed. Considering that CRMC's five-step Coastal Hazard Application Guidance process for development proposals may not be immediately adopted by municipalities, municipalities have suggested expanding CRMC's jurisdiction within the full expanse of the Shoreline Change SAMP Boundary. At this time, however, CRMC does not have the statutory authority, nor additional resources to address all future development applications that may be put forward in the Shoreline Change SAMP Project Boundary.
4. Depending on municipal staff availability and support from local elected officials and boards/commissions, municipalities could refer applicants to the mapping tools offered by CRMC, and encourage voluntary use of the 5-step process outlined in Chapter 5 of this document. As an example, municipalities could require submittal or reference to this material as part of the application process. CRMC's 5-step Coastal Hazard Application Guidance process, and related mapping tools, are designed to be user-friendly to multiple audiences and are intended to educate applicants on the risk profile for the development, potentially reducing risk from coastal hazards and in turn, flood insurance premiums, over the near and long term.
5. Strategies that municipalities may consider as short-term demonstration or pilot projects to replicate CRMC's 5-step Coastal Hazard Application Guidance process at the local level might include:
 - a. Establish thresholds for types of development that are subject to this process, and apply the CRMC risk assessment process only to projects that meet specific criteria. For example, municipalities could test this process on projects that are triggered by existing stormwater management regulations, or on larger-scale projects with a specified minimum building footprint or that propose to add fill or materials in excess of a defined area or volume.
 - b. Hold advisory pre-application site plan meetings with property owners and developers to share CRMC's risk assessment tools. Advise applicants during this meeting to identify design life of their proposed development, identify a date that relates to future conditions, and consider the relationship of their proposed development with future flood and erosion scenarios. Discuss with applicants the uncertainty of future conditions, including flood insurance premiums, in order to relay that a decrease in the risk profile for a property will likely result in

a decrease in long-term flood insurance premiums. Municipal staffers can make CRMC's risk assessment tools and resources available to applicants, without requiring they be used.

- c. Consider incentives for applicants who voluntarily follow the CRMC Coastal Hazard Application Guidance process and submit those findings to the town for building permits outside of CRMC's jurisdiction. Examples of incentives could include decreased application fees or expedited review or permitting for projects that apply CRMC's five-step Coastal Hazard Application Guidance.
6. For significant infrastructure or transportation projects that fall within the Shoreline Change SAMP Boundary but lie outside of CRMC's jurisdiction, municipalities are encouraged to use the risk assessment tools (STORMTOOLS or CERI, as available), to evaluate future conditions for these projects and coordinate with CRMC and other relevant agencies to enact a procedure to review project alternatives. For example, if a road project submitted for funding under the State Transportation Improvement Program (STIP) identifies a road for resurfacing, but the area is showing exposure or long-term impact from current or future coastal hazards, planners from the municipality and the Statewide Planning Program are encouraged to reconsider investment in that project until a more thorough analysis is completed to consider the long-term cost/benefits of improving or enhancing that roadway.
 7. Municipalities must decide how they want to offer CRMC's voluntary design elevation levels to educate and inform permit seekers of future coastal hazard risk. Considering the inaccuracy of existing FEMA maps for Rhode Island, and the uncertainty of how FEMA will handle these changes in the future, the STORMTOOLS Design Elevation (SDE) maps described in Chapters 3 and 5 will assist municipalities in evaluating the future risk profile in coastal areas under varying sea level and storm scenarios with a 95% confidence level that the flood water will not exceed that depth during defined storm scenarios. Because the FEMA-defined "special flood hazard area" and related V and A zones are expected to shift inland as conditions change into the future, CRMC is also mapping where potential V and A zones could be as a result of changing coastal conditions and related hazards. Surge and wave will be higher in these zones. These forces act higher on the structure, increasing damage potential.
 8. Additionally, municipalities are encouraged to use CRMC's maps and data to evaluate the assessed value of coastal structures at risk and the potential threat to tax base and municipal finance. For future municipal financial stability, it is important to consider and develop decision support strategies related to uncertainty with the long-term

market value of homes in high hazard areas, and resulting implications on municipal tax base. Moody's Investors Service is currently considering future risk conditions attributed to climate change when determining municipal bond ratings.²

6.4 Addressing Coastal Risk in Municipal Planning Initiatives

1. Municipal governments are responsible for defining a future vision for the growth and management of land uses, and for documenting strategies for addressing local hazards to protect public health, safety and welfare. Two municipal tools that guide local planning and emergency management are the Comprehensive Plan and the Hazard Mitigation Plan.
2. A local Comprehensive Plan is 20-year "blueprint" for a municipality that defines aspirations for growth and strategies for implementing projects that support the vision outlined in the plan.³ In the 2012 update to Rhode Island's Comprehensive Planning and Land Use Act, section § 45-22.2-6(10) added a requirement for Comprehensive Plans to address natural hazards, including, "...the effects of sea-level rise, flooding, storm damage, drought, or other natural hazards." Local Comprehensive Plans are prepared by each municipality in coordination with the state's Division of Planning/Statewide Planning Program.
3. The 2014 Rhode Island State Hazard Mitigation Plan states its vision as, "Rhode Island is resilient to natural hazards and climate change."⁴ and states as one of its goals, "Local communities address natural hazards and long-term risk reduction in local decision making and planning." Local hazard mitigation plans are prepared by each municipality in coordination with the Rhode Island Emergency Management Agency.

² Moody's Investors Service. 2017. "Environmental Risks -- Evaluating the impact of climate change on US state and local issuers." https://www.moody.com/research/Moody-Climate-change-is-forecast-to-heighten-US-exposure-to-PR_376056

³ RI Statewide Planning Program. 2015. *Comprehensive Planning Guidance Handbook #1: The Comprehensive Plan 101*. http://www.planning.ri.gov/documents/comp_handbook/1_CompPlan101.pdf

⁴ RI Emergency Management Agency. 2014. *Rhode Island Hazard Mitigation Plan Update*.

http://www.riema.ri.gov/resources/emergencymanager/mitigation/documents/RI%20HMP_2014_FINAL.pdf

6.4.1 Model Process for Coastal Risk Assessment and Local Comprehensive Plans

1. In 2014, the RI Statewide Planning Program worked with the University of Rhode Island’s Coastal Resources Center to develop a pilot project for the town of North Kingstown focused on adaptation to future sea level rise conditions.⁵ This document analyzed parcels within 12 sub-areas of the town within a one, three, and five-foot sea level rise scenario, and went on to identify adaptation strategies for 18 different sectors of the town that corresponded to different sections of the Comprehensive Plan. This pilot project formed the basis of a statewide “model process” for coastal risk assessment that other coastal communities in Rhode Island could follow to address the “Natural Hazards” requirement in their Comprehensive Plan.

2. In 2015, RI Statewide Planning and the URI Coastal Resources Center produced, *“Resilient Communities: Natural Hazards & Climate Change Adaptation, a how-to guide on incorporating natural hazards planning and climate change adaptation into local comprehensive plans.”*⁶ This “model process” document outlined the base information that communities could use to meet the requirement of the 2012 Comprehensive Plan Act update requiring Rhode Island municipalities to include natural hazards and climate change into municipal comprehensive plans.

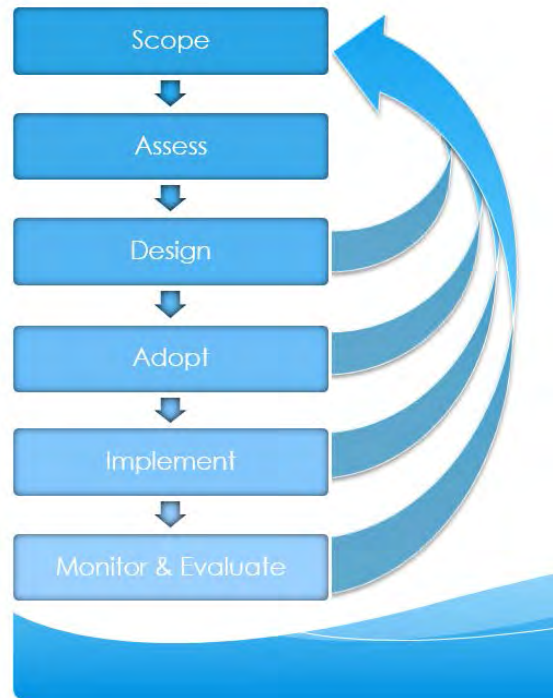


Figure 2. Model process for Community Resilience.

3. Upon completion of the North Kingstown pilot project and the release of the “model process” document described above, RI Statewide Planning then compiled this information with other data and process offered by the RI Emergency Management

⁵ Crean, T., M. Carnevale, P. Rubinoff. 2014. Adaptation to Natural Hazards and Climate Change in North Kingstown, RI. Narragansett, RI. <http://rhody.crc.uri.edu/accnk/sample-page/>

⁶ Crean, T., Carnevale, M. and Rubinoff, P. 2015. Resilient Communities: Natural Hazards & Climate Change Adaptation, a how-to guide on incorporating natural hazards planning and climate change adaptation into local comprehensive plans. University of Rhode Island Coastal Resources Center and Rhode Island Sea Grant College Program, Narragansett, RI. <http://www.beachsamp.org/relatedprojects/>

Agency to produce, “The Rhode Island Comprehensive Planning Standards, Guidance Handbook #12, Planning for Natural Hazards and Climate Change.” This guidance document has been in place since 2016 and is an invaluable resource being used by Rhode Island cities and towns to meet the Natural Hazards requirement of the 2012 Comprehensive Plan Act update. The handbook offers all 39 Rhode Island cities and towns a step-by-step process to consider relevant hazards, exposed and vulnerable resources, assets, populations, a one-stop menu of adaptation strategies that can be applied to their municipality, a strategy to develop priorities for implementation.

4. Since a local Comprehensive Community Plan serves as a 20-year blueprint for a municipality, it is important to consider that, as mentioned throughout this Shoreline Change SAMP document, the science is rapidly changing and the conditions along Rhode Island coast are also rapidly changing. As discussed in Section 6.3 of this chapter, municipalities are encouraged to coordinate closely with CRMC to ensure the best available science and updated tools are being applied to evaluate existing and future risk from coastal hazards. Municipalities also have an opportunity to apply a natural hazards and climate change “lens” to all the elements of a Comprehensive Plan, and consider where the exposed and vulnerable assets valued by the municipality can be protected in the face of future coastal flood risk.
5. Considering that the RI Statewide Planning Comprehensive Plan Guidebook is not being continually updated, municipalities are encouraged to refer to CRMC for the most current data and trends related to shoreline change and coastal hazards in Rhode Island. See Chapter 2 of this Shoreline Change SAMP for more information.
6. Local Comprehensive Community Plans are encouraged to reference the Shoreline Change SAMP process and tools, include a map of the SAMP planning boundary, and recommend that development plans are reviewed based on the CRMC Coastal Hazard Application Guidance.

6.4.2 Local Hazard Mitigation Plans & Community Rating System

1. In order to receive FEMA grant funds per the Disaster Mitigation Act of 2000, municipalities must have an approved local Hazard Mitigation Plan (HMP). HMP’s are written as a 5-year plan that set out policies and actions to prepare for and reduce risk and losses from natural hazards. The HMPs are guided, in part, by a Statewide Hazard Mitigation Plan that is managed and administered by the Rhode Island Emergency Management Agency (RIEMA). RIEMA assists Rhode Island municipalities with development of the local HMPs by offering report templates, funds, and technical

assistance to municipalities by the State Hazard Mitigation Officer (SHMO).

2. The Community Rating System (CRS) program is a voluntary effort administered by FEMA/RIEMA that allows municipalities to offer flood insurance premium reductions across their city or town upon documentation of the municipality meeting or exceeding targets for floodplain management and risk reduction. CRS ratings range from a score of “1” to “9,” and correspond to savings on flood insurance premiums in increments of five percent. For example, a community with a CRS rating of “9” is the first level in the CRS and allows a 5% reduction in flood insurance premiums for all flood insurance policy holders in that municipality, while a CRS rating of “7” means a community has met even more targets to reduce risk and manage floodplains across the municipality, resulting in a 15% reduction in flood insurance premiums for all policy holders.
3. STORMTOOLS, the Coastal Environmental Risk Index (CERI), and the STORMTOOLS Design Elevation (SDE) maps offer methods to document both current and future risk from coastal hazards in the LHMP and CRS programs. Integrating the Shoreline Change SAMP tools into these RIEMA–managed programs can ultimately offer financial benefits that are passed on to taxpayers through grant programs and savings on flood insurance premiums, and tangible implementation actions across the community that protects public health, safety, and welfare by reducing the overall risk profile and threat of losses from coastal hazards.

6.5 Relationship of State Law to CRMC's Coastal Hazard Application Process and Municipal Implementation

1. Rhode Island's cities and towns have authority over several aspects of building and land development in the coastal area that are granted to them by the RI Legislature through enabling legislation. Because of the statewide application of this enabling legislation, the authority to regulate development extends beyond CRMC's jurisdiction but within the Shoreline Change SAMP Boundary (land area inland of CRMC's legal jurisdiction). This presents an opportunity for coastal communities to implement the CRMC's five step Coastal Hazard Application Guidance as a means to educate property owners.
2. Because the enabling legislation described below does apply on a statewide basis, many of the recommendations that are intended to address resiliency and climate change preparedness can be applied outside of the SAMP Boundary and to inland areas of Rhode Island as well, which have their own unique challenges related to changing weather patterns.
3. Considering the CRMC five-step Coastal Hazard Application Guidance, as outlined in Chapter 5, may not be immediately adopted by the municipalities, suggestions of expanding CRMC's jurisdiction to educate property owners within the full expanse of the Shoreline Change SAMP Boundary may be considered desirable by local officials. As mentioned in Section 6.3.4, CRMC does not currently have the statutory authority, nor additional resources to address all future development applications that may be put forward within the Shoreline Change SAMP Project Boundary.

6.5.1 State Building Code, Rhode Island General Laws 23-27.3

1. Municipalities cannot require applicants to build to standards that exceed the State Building Code, but can recommend or suggest voluntary strategies that are allowable but not mandated by the State Building Code. As described in Chapter 3, the Building Code Commission's purpose is to establish minimum building code requirements for the protection of public health, safety, and welfare in the built environment. Building code requirements address coastal hazards in numerous ways; for example, the RI State Building Code incorporates the vast majority of the NFIP floodplain management requirements. Towns in turn use the design standards set by the state building code. For further information please see <http://www.ribcc.ri.gov/>.
2. As mentioned in Chapter 5, Section 23-27.3-100.1.5.5 of the RI State Building

Code defines hurricane, storm, and flood standards:

The state building code standards committee has the authority in consultation with the building code commissioner, to adopt, maintain, amend, and repeal code provisions, which shall be reasonably consistent with recognized and accepted standards and codes, including for existing buildings, for storm and flood resistance. Such code provisions shall, to the extent reasonable and feasible, take into account climatic changes and potential climatic changes and sea level rise. Flood velocity zones may incorporate freeboard calculations adopted by the Coastal Resources Management Council pursuant to its power to formulate standards under the provisions of § 46-23-6.

3. The RI State Building Code lays out requirements for construction of different categories of structures, and outlines details of load requirements to withstand high winds and flooding; lowest floor elevation requirements, including basements; and design parameters to address hydrostatic flood forces in accordance with standards defined by the American Society of Civil Engineers (ASCE). For example, for One and Two Family Dwellings, the RI State Building Code section R322.3.6.1 addresses Flood Hazard Certificates. Certifications for construction in flood hazard areas both with and without high-velocity wave action are defined in the code, and are required to be submitted to municipal building officials.
4. The RI Building Code Commission is the only authority who can change or increase the resiliency requirements of the State Building Code. Municipalities can only encourage or incentivize voluntary actions that surpass the requirements of the building code. Examples could include increased freeboard or application of the FORTIFIED standard, both of which are discussed in more detail in Chapter 7.

6.5.2 Rhode Island Comprehensive Planning and Land Use Act 45-22.2

1. Section § 45-22.2-3 of the Rhode Island General Laws outlines the Comprehensive Planning and Land Use Act that guides municipalities in developing a Comprehensive Community Plan to serve as the 20-year “blueprint” for the municipality as a whole, and serves as the guiding document to which all zoning changes must be consistent.
2. Section 45-22.2-6 outlines the required content of a comprehensive plan, which includes maps illustrating existing conditions, land use, housing density, zoning, roads, water and sewer service areas, cultural resources, open space, and

natural resources, including floodplains. The Comprehensive Plan's featured map illustrates "future land use" and indicates where the municipality envisions its growth and change over the course of the 20-year planning horizon of the plan.

3. In 2012, the Comprehensive Planning and Land Use Act was updated to require that Rhode Island cities and towns address "Natural Hazards" in their municipal Comprehensive Plans. Section 45-22.2-6(b)(10) lists this requirement as:

Natural hazards. The plan must include an identification of areas that could be vulnerable to the effects of sea-level rise, flooding, storm damage, drought, or other natural hazards. Goals, policies, and implementation techniques must be identified that would help to avoid or minimize the effects that natural hazards pose to lives, infrastructure, and property.

4. Section 45-22.2-4. defines "Floodplains" or "flood hazard area" as:
...an area that is subject to a flood from a storm having a one percent (1%) chance of being equaled or exceeded in any given year, as delineated on a community's flood hazard map as approved by the federal emergency management agency pursuant to the National Flood Insurance Act of 1968, as amended (P.L. 90-448), 42 U.S.C. § 4011 et seq.
5. As outlined in this Shoreline Change SAMP, the FEMA floodplain maps for Rhode Island, while still regulatory for purposes of determining flood insurance premiums for policy holders, have been determined to be inaccurate and not appropriate for projecting future risk along the Rhode Island coast. For this reason, as mentioned in Chapter 5, CRMC has developed STORMTOOLS Design Elevation (SDE) maps to illustrate future risk to coastal developments and offer a recommended design elevation for use in design and construction.
6. Considering that stated goals of comprehensive plans in Section 45-22.2 include promotion of suitability of land for use that protects public health 45-22.2-6(c)(1), and encourages use of innovative development regulations that promote suitable land development while protecting valued resources, 45-22.2-6(c)(6), evaluating long-term coastal risk and the exposure of valued resources in the coastal zone is necessary to meet these goals. Through this Shoreline Change SAMP, and the associated mapping tools offered through STORMTOOLS, the Coastal Environmental Risk Index (CERI) (where available), and the SDE maps, local comprehensive plans are now able to appropriately document this risk and

indicate through the Future Land Use Map how the municipality might adjust land use patterns within the Shoreline Change SAMP Planning Boundary.

6.5.3 Zoning Ordinances, Rhode Island General Laws 45-24

1. The Rhode Island Zoning Enabling Act of 1991 requires that zoning ordinances for each municipality be consistent with the adopted Comprehensive Community Plan (see 6.2.2). Zoning ordinances are regulatory and define current and future community needs, enforce standards and procedures for management and protection of natural resources, emphasize current concepts that address emerging demand for land use, and consider economic impacts of proposed changes. (R.I. Gen. Laws §45-24-29)
2. The general purposes of zoning ordinances stated in R.I. Gen. Laws § 45-24-30(a) that are relevant to the Shoreline Change SAMP and present opportunities for municipalities to expand CRMC's Coastal Hazard Application Guidance to municipal jurisdiction beyond CRMC's jurisdiction include:
 - (1) Promoting the **public health, safety, and general welfare**.
 - (2) Providing for a range of uses and intensities of use appropriate to the character of the city or town and reflecting current and **expected future needs**.
 - (3) Providing for orderly growth and development that recognizes:
 - (i) The goals and patterns of land use contained in the **comprehensive plan** of the city or town adopted pursuant to chapter 22.2 of this title;
 - (ii) The **natural characteristics of the land**, including its suitability for use based on soil characteristics, topography, and susceptibility to surface or groundwater pollution;
 - (iii) The **values and dynamic nature of coastal and freshwater ponds, the shoreline, and freshwater and coastal wetlands**;
 - (iv) The **values of unique or valuable natural resources and features**;
 - (v) The availability and capacity of **existing and planned public and/or private services and facilities**;
 - (vi) The need to **shape and balance urban and rural development**; and
 - (vii) The use of **innovative development regulations and techniques**.
 - (4) Providing for the **control, protection, and/or abatement of air, water, groundwater, and**

noise pollution, and soil erosion and sedimentation.

(5) Providing for the **protection of the natural, historic, cultural, and scenic character** of the city or town or areas in the municipality.

(7) Providing for the **protection of public investment** in transportation, water, stormwater management systems, sewage treatment and disposal, solid waste treatment and disposal, schools, recreation, public facilities, open space, and other public requirements.

(10) Promoting **safety from fire, flood, and other natural or unnatural disasters.**

(15) Providing for **procedures for the administration of the zoning ordinance**, including, but not limited to, variances, special-use permits, and, where adopted, procedures for modifications.

3. Considering the purposes listed above, coupled with direct input from municipal planning officials throughout the Shoreline Change SAMP process, amending the purposes of zoning to include resiliency provisions that reflect the best available science related to climate change, storm surge, coastal erosion, sea level rise is encouraged to increase overall resiliency of Rhode Island's coastal communities.
4. As an example, in 2017, R.I. Gen. Laws § 45-24-31 of the Zoning Enabling Act was amended to allow for additional freeboard and height allowances for properties elevating to reduce their flood risk in coastal high hazard areas.

For a vacant parcel of land, building height shall be measured from the average existing grade elevation where the foundation of the structure is proposed. For an existing structure, building height shall be measured from average grade taken from the outermost four (4) corners of the existing foundation. In all cases, building height shall be measured to the top of the highest point of the existing or proposed roof or structure. This distance shall exclude spires, chimneys, flag poles, and the like. For any property or structure located in a Special flood hazard area, as shown on the official FEMA Flood Insurance Rate LC004786/SUB A/2 - Page 3 of 10 1 Maps (FIRMs), where freeboard as defined in this section, is being utilized or proposed, such 2 freeboard area, not to exceed five feet (5'), shall be excluded from the building height calculation.

5. As mentioned in 6.2.3.4 above, CRMC is currently developing STORMTOOLS Design Elevations (SDEs) that will offer a recommended base flood elevation to account for sea level rise when comparing with the base flood elevation in the FEMA FIRMs. Municipalities have the option of sharing the SDEs with property owners as developers submit plans to the cities and towns for review outside of CRMC's jurisdiction. R.I. Gen. Laws § 45-24-47(c) of the Zoning Enabling Act outlines special provisions for land development projects that may

be amended to reflect: (1) “future conditions” as a special provision for land development projects, thus reflecting new data and information available to increase coastal resilience, (2) the guiding principles of the Shoreline Change SAMP, including a requirement to document the SDE in development applications, and (3) relevant resiliency measures to be consistent with the adopted local Comprehensive Plan.

6.5.4 Subdivision of Land, Rhode Island General Laws Chapter 45-23

1. The Rhode Island Land Development and Subdivision Review Enabling Act of 1992 requires that all municipalities: (a) adopt land development and subdivision review regulations; and (b) establish the standard review procedures for local land development and subdivision review and approval that are thorough, orderly, and lead to expeditious processing of development project applications. (R.I. Gen. Laws § 45-23-26.)
2. The following five bullets in R.I. Gen. Laws § 45-23-29, “Legislative findings and intent”, illustrate potential to implement the Shoreline Change SAMP by requiring documentation of future risk consistently among several municipal planning tools to assist municipalities in addressing future risk from coastal hazards:
 - (1) *That the land development and subdivision enabling authority contained in this chapter provide all cities and towns with the ability to adequately address the **present and future needs** of the communities;*
 - (2) *That the land development and subdivision enabling authority contained in this chapter require each city and town to develop land development and subdivision regulations **in accordance with the community comprehensive plan, capital improvement plan, and zoning ordinance** and to ensure the consistency of all local development regulations;*
 - (3) *That **certain local procedures** for review and approval of land development and subdivision **are the same** in every city and town;*
 - (4) *That the local procedure for **integrating the approvals of state regulatory agencies** into the local review and approval process for land development and subdivision is the same in every city and town; and*
 - (5) *That all proposed land developments and subdivisions are **reviewed by local officials**, following a standard process, prior to recording in local land evidence records.*

3. For properties that sit outside of CRMC’s jurisdiction, municipalities can utilize STORMTOOLS to educate property owners on flood risk for proposed developments on one parcel, or for proposals that recommend subdivision of land into two or more lots. Chapter 3, Section 3.2.3.4 also explains that CRMC has developed STORMTOOLS Design Elevations (SDEs) that will offer a recommended base flood elevation to account for sea level rise when comparing with the base flood elevation in the FEMA FIRMs. Municipalities have the option of sharing the SDEs with property owners as developers submit plans to the cities and towns for review. The municipalities can consider several approaches to share the coastal risk profile of a particular development with applicants proposing development outside of CRMC’s jurisdiction:

- a. Replicate CRMC’s proposed five-step process as outlined in Chapter 5 of this Shoreline Change SAMP document, and consider requirements for (1) type of development; (2) procedures for evaluating risk assessment; and (3) design standards; or
- b. Require the developer complete an online assessment developed by the University of Rhode Island, known as a Rapid Property Assessment for Coastal Exposure (Rapid PACE). This tool can be used to compile all state data illustrating coastal risk for individual properties across all 420 miles of Rhode Island’s coastline.

4. Considering that documentation of current and future risks, as stated in R.I. Gen. Laws § 45-23-29 (see 6.5.3.2 above), is an intent of the legislation, the data and tools presented in this Shoreline Change SAMP can be used to revise the “required findings” outlined in R.I. Gen. Laws § 45-23-60 of the Land Development and Subdivision Review Enabling Act of 1992 and offer municipalities clear strategies for requiring applicants to document future risk. The “required findings” for location regulations regarding land development and subdivision review currently include:

(a) All local regulations shall require that for all administrative, minor, and major development applications the approving authorities responsible for land development and subdivision review and approval shall address each of the general purposes stated in § R.I. Gen. Laws § 45-23-30 and make positive findings on the following standard provisions, as part of the proposed project's record prior to approval:

- (1) The proposed development **is consistent with the comprehensive community plan** and/or has satisfactorily addressed the issues where there may be inconsistencies;*
- (2) The proposed development is **in compliance** with the standards and provisions of the*

municipality's zoning ordinance;

*(3) There will be **no significant negative environmental impacts** from the proposed development as shown on the final plan, with all required conditions for approval;*

*(4) The subdivision, as proposed, will **not result in the creation of individual lots with any physical constraints to development** that building on those lots according to pertinent regulations and building standards would be impracticable. (See definition of Buildable lot). Lots with physical constraints to development may be created only if identified as permanent open space or permanently reserved for a public purpose on the approved, recorded plans; and*

*(5) All proposed land developments and all subdivision lots have **adequate and permanent physical access to a public street**. Lot frontage on a public street without physical access shall not be considered in compliance with this requirement.*

*(b) Except for administrative subdivisions, findings of fact must be supported by **legally competent evidence on the record which discloses the nature and character of the observations** upon which the fact finders acted.*

5. To adequately address coastal change as documented throughout this Shoreline Change SAMP, a future amendment to R.I. Gen. Laws § 45-23-60, specifically to sections (a)(4) and (a)(5) stated above, could include documentation of “future conditions” as a required finding. For example, municipalities could consider future conditions that they can enact without changes to current state zoning law when determining considering permanent access to lots, developments, structures, such as prohibiting new public or private streets within defined coastal and riverine Special Flood Hazard Areas (SFHAs).
6. Considering that CRMC’s STORMTOOLS, CERI (where available), and the SDE maps provide more accurate and reliable mapping of the Rhode Island landscape and coastal flooding scenarios – both from twice daily tides from projected sea level rise, and from episodic coastal storm events – documentation of the risk profile of any development within the Beach SAMP Project Boundary would illustrate the risk of various properties within the high-hazard coastal areas, and alert the municipality and any prospective buyers of that property of the risk they are buying into.
7. Strengthening the language regarding the documentation of future risk in the Subdivision Review Act, especially related to preventing or mitigating negative environmental impacts, avoiding areas with physical constraints to development and ensuring permanent physical access, can be applied to all land developments and subdivisions not just those potentially impacted by coastal hazards. These include areas

subjected to inland flooding, high winds and severe erosion.

6.5.5 Highways and Mapped Streets

1. An additional consideration for long-term resilience at the municipal level is the location, management, and long-term maintenance of highways and mapped streets, and their exposure and vulnerability to recurring damage from storms, coastal erosion and sea level rise. The “Highways” and “Mapped Streets” sections of Rhode Island General Laws included below will be important to consider as future risks and associated costs/benefits of capital improvement investments are evaluated.

2. Rhode Island General Laws § 24-8-1.2, “Highways,” defines the establishment of the Rhode Island highway system:

There is hereby established a Rhode Island highway system which shall include state roads and municipal roads. The determination of those roads designated as state roads and those designated as municipal roads shall be based upon a functional classification system, as established by the state planning council.

3. Rhode Island General Laws § 45-23.1, “Towns and Cities,” addresses mapped streets and the establishment of official maps.

*R.I. Gen Laws § 45-23.1-2 (e) The locating, widening, or closing, or the approval of the locating, widening, or closing of streets by the city or town, under provisions of law other than those contained in this chapter, are deemed **to be changes or additions to the official map**, and are subject to all the provisions of this chapter except provisions relating to public hearing and referral to the plan commission.*

4. Rhode Island General Laws Chapter 24-6, “Highways,” addresses Abandonment By Towns:

R.I. Gen Laws § 24-6-3 Damages payable to abutting landowners. – The owners of land abutting upon a highway or driftway in any town shall be entitled, upon the abandonment of the highway or driftway, either wholly or in part, to receive compensation from the town for the damages, if any, sustained by them by reason of the abandonment; and the town council, whenever it abandons the whole or any part of a public highway or driftway, shall at the same time appraise and award the damages.

5. The concern with long term resilience of coastal roads is if a shore-parallel roadway, as seen in many coastal communities throughout Rhode Island (Atlantic Avenue in Westerly, Matunuck Beach Road in South Kingstown, etc.), becomes damaged abruptly from a coastal storm, or over time by sea level rise and gradual erosion, the state and town are responsible for providing access from that roadway to the properties it was designed to serve.

Abandoning these roadways could result in a financial burden to the municipality if they are required to compensate landowners, which could lead to decisions to continue investing funds into roadways in high risk coastal hazard zones that will eventually be inundated on a regular basis from future sea level conditions, or undermined by future coastal erosion. As the expense of the maintenance cost for these roads or the cost to reimburse property owners is expected to place an extra financial burden on communities in the future, a statutory revision that defines and limits community financial exposure related to coastal and other natural hazards will be needed. Additionally, establishing special assessment or tax districts could be evaluated to determine if improvements in high risk or hazard areas can be supported by the property owners in that specific area.

6.5.6 Other Land Use Considerations

1. In addition to suggestions outlined above to strengthen state regulations in support of coastal resilience measures, several other issues and concerns have been raised during the Shoreline Change SAMP process that are worthy of future policy review and consideration:
 - a. **Debris management for properties in coastal high hazard areas with first floor enclosures below the FEMA-designated Base Flood Elevation (BFE).** First floor enclosures that are subject to flooding have the potential to create debris if the first floor enclosure is damaged or flooded during a storm event. Drafting regulations that regulate construction and contents of first floor enclosures below BFE would help minimize damage created by storm-related debris and reduce public expenditures for cleanup and disaster relief.
 - b. **Long-term impacts of structures that are designed to weather future storm events, but are in active erosion areas with shorelines that are projected to migrate inland.** Consideration of future coastal conditions will serve to address land use policy conflicts that may arise when structures along the coast are designed to be more resilient to extreme storm events, but the land around those structures is projected to erode. Stipulations in CRMC assents for future structure removal or relocation in “active erosion” areas, including barriers and beaches on headlands, could be considered for future permit requirements.

6.6 Future Research Needs

6.6.1 Financial Impacts, Incentives, and Cost/Benefit Analyses

1. The Shoreline Change SAMP has created tools for assessing risk across all 420 miles of Rhode Island's coastline. This baseline information of risk exposure can serve as the foundation for municipal cost/benefit analysis to begin assessing feasibility of implementing adaptation measures, some of which are described in Chapter 7 of this document. For example, assessed property values for each municipality have been compiled for all 21 coastal towns during the course of the Shoreline Change SAMP effort. From the assessed value data, a similar exposure assessment can be completed as was done for the e-911 data presented in the CRMC Exposure Assessment described in Section 4.5.1. Analyzing the assessed value of structures in each coastal flooding scenario can illustrate potential implications to a town's tax base and overall municipal finance strategy, and broader economic impacts of coastal hazards at a municipal scale. Defining different scenarios, financial implications, adaptation measures and potential return on investment of implementation strategies can assist cities and towns in sound decision making and wise investment of capital improvement funds.
2. For both regulators and individual property owners, information and decision support tools related to market forces and the potential for enacting financial and other incentives that encourage implementation of resiliency measures are needed. For example, defining tax incentives for property owners who voluntarily implement and document accepted measures to address resiliency, and ensuring those property owners are not penalized with higher property tax after their property is improved and valued at a higher assessment. Additionally, identification of financing strategies for making improvements that can be amortized over a defined period of time could assist property owners in making improvements in the near term to reduce their risk from projected future conditions outlined in this Shoreline Change SAMP.
3. Following resilience initiatives in other flood-prone states and in communities with a high coastal risk profile such as Norfolk, Virginia, will allow decision makers in Rhode Island to evaluate "lessons learned" in other communities and techniques that might be feasible in Rhode Island coastal cities and towns. As mentioned in Section 6.3.8, Moody's Investors Service is considering future risk conditions attributed to climate change when determining municipal bond ratings. A case study like Norfolk, VA where the city's involvement in the "100 Resilient Cities" initiative is helping to assess strategies that could protect the city's bond rating over the long term, could offer

strategies to protect and sustain long term financial stability in Rhode Island's high-risk coastal municipalities.

6.6.2 Municipal Liability

1. The process of adopting the CRMC's Coastal Hazard Application Guidance into the RI Coastal Resources Management Program will require coastal permit applicants to complete and submit a risk assessment for their proposed development that will then be attached to the Council Assent. This initiative will allow CRMC to disclose risk from coastal hazards to those who wish to own and occupy property in high hazard coastal areas, and ensure that the best available science is made available to those property owners.
2. Roger Williams University School of Law produced a technical memorandum⁷ titled "RI CRMC Liability Exposure for Permit Granting in Flood-Risk Areas," summarizing potential for state liability, public duty defense, special duty, and egregious conduct, and presenting examples of case law as "cautionary tales" for wrongful permitting. This type of effort would also assist municipalities in considering their liability for issuing building permits in areas of high coastal risk recently identified by CRMC in their decision support mapping tools, but outside of CRMC's jurisdiction.
3. In December of 2015, a conversation with municipal solicitors was initiated through a one-day event at Roger Williams University that addressed emerging legal issues related to coastal hazards and land use, including municipal liability and takings law, among other topics. Video and presentations from that event can be found on line <https://law.rwu.edu/academics/marine-affairs-institute/research-and-outreach/symposiaconferences/legal-aspects-coastal-adaptation-resilience-ri-dec-2015>
4. Future contributions to Rhode Island's body of knowledge could include national case law monitoring by the Roger Williams School of Law, Marine Affairs Institute and the RI Sea Grant Legal Program.
5. The Conservation Law Foundation's (CLF) 2018 document, "Climate Adaptation and Liability: A Legal Primer and Workshop Summary Report,"⁸ addresses not only government sector liability, but also liability for design and environmental professionals. The workshops held by CLF resulted in recommendations summarized in this document

⁷ Ryan-Henry, J. and D. Esposito. 2014. Technical Memorandum, "RI CRMC Liability Exposure for Permit Granting in Flood-Risk Areas." Roger Williams University. Bristol, RI.

⁸ Moran, D. and E. Mihaly. 2018. *Climate Adaptation and Liability: A Legal Primer and Workshop Summary Report*. Conservation Law Foundation. Boston, MA.

that include continuing dialogue and education among the private-sector design community and regulators at different levels of government, as well as exploration of standards and codes that consider disclosures, incentives, and financing for long-term climate adaptation.

6.6.3 Site Systems and Groundwater Dynamics

1. As outlined at the end of Chapter 4 of this Shoreline Change SAMP document, future research is needed on the effects that sea level rise will have on groundwater. For state permitting and municipal decision making on land development projects, the considerations include saltwater intrusion into drinking water supplies, contaminant mobilization throughout groundwater systems, and reduction of efficiency of on-site wastewater treatment and stormwater management systems.

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