



CLIMATE ADAPTATION AND RESILIENCE CHECKLIST AND GUIDANCE



High Water Mark Initiative for Coastal New Hampshire



Photo: Jav Diener

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CLIMATE ADAPTATION AND RESILIENCE CHECKLIST AND GUIDANCE

High Water Mark Initiative for Coastal New Hampshire

PLANNING FOR CLIMATE CHANGE

In order to effectively adapt in the short-term and long-term, municipalities need help developing and implementing policies and regulations to plan for and minimize the impacts of climate induced changes. Important first steps for coastal municipalities toward adaption and resilience are to:

- ✓ Identify areas at most risk from flooding due to sea-level rise and coastal storms.
- ✓ Incorporate climate change adaptation and resilience strategies in local hazard mitigation plans.
- ✓ Adopt regulations that decrease the vulnerability of buildings and infrastructure in these areas subject to higher risk of flooding, particularly in the next 30 to 50 years.
- ✓ Leverage existing institutional practices - such as master plans, and capital improvement plans – to maximize staff capacity and use of available funds.
- ✓ Implement comprehensive strategies to adapt to changing conditions, prevent or minimize impacts and protect public and private investments.

Planning for climate change can result in positive actions that improve preparedness and reduce impacts from current coastal hazards and address long-term changes that may result from climate change including sea-level rise. Communities that implement climate adaptation planning may see benefits such as:

Enhancing preparedness and community awareness of future flood risks.

Identifying cost-effective measures to protect and adapt to changing conditions.

Improving resiliency of infrastructure, buildings and other community investments.

Protecting life, property and local economies.


Protecting coastal natural resources and the critical services they provide.

Preserving historical assets and unique community character.

CLIMATE ADAPTATION AND RESILIENCE CHECKLIST AND GUIDANCE

The Climate Adaptation and Resilience Checklist was developed to assist coastal municipalities in achieving their climate adaptation and resilience goals in an organized and efficient manner. The Checklist is not a step-by step approach but rather it lays out options that can be implemented in combination, in any sequence appropriate for local conditions, and in timeframes compatible with local capacity to take action. The Checklist may also serve as an inventory or “status report” of accomplishments, future actions needed, and guide coordination among the various stakeholders participating on behalf of the municipality.

The Climate Adaptation and Resilience Guidance is a stepped approach that takes you from getting organized to taking action! Jump in at whatever step your community is at currently working from.



ZONING and REGULATIONS
MUNICIPAL PLANNING
MUNICIPAL POLICY and CAPACITY
ASSET and INFRASTRUCTURE
MANAGEMENT
NATURAL RESOURCE and
ENVIRONMENT
OUTREACH, AWARENESS and
COLLABORATION

CLIMATE ADAPTATION AND RESILIENCE CHECKLIST

HOW TO NAVIGATE THE CHECKLIST

Welcome to the Climate Adaptation and Resilience Checklist.
Let's get started!

The Checklist provides a wide range of strategies to implement climate adaptation and resilience actions that address specific flood impact issues relative to each municipality. Strategies range from regulatory, planning and policy, municipal operations and infrastructure management, natural resources and environment, and community outreach and engagement.

How is the Climate Adaptation and Resilience Checklist useful?

The Checklist serves as a tool to track implementation progress over time. The Checklist provides a wide range of strategies to implement climate adaptation and resilience actions that address specific flood impact issues relative to each municipality.

Who can use the Climate Adaptation and Resilience Checklist?

The Checklist can be used by any municipality or other organization that wishes to identify and prioritize climate adaptation and resilience actions, and inform development of an implementation plan to achieve their priorities.

How can the Climate Adaptation and Resilience Checklist be used?

The Checklist can be used collaboratively by multiple stakeholders. For example, two or more municipalities or stakeholder groups may wish to collaborate on a specific geography such as a watershed, estuary or river corridor; focus on asset specific strategies such as infrastructure management; or a resource based approach such as living shorelines. The Checklist can provide a unified approach for such collaboration at both temporal and spatial scales.

The Climate Adaptation and Resilience Checklist and other High Water Mark Initiative for Coastal New Hampshire resources are available on the RPC website at <http://www.rpc-nh.org/highwatermarknh>.

CLIMATE ADAPTATION AND RESILIENCE CHECKLIST

A. ZONING AND REGULATIONS

<p>1. FLOODPLAIN STANDARDS</p>	<ul style="list-style-type: none"> a. Adopt floodplain standards beyond the minimum FEMA requirements and consider or sea level rise projections such as mandatory (1-2 feet) freeboard (elevation above the base flood or 100-year/1% storm flood) for new construction and substantial improvements. b. For critical facilities or high cost infrastructure projects with long lifecycles, require up to 4 feet elevation above base flood elevation and encourage the facility design to be adaptable to even higher elevations. c. Prohibit or limit floodplain development (i.e. density, scale, loss of flood storage) through regulatory and/or incentive-based measures. d. Require and maintain FEMA elevation certificates for all pre-FIRM, post-FIRM and new and improved buildings in the floodplain. e. Apply open space requirements for development to floodplains to preserve flood storage areas, and track acreage preserved.
<p>2. COASTAL FLOOD HAZARD OVERLAY DISTRICTS</p>	<ul style="list-style-type: none"> a. Identify high-risk flood areas that are already subject to flooding from sea-level rise or storm surge or projected to flood in the future. b. Adopt a Coastal Flood Hazard Overlay District (zoning ordinance) that includes performance based standards that protect against flood impacts from sea-level rise and coastal storm surge. Establish the overlay district boundaries based on current flood hazard areas on FEMA Flood Insurance Rate Maps and projected future high-risk flood areas mapped by local vulnerability assessment. c. Evaluate utility of adopting a Coastal Resilience Incentive Zone (CRIZ) under RSA 79-E which allows use of tax abatement incentives to encourage property owners to improve their property to reduce impacts from storm surge, sea-level rise and extreme precipitation.
<p>3. STORMWATER MANAGEMENT</p>	<ul style="list-style-type: none"> a. Adopt comprehensive stormwater management standards for all new and redevelopment. b. Design to retain or reduce natural runoff or zero discharge of runoff. c. Collect runoff for use as reclaimed water. d. Reduce volume of runoff generated from developed sites using techniques such as Low Impact Development and green infrastructure. e. Link flood hazard mitigation objectives with EPA Stormwater Phase II and MS4 permit requirements. f. Adopt a community-wide stormwater management plan. g. Implement an inspection and enforcement program to help ensure proper function and continued integrity of private stormwater management facilities.
<p>4. SITE DESIGN STANDARDS, DIMENSIONAL REQUIREMENTS AND BUILDING CODES</p>	<ul style="list-style-type: none"> a. Retain trees and natural vegetation in flood hazards areas. b. Adopt ASCE 24-05 Flood Resistant Design and Construction (a referenced standard in the International Building Code) that specifies minimum requirements and expected performance design and construction in flood hazard areas. c. Adjust maximum building height requirements to accommodate elevation of structures above the base flood elevation or sea level rise projection. d. Adopt “freeboard” requirements (feet above base flood elevation or sea level rise projection) in the flood damage ordinance. e. Prohibit first floor enclosures below base flood elevation or sea level rise projection for all structures in flood hazard areas. f. Require standard tie-downs of fuel tanks.
<p>5. WATER RESOURCE PROTECTION</p>	<ul style="list-style-type: none"> a. Infiltrate treated stormwater runoff to recharge groundwater, aquifers and surface waters b. Adopt stormwater management standards that require groundwater recharge and reuse of runoff after water quality treatment. c. Adopt standards that protect and maintain the functions of natural/living shorelines. d. Adopt an Aquifer Protection Overlay District containing water quality performance standards.
<p>6. BUFFERS AND SETBACKS</p>	<ul style="list-style-type: none"> a. Require buffers to preserve flood storage areas adjacent to surface waters and wetlands. b. Require development setbacks to protect against flooding and erosion. Setbacks can be based on erosion rates/trends, sea level rise projections, 500-year floodplain and fluvial erosion hazard zones.

B. MUNICIPAL PLANNING

<p>7. INTEGRATION WITH SECTOR PLANNING</p>	<p>Integrate climate mitigation actions across all sectors of planning, transportation, land development and infrastructure projects.</p> <ul style="list-style-type: none"> a. Attain reduction in vehicle miles travelled and overall greenhouse gas emissions in the region. b. Protect areas that serve as carbon storage such as forests, wetlands and other natural landscapes. c. Facilitate increase in use of low-carbon energy sources and installation and use of renewable energy sources. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>With respect to climate change, mitigation is the reduction of greenhouse gas (GHG) emissions achieved through energy efficiency and conservation, use of renewable and alternative energy sources, and CO₂ storage in forests and biomass.</p> </div>
<p>8. MASTER PLANS</p>	<ul style="list-style-type: none"> a. Adopt a Coastal Hazards and Climate Change Chapter in the Master Plan. b. Insert specific adaptation recommendations in other parts of the master plan for municipal facilities, transportation and natural resources.
<p>9. HAZARD MITIGATION PLANS</p>	<ul style="list-style-type: none"> a. Incorporate the vulnerability assessment information and recommendations from the Tides to Storms or Climate Risk in the Seacoast Vulnerability Assessments in municipal Natural Hazards Mitigation Plan updates. Continue revising and updating the assessment information and climate adaptation recommendations in future updates of the Plan.
<p>10. OPEN SPACE, LAND CONSERVATION</p>	<ul style="list-style-type: none"> a. Incorporate climate change strategies in hazard mitigations plans, open space and land conservation plans, zoning ordinances and land development regulations. b. Implement climate change actions and adaptation strategies including adoption of policy, planning and regulatory measures. c. Support comprehensive land use planning, environmental planning and floodplain management that prevents and minimizes impacts.
<p>11. FEMA COMMUNITY RATING SYSTEM AND NATIONAL FLOOD INSURANCE PROGRAM</p>	<ul style="list-style-type: none"> a. Participate in the FEMA’s Community Rating System (CRS). [First evaluate readiness and need in the community to participate in the CRS.] b. Support implementation of climate adaptation actions that will increase its rating in the CRS program or if not in the CRS program will reduce flood risk and impacts. Climate adaptation implementation includes planning and policy, regulatory, non-regulatory, and community outreach and engagement activities. c. Conduct National Flood Insurance Program (NFIP) workshops to provide information and identify incentives for property owners to acquire flood insurance. d. Designate a floodplain manager and/or CRS coordinator with Certified Floodplain Manager certification. <p>Note: All municipalities in Rockingham and Strafford Counties participate in the NFIP.</p>
<p>12. EMERGENCY RESPONSE, EVACUATION AND RECOVERY PLANS</p>	<ul style="list-style-type: none"> a. Prepare evacuation plans and coordinate these plans with towns in the coastal region to implement timely and comprehensive planning and notification for coastal storm events. Mark evacuation routes with signage and communicate these routes to the public with information on the town’s website and printed maps.
<p>13. ASSESSMENTS</p>	<ul style="list-style-type: none"> a. Track cumulative impacts from flood events (high water marks, stormwater flooding, infrastructure damage, repetitive loss). b. Complete a hydrologic watershed based analysis of culverts, crossings and drainage infrastructure (based on buildout and climate change conditions).
<p>14. FUNDING MECHANISMS AND PLANS</p>	<ul style="list-style-type: none"> a. Use taxes, bonds and/or block grants to support a regulatory system of floodplain and infrastructure management and improvements. b. Use impact fees from development to help fund public projects including new and upgraded infrastructure. c. Create special tax districts to finance maintenance and improvements to drainage systems and capital improvements in high hazard areas. d. Create a community-wide stormwater utility to finance maintenance and improvements to drainage systems.

C. MUNICIPAL POLICY AND CAPACITY BUILDING

<p>15. MUNICIPAL CAPACITY</p>	<p>Strengthen municipal capacity to understand risks and vulnerability to potential future impacts of climate change.</p> <ol style="list-style-type: none"> Obtain technical assistance with application of assessments, data and science-based guidance about climate change planning and climate adaptation strategies. Partner with federal and state agencies, regional partners and local organizations to apply for funding and technical support. Partner with federal and state agencies, regional partners and local organizations to expand resources and improve coordination. Support implementation of state, regional and local research, assessments and initiatives that fill gaps in climate change data, resources and tools. Municipalities commit resources and capacity to plan for climate change. Provide training opportunities for officials, staff, boards and commissions about climate adaptation and resilience options and certifications that will enhance municipal functions (e.g. certified floodplain manager, building codes, shoreline management).
<p>16. FUNDING MECHANISMS AND PLANS</p>	<ol style="list-style-type: none"> Use taxes, bonds and/or block grants to support a regulatory system of floodplain and infrastructure management and improvements. Use impact fees from development to help fund public projects including new and upgraded infrastructure. Create special tax districts to finance maintenance and improvements to drainage systems and capital improvements in high hazard areas. Create a community-wide stormwater utility to finance maintenance and improvements to drainage systems.

D. ASSET AND INFRASTRUCTURE MANAGEMENT

<p>17. INFRASTRUCTURE PLANS (ROADS, UTILITIES, DRAINAGE, BUILDINGS, WASTEWATER)</p>	<ol style="list-style-type: none"> Conduct regular inspections and maintenance of drainage systems and flood control structures to ensure proper function. Elevate structures with the lowest floor including the basement raised above the base flood elevation or sea level rise projection. Small berms or floodwalls can also be constructed. Relocate utilities and other electrical/mechanical systems above the base flood elevation or sea level rise projection. Install back-up generators for electrical systems. Flood proof (wet and dry) buildings containing critical materials and equipment. Elevate roads and bridges to accommodate flood levels (e.g. the 100-year and 500-year storm or projected sea levels).
<p>18. CAPITAL IMPROVEMENT PLANS</p>	<ol style="list-style-type: none"> Incorporate consideration of impacts from sea-level rise and coastal storm surge flooding in current and future capital infrastructure projects. Incorporate the local vulnerability assessment information into infrastructure management plans and capital improvement plans. Evaluate the extent of sea-level rise and storm surge flooding on individual municipal facilities (e.g. wastewater treatment plant, transfer station, high school, drinking water systems). Periodically revise strategies to respond to existing and projected conditions.
<p>19. DRINKING WATER MANAGEMENT PLANS</p>	<ol style="list-style-type: none"> Incorporate iterative management strategies, infrastructure improvements, and public education and conservation programs to minimize impacts from natural hazards and climate change. Implement a Drinking Water Resources Management Plan that focuses on managing volume, sources, quality, drought conditions, maintaining/increasing recharge, and conservation measures.
<p>20. REMOVAL/RELOCATION OF STRUCTURES</p>	<ol style="list-style-type: none"> Municipalities may remove municipal structures from high hazard areas subject to flooding and erosion to minimize future loss and damage by relocating structures to more secure locations. Incentivize managed retreat of private structures in high hazard areas subject to flooding and erosion (e.g. property improvement loan program, property buyout program, transfer of develop rights). Use land conservation as a tool for implementing adaptation reuse of properties or facilitate managed retreat.

E. NATURAL RESOURCE AND ENVIRONMENTAL SERVICES MANAGEMENT

<p>21. WATER RESOURCE PROTECTION</p>	<ul style="list-style-type: none"> a. Adopt watershed-based plans that apply iterative water management strategies, water protection actions, and public education and conservation programs to minimize impacts from natural hazards and climate change. b. Implement a community wide public outreach program about water quality protection. c. Implement a water quality testing program for surface waters and water bodies. d. Encourage water quality testing for private wells and water supplies.
<p>22. OPEN SPACE AND LAND CONSERVATION</p>	<ul style="list-style-type: none"> a. Adopt open space and land conservation plans that protect resources and environmental services while minimizing impacts from natural hazards and climate change. b. Include land acquisition, reuse and preservation in high hazard/risk areas. c. Secure conservation easements for land in high hazard/risk areas. d. Adopt a targeted scoring framework or incorporate new scoring criteria into existing land conservation prioritization efforts that consider climate adaptation benefits when evaluating land for conservation purposes. e. Increase funding and resources for land conservation, land management programs, and land stewardship activities. (Note: Land conservation scores very high as an activity in the FEMA Community Rating System program.) f. Support retreat from high risk areas by buying properties and restoring them to a natural condition.
<p>23. HABITAT AND RESOURCE PROTECTION</p>	<ul style="list-style-type: none"> a. Adopt habitat protection plans that protect critical habitats and lands while minimizing impacts from natural hazards and climate change. b. Identify and inventory lands where protection of tidal and freshwater wetlands would provide tangible benefits to protect against flooding, and restoration opportunities to remove barriers to tidal function and marsh and migration. [This inventory will allow the town to pre-identify and prioritize sites that can be permanently preserved as a mitigation strategy for wetland impacts from development in high risk coastal areas.]
<p>24. ENVIRONMENTAL SERVICES MANAGEMENT</p>	<ul style="list-style-type: none"> a. Adopt plans that protect ecosystem services provided by natural resources such as flood storage, recreation, tourism, commercial fish and shellfish. b. Implement restoration projects to enhance shorelines, dunes and wetlands. c. Quantify and monetize ecosystem services and track when they are improved or diminished.
<p>25. INTEGRATION WITH BUILT SYSTEMS/SOCIAL, CULTURAL, HISTORICAL RESOURCES</p>	<p>Integrate protection of natural with constructed systems, social services, and historic and cultural resources into engineering and regulatory frameworks of shoreline management.</p> <ul style="list-style-type: none"> a. Improve shoreline management to address the intensifying challenges posed by climate change, including management of development in high risk areas. b. Improve shoreline management to include measures that minimize coastal and floodplain erosion, and loss of natural resources that protect against flooding. c. Retain and expand dunes, beaches, wetlands, forests and natural vegetation to protect against coastal and riverine flooding. d. Discourage hardening of shorelines in favor of protecting existing natural shorelines and restoring them when feasible. e. Apply hard and engineered shoreline techniques only to protect essential infrastructure and evaluate the benefit to cost of maintaining these techniques in the future.
<p>26. COASTAL BUFFERS AND SETBACKS</p>	<ul style="list-style-type: none"> a. Adopt coastal (no-disturb) buffer zones and structural setbacks that adequately separate development and infrastructure from tidal wetlands, freshwater wetlands and surface waters to sustain flood storage capacity, and allow for inland migration of tidal marsh systems and conversion of freshwater systems to tidal systems to accommodate projected changes in sea-levels. b. Require a larger percentage of open space preservation and less impervious coverage in high risk areas.
<p>27. LIVING SHORELINES</p>	<ul style="list-style-type: none"> a. Maintain natural shorelines AS an effective way to preserve the functions of shoreline systems (marshes, dunes, estuaries) in providing valuable services including flood storage, recreational areas, and commercial harvesting of fish and shellfish. b. Provide information to property owners about living shorelines and the importance of retaining the functions of natural shorelines, and implementing landscaping best practices. c. Implement living shorelines projects on town lands to demonstrate best practices, and the benefits and effectiveness of living shorelines approaches.

F. OUTREACH, AWARENESS, COLLABORATION

<p>28. STEWARDSHIP PROGRAMS</p>	<p>a. Encourage voluntary conservation easements on land in riverine and coastal floodplains. b. Organize a volunteer program to provide professional ad-hoc services as needed such as event speakers, project managers, communications specialists, graphic designers, and writers.</p>
<p>29. DEMONSTRATION PROJECTS</p>	<p>a. Install demonstration projects on municipal lands and buildings to inform the public about flood protection and climate adaptation strategies (e.g. schools, libraries or town hall). b. Implement demonstration projects on private property such as in a neighborhood or targeting a problem area such as eroding shoreline, buffer plantings, or stormwater management.</p>
<p>30. INFORMATIONAL MATERIALS AND EVENTS</p>	<p>a. Encourage homeowners in high hazard/risk areas to purchase flood insurance. b. Distribute flood safety informational materials to home owners in high-risk and flood prone areas. c. Educate residents and businesses about natural hazard preparedness and safety planning, flood-proofing and elevating buildings, and elevating electric systems and utilities above the base flood elevation.</p>
<p>31. COMMUNITY AWARENESS</p>	<p>a. Implement outreach and engagement measures to raise community-based awareness about climate change. b. Work with community partners to promote and encourage land and resource conservation in high risk areas such as coastal and riverine floodplains and to protect surface and groundwater resources. c. State, regional and municipal decision-makers work together to protect critical services and the health and safety of the public. d. Disseminate climate change informational resources through RPC staff and circuit riders, website, Commission meetings and other partners. e. Educate municipalities and property owners regarding options for protecting properties from flooding and erosion.</p>
<p>32. COLLABORATIVE CLIMATE-BASED WORKGROUPS</p>	<p>Support the NH Coastal Adaptation Workgroup and other regional and statewide climate adaptation initiatives.</p> <p>a. Partner with the NH Coastal Adaptation Workgroup and its members to apply for funding and technical support for climate change initiatives. b. Form collaborative partnerships and networks of professionals, practitioners, and researchers that provide technical assistance and build capacity for municipal actions. c. Continue the partnerships with NH Coastal Adaptation Workgroup in climate adaptation activities that facilitate, coordinate, provide technical information, and convene public outreach events.</p> <p>Support initiatives of the Seabrook-Hamptons Estuaries Alliance.</p> <p>a. Partner with SHEA and the NH Coastal Adaptation Workgroup in climate adaptation activities that facilitate, coordinate, provide technical information, and convene public outreach events for the Estuary towns.</p>
<p>33. ADVISORY, GUIDANCE MAPS</p>	<p>a. Use the Coastal Flood Hazard Overlay Maps as a tool to inform property owners of existing and future risks and hazards based on projected sea-level rise and coastal storm surge flooding.</p>



GET ORGANIZED
KNOW YOUR HAZARDS
ASSESS RISK and VULNERABILITY
INVESTIGATE OPTIONS
PRIORITIZE and PLAN
TAKE ACTION

CLIMATE ADAPTATION AND RESILIENCE GUIDANCE: HOW TO DEVELOP SUCCESSFUL IMPLEMENTATION

HOW TO NAVIGATE THE GUIDANCE

Welcome to the Climate Adaptation and Resilience Guidance. Let's get started!

The Guidance is organized in 5 sections designed to guide municipal adaptation and resilience planning from getting organized to taking action. Through a stepped process of information gathering, evaluation and prioritization, a coordinated action plan emerges focused on the risk reduction benefits of incorporating adaptation and resilience action into local planning.

How is the Climate Adaptation and Resilience Guidance useful?

The Guidance lays out a fact finding and decision making framework for building organizational capacity, identifying key assets and resources at risk, and prioritizing actions based on local needs and considerations.

The Guidance is scalable to a geographic area of interest, complexity of assessment, and implementation timeframe. The framework can be utilized to develop individual asset or resource based plans or coordinated place-based plans that incorporated multiple assets and resources.

Who can use the Climate Adaptation and Resilience Guidance?

The Guidance is designed for municipal decision makers or other stakeholder groups and organizations focused on creating a well-informed achievable plan to address the impacts of climate change by weaving adaptation and resilience actions into day to day operations, management, policies, and plans. The Guidance is flexible such that a municipality can start at whatever step is suitable for them, recognizing that some municipalities are farther along than others in climate adaptation and resilience implementation.

For municipalities and other users who have already completed some of the steps in the Guidance, it might be helpful to revisit and document information and decisions made previously then complete the remaining steps.

The Climate Adaptation and Resilience Checklist and other High Water Mark Initiative for Coastal New Hampshire resources are available on the RPC website at <http://www.rpc-nh.org/highwatermarknh>.

GET ORGANIZED

GOAL: The working group commits to a regular meeting schedule, and to develop meeting agendas, keep minutes, and make materials and information accessible.

Identify local decision makers and municipal staff responsible for infrastructure management, emergency response, land development oversight, and natural resource management and protection.

Identify key stakeholders in the community who have demonstrated ability to mobilize and act, and have the expertise needed to develop plans and implement priority actions.

Identify outside technical service providers for science based expertise, community outreach and engagement, and planning, regulatory and policy assistance.

Convene an Adaptation and Resilience Working Group dedicated to addressing climate adaptation and resilience in the community.

To ensure the broad support necessary to implement an adaptation and resilience program, recruit a comprehensive group of stakeholders to convene an Adaptation and Resilience Working Group. All the individuals and organizations that could be affected by the issues identified or implement strategies to address them are potential stakeholders. To move forward most efficiently, focus on involving the groups and individuals who are willing to accept responsibility and have dedicated resources to address the issues and implement strategies. **When inviting individuals to participate in the Adaptation and Resilience Working Group, be sure to focus on and keep in mind the common values and shared interests of all potential stakeholders particularly when making decisions or setting priorities.**

Dedicate an accessible communication platform to archive materials and disseminate information about Adaptation and Resilience Working Group actions and initiatives.

KNOW YOUR HAZARDS

GOAL: Identify hazards and evaluate where extreme weather and climate change represent a hazard to key assets and resources.

Inventory past hazards including freshwater flooding, storm events and seasonal highest tides.

Review local Hazard Mitigation Plans, Emergency Response Plans and FEMA Flood Insurance Rate Maps.

Identify areas at high risk of flooding from tides, extreme precipitation and storm surge.

Reference previous assessments such as the Tides to Storms (2015) at <http://www.rpc-nh.org/regional-community-planning/climate-change/tides-storms> and Coastal Risk in the Seacoast (2017) Vulnerability Assessments at <http://www.rpc-nh.org/regional-community-planning/climate-change/crise>.

Reference best available regional climate science on current climate change trends and future projections to identify current and future areas of high risk for flooding, erosion and tidal inundation.

Reference the NH Coastal Risk and Hazards Commission report (2016) at <http://www.rpc-nh.org/regional-community-planning/climate-change/tides-storms> and Science and Technical Advisory Panel Report (2015). <http://www.nhcrhc.org/>

Inventory key assets and resources located in high risk areas identified by vulnerability assessments.

ASSESS RISK and VULNERABILITY

GOAL: Evaluate risk and vulnerability of key assets and resources to extreme weather and climate change related hazards.

Rank critical assets and resources based on criteria that reflects local values and priorities.

Selected criteria may include critical service facilities, importance to emergency management, level of existing/future financial investment, flood attenuation function(s), economic value, ecosystem services, sensitive/rare habitat, and natural resource value.

Identify non-climate “stressors” and evaluate how these stressors exacerbate climate related hazards.

Conditions that exacerbate hazards and promote damage are called stressors, and they come from both climate and non-climate sources. Non-climate **stressors** may include changes in land cover and impervious surface (e.g. land development), disruption of natural drainage patterns, construction projects that alter traffic pattern and/or volume, and decreased infrastructure function or condition. Identify whether non-climate stressors are increasing, remaining the same, or decreasing in your frequency or extent.

Identify potential tipping points and assess when and where irreversible changes or loss of key assets and resources could occur.

One consideration in the decision is how close each asset may be to a *tipping point*—a point when incremental change in a system results in a new, irreversible response. Some people refer to tipping points as critical thresholds. Describe situations that could represent tipping points for any one or combinations of assets and resources. If possible, give some indication of the probability for reaching a tipping point.

Look back to the potential or historical consequences you identified for each asset-hazard pair. In some cases, the consequence you described might be considered a tipping point. Looming tipping points aren't the only factor groups need to consider when deciding which assets to protect, but the potential for a large change in the system can elevate the level of concern for those assets.

Categorize the sensitivity and adaptive capacity of key assets and resources as high, medium, or low.

Sensitivity is the degree to which a population or asset is susceptible or resistant to impacts or disruption from extreme weather, climate related events and non-climate stressors.

Describe and categorize the adaptive capacity of assets and resources or their ability to cope with stress or adjust to new conditions.

Determine overall vulnerability of key assets and resources.

Consider both vulnerability to existing and future climate related impacts and sensitivity of assets and resources to non-climate stressors. Assign vulnerability ratings to each key asset and resource. In general, vulnerability will be high when sensitivity is high and adaptive capacity is low, or the potential for reaching a tipping point is high. Conversely, assets with low sensitivity and high adaptive capacity have low vulnerability.

Characterize the risk from climate related impacts to the most vulnerable key assets and resources.

To characterize **risk**, estimate the **probability** of a loss, and the **magnitude** of the (potential) loss, financial and otherwise. These are the two distinct elements of risk.

Prioritize key assets and resources for sustained investment, protection and management.

Identify asset/resource specific actions necessary to achieve this.

INVESTIGATE OPTIONS

GOAL: Compile a list of strategies the Adaptation and Resilience Working Group is willing to support.

Consider possible strategies to address highest priority key assets, infrastructure, and natural resources.

Analyzing past events can be an efficient way to identify potential solutions: working backwards from a negative impact, look for any points in the process at which an intervention could have improved the outcome.

Review existing operations, management, policies, and plans for opportunities to incorporate adaptation and resilience actions into day to day activities.

Reference successful examples of asset and resource specific strategies used by others.

Explore case studies and adaptation planning resources.

Leverage successes to gain funding and support for next steps and even larger initiatives.

Prioritize identified strategies based on feasibility, cost, benefit and risk reduction.

PRIORITIZE, PLAN and COLLABORATE

GOAL: Compile an action and implementation plan the Adaptation and Resilience Working Group is committed to achieving.

Compile strategies to create an action and implementation plan.

The Plan can be based on specific assets and resources and/or placed based action plans that combine actions related to multiple goals, assets and resources.

Assign a lead for implementation, implementation cost, staff and/or training needs, outside funding, and technical assistance needs.

Rank the expected value of each action. Note the feasibility, benefits, and capacity to accomplish each action and **note when added investment(s) will reduce risk. Evaluate trade-offs given finite resources and capacity.**

Consolidate actions into a coordinated plan.

Combine similar actions and sequence them to reduce costs and estimate risk reduction over time. Designate a local lead to coordinate implementation particularly if several individuals or groups are responsible for implementation.

Identify specific asset and resource based project action plans.

Prepare short-term action plans that focus on a single goal or address multiple assets or resource based goals. Develop a timeline and milestones to mark implementation tasks and mark progress.

Collaborate with others doing similar work.

Collaborate with neighboring municipalities or those that share critical resources such as transportation networks, natural resources or utilities (water and wastewater services). Take advantage of your collective capacity to enhance implementation and bring valuable resources and expertise to the table.

TAKE ACTION

GOAL: Action plans are implemented by the Adaptation and Resilience Working Group and shared with the community.

Implement the Plan

Ensure that you've communicated the intended outcomes of your actions clearly and broadly, and then get started implementing your plan. Acknowledge the stakeholders who are stepping forward to implement climate adaptation and resilience. Generate additional support by involving civic groups or local champions who support your efforts.

Monitor Results

Measure the effectiveness of each step/task and make any adjustments necessary before moving to the next phase. Report periodically on implementation progress.

Actively seek input and feedback to check if the actions taken are yielding the envisioned/desired benefits. Showcase early successes to show the public and other stakeholders the benefits of adaptation and resilience.

Document any less-than-optimal results and address them by modifying approaches or identifying new approaches or strategies.

Pay attention to external factors such as reduced funding sources, staff changes, or shifts in local political will that could impact implementation or outcomes.

Iterate and Adjust as Needed

Watch for opportunities to improve or repeat successful actions. If actions aren't producing the desired outcome, consider modifying approaches or making amendments to the plan. Review your options, re-evaluate benefits and costs, and then decide what additional or different actions will help correct the course.

Share Your Stories

Document how implementation of your plan increasing climate adaptation and resilience in the community and share this information broadly.

Through the implementation process, the Adaptation and Resilience Working Group likely learned valuable lessons about successful and less than successful strategies. Others can benefit from these experiences. Consider submitting a case study for publication on a climate adaptation website or sharing your experience in a report or newsletter.

Climate Adaptation

Climate adaptation refers to adjustments in ecological, social, or economic systems in response to actual or expected climatic change and their effects or impacts. It refers to changes in processes, practices and infrastructures to moderate potential damages or to benefit from opportunities associated with climate change. ¹. Climate adaptation is often described as actions in three main categories.

Accommodate

Managing risk by requiring development to be built and retrofitted to be more resilient to impacts and by limiting certain types or all development in highest risk areas, favoring adaptive uses (passive uses such as recreation) and gradual modification of structures and uses as conditions change.

Protect

Actions focused partly on hard and soft-engineered solutions to prevent impacts from flooding, storm surge and erosion. Protection may include preservation strategies such as restoration and/or maintenance of natural dune systems and "living shorelines", and beach nourishment.

Retreat

Often the last action before abandonment, retreat focuses on planning for the eventual relocation of structures to upland areas as properties become threatened or directly impacted by rising sea level, erosion and coastal storms. Such actions may include rolling setbacks, buffers, transfer of development rights, and property acquisition and/or buyout programs.

¹ United Nations Framework Conference on Climate Change at <http://unfccc.int/focus/adaptation/items/6999.php>

Reference Documents

Climate Preparedness and Resiliency Checklist prepared by Boston Planning & Development Agency and Boston Environment Department <http://www.bostonplans.org/getattachment/5d668310-ffd1-4104-98fa-eef30424a9b3>

FEMA Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards (2013) and the Georgetown Climate Center Sea Level Rise Toolkit (2011).

Tides to Storms Regional Vulnerability Assessment, Rockingham Planning Commission (2015) <http://www.rpc-nh.org/regional-community-planning/climate-change/tides-storms>

NH Coastal Risk and Hazards Commission report (2016) at <http://www.rpc-nh.org/regional-community-planning/climate-change/tides-storms> and Science and Technical Advisory Panel Report (2015). <http://www.nhcrhc.org/>