NATURAL HAZARDS & CLIMATE CHANGE

Introduction

The Natural Hazards and Climate Change element identifies Bristol's primary natural hazard risks, summarizes existing conditions and vulnerabilities, and establishes goals, policies, and actions to guide long-term land use decisions, infrastructure investment, and hazard mitigation efforts. This element builds upon the Town's Hazard Mitigation Plan, state and regional vulnerability assessments, and public input to support coordinated decision-making aimed at reducing risk to life, property, critical infrastructure, and community assets.

2016 Comprehensive Plan Implementation Progress

Since adoption of the 2016 Comprehensive Plan, the Town of Bristol has made substantial progress in advancing hazard mitigation, flood resilience, and climate-informed planning. Key accomplishments include:

- Historic Resource Vulnerability Assessment: Completion of a study identifying flood-vulnerable buildings within the Bristol Waterfront Historic District, providing a foundation for preservation-sensitive mitigation and adaptation strategies.
- FEMA / SHPO Building-Level Resilience Study: Partnership with FEMA and the Rhode Island State Historic Preservation Office to evaluate nine commercial and public buildings in the downtown historic district and develop building-specific flood mitigation recommendations to inform long-term resilience planning.
- Stormwater and Watershed Planning and Improvements: Completion of multiple grant-funded drainage studies and stormwater retrofit projects within the Silver Creek and Tanyard Brook watersheds to address recurring flooding and water-quality concerns. Implemented projects include:
    - A drainage retrofit for the paved parking area at the Bristol Police Department within the Tanyard Brook watershed;
    - Completion of stormwater management improvements at the Bristol Golf Course;
    - Completion of a parking lot retrofit at the Guiteras School, adjacent to Silver Creek, to reduce runoff and improve water quality.
- Drainage Planning for Future Capital Investment: Completion of a grant-funded drainage planning project at Mt. Hope High School within the Silver Creek watershed, providing a framework for future stormwater improvements and capital investment.
- Regulatory Updates: Amendment of the Subdivision and Development Review Regulations to require the use of Low Impact Development (LID) techniques in all subdivision and land development applications, establishing townwide standards for stormwater management and on-site infiltration.

- Community Rating System (CRS) Participation: Continued participation in FEMA's Community Rating System, achieving a Class 7 rating, reflecting ongoing floodplain management and public information efforts and providing flood insurance premium reductions for Bristol property owners.

Together, these actions demonstrate Bristol's sustained commitment to watershed-based stormwater management, flood risk reduction, and the implementation of low-impact and nature-based solutions through both regulatory tools and targeted capital projects.

Goals and Policies

NH-1. Minimize the impacts of natural hazards on the Bristol community by reducing risk to life, property, critical infrastructure, historic resources, and economic activity from coastal, tidal, and inland flooding and other climate-related hazards, with attention to areas experiencing recurring impacts.

Policies

1. Direct growth away from FEMA Special Flood Hazard Areas and other high-risk flood and coastal hazard areas, and require mitigation and resilient site design where development cannot be avoided.
2. Require resilient site design and stormwater management practices for new development and redevelopment, including Low Impact Development techniques, to reduce runoff, increase infiltration, and limit downstream flooding impacts.
3. Prioritize watershed-based stormwater and drainage improvements, including within the Silver Creek and Tanyard Brook watersheds, to reduce chronic flooding and improve water quality through coordinated investments in roads, drainage systems, outfalls, and receiving waters.
4. Support a phased approach to coastal adaptation that emphasizes near-term, lower-cost risk reduction measures while planning for longer-term infrastructure and land-use responses to sea level rise.

NH-2. Protect and enhance wetlands, floodplains, coastal buffers, and open space that reduce hazard impacts by providing flood storage, shoreline protection, and water-quality benefits.

Policies

1. Protect and, where feasible, restore wetlands, riparian buffers, floodplains, and coastal features that provide flood storage and attenuation, avoid actions that reduce floodplain function, and support opportunities for marsh migration and long-term coastal resilience.

NH-3. Strengthen community preparedness, recovery capacity, and climate-informed decision-making by maintaining effective floodplain management, public communication, and coordination with state and regional partners.

Policies

1. Maintain strong floodplain management practices and continued participation in the National Flood Insurance Program and Community Rating System (CRS), and pursue opportunities to strengthen local capacity and community benefits.
2. Incorporate state, regional, and local flood hazard and climate vulnerability data into land-use decisions, capital improvement planning, municipal investments, and hazard mitigation efforts.
3. Prioritize flood resilience strategies in areas with a high concentration of historic structures, commercial uses, and public amenities, particularly along the Thames Street waterfront.
4. Design flood mitigation and adaptation measures to maintain public access, support local businesses, and respect the character and architectural integrity of the Bristol Waterfront Historic District.

Data and Mapping

Bristol relies on a combination of federal and state mapping resources to understand current and future flood risk and to inform floodplain management, land use decisions, capital planning, emergency preparedness, and hazard mitigation.

- FEMA Flood Hazard Map (Map NH-1): Depicts FEMA Flood Insurance Rate Map (FIRM) flood zones, including VE (Coastal High Hazard Area), AE (1% annual chance flood), X (Shaded, 0.2% annual chance flood), and X (Unshaded, minimal flood risk). Statewide flood hazard areas compiled from county-based Digital Flood Insurance Rate Map (DFIRM) databases for Rhode Island with a FEMA effective FIRM date of 2022.
- Hurricane Evacuation Zones and Routes (Map NH-2): Illustrates RIEMA-designated hurricane evacuation zones and primary evacuation routes based on storm surge risk (Zones A and B). Zone A risk corresponds to Category 1 and 2 hurricanes while Zone B risk corresponds to Category 3 and 4 hurricanes per RIEMA designations.
- Sea Level Rise Projections (Map NH-3): Illustrates areas potentially affected by 1, 3, and 5 feet of sea level rise, relative to Mean Higher High Water (MHHW), using state-accepted methodologies.
- Potential Marsh Migration (SLAMM) (Maps NH-4 through NH-6): Identifies potential tidal marsh migration areas under future sea level rise scenarios using the Sea Level Affecting Marshes Model (SLAMM). Data was retrieved from the SLAMM 6.1 model for sea level rise compared to initial conditions in 2010.

Hazard Mitigation Planning

The Town of Bristol maintains a FEMA-approved Hazard Mitigation Plan, which serves as the Town's primary document for identifying natural hazards, assessing risk and vulnerability, and prioritizing mitigation actions. This Natural Hazards and Climate Change element is informed by and consistent with the Hazard Mitigation Plan, while focusing on long-range land use, infrastructure, and policy considerations appropriate for a comprehensive plan. Implementation of mitigation actions will continue to occur through the Hazard Mitigation Plan, the Capital Improvement Program, and other Town programs, which may be updated independently over time.

Based on Bristol's Hazard Mitigation Plan and local experience, the hazards posing the greatest risk to the community include:

- **Flooding:** Coastal storm surge, tidal flooding, and inland flooding from heavy rainfall are recurring concerns in low-lying and developed areas.
- **Hurricanes and Nor'easters:** High winds and coastal storms have the potential to cause widespread flooding, infrastructure damage, and service disruptions.
- **Winter Storms:** Snow and ice events strain transportation, utilities, and emergency services.
- **Sea Level Rise (Climate Amplifier):** Rising sea levels are increasing the frequency, extent, and duration of coastal and tidal flooding, particularly along the waterfront and estuarine areas.

Vulnerability Considerations

Bristol faces multiple, overlapping flood and climate-related risks that affect people, property, infrastructure, and economic activity. Key exposure and vulnerability considerations include:

- A significant number of residential, commercial, and historic structures are located within FEMA-mapped Special Flood Hazard Areas (SFHAs).
- Bristol has documented repetitive flood losses, indicating chronic exposure and ongoing recovery costs in certain neighborhoods.
- Critical infrastructure, including roads, drainage systems, utilities, and waterfront facilities, is vulnerable to both coastal and inland flooding.
- Transportation access and emergency routes, particularly along low-lying corridors, are sensitive to flood conditions and may be compromised during storm events.

Flooding, including coastal flooding, storm surge, and heavy rainfall events, is identified as the most significant hazard affecting Bristol. Hurricanes and Nor'easters, winter storms, and climate-amplified sea level rise further compound these risks by increasing the frequency and severity of both tidal and inland flooding.

Waterfront and Coastal Flooding

Bristol's downtown waterfront and Thames Street corridor face increasing risk from coastal flooding and sea level rise. State and regional studies identify both direct coastal inundation from Bristol Harbor and "penetration flooding," where floodwaters move inland through streets, driveways, storm drains, and shoreline access points. These pathways increase flood frequency and extent during coastal storms, high tides, and future sea level rise conditions.

Key public spaces, parking areas, and waterfront facilities are particularly vulnerable, including Independence Park, the Maritime Welcome Center, and adjacent parking areas. Boat ramps and shoreline access points along the harbor allow floodwaters to move inland, contributing to the inundation of first-floor building spaces, public parks, and roadways during storm events.

The waterfront is also economically sensitive. Approximately 56 percent of the buildings in the Thames Street district are commercial, including restaurants, mixed-use buildings, and lodging establishments concentrated in the lowest-lying areas. Flooding therefore affects not only individual properties, but also local businesses, tourism, and municipal revenues. Flooding near the Prudence Island Ferry terminal further raises concerns related to transportation reliability, emergency access, and evacuation.

Transportation and Regional Resilience

Route 114 is a critical north–south corridor serving Bristol, Warren, and Barrington and functions as a designated evacuation route within the Rhode Island Emergency Route Network. Several segments of Route 114 experience periodic flooding during coastal storms, high tides, and heavy rainfall events, conditions that are expected to worsen with sea level rise and increasing storm intensity.

Recent regional planning efforts, including the Resilient Route 114 Study (February 2025), have focused on assessing vulnerability and identifying strategies to improve the long-term resilience of the corridor while maintaining its role as a scenic and historic roadway. The study evaluates roadways, drainage and utility systems, bridges, and culverts vulnerable to coastal flooding from projected sea level rise and storm surge events and identifies strategies to maintain emergency access, evacuation capacity, and regional connectivity.

Bristol County residents rely heavily on Route 114 for commuting to Providence and Kent Counties, reinforcing the corridor's importance to daily mobility, emergency response, and long-term economic resilience.

Community Rating System (CRS) and Local Resilience Initiatives

The Town of Bristol participates in FEMA's National Flood Insurance Program Community Rating System (CRS), a voluntary program that recognizes floodplain management activities exceeding minimum NFIP requirements. Bristol has achieved a CRS Class 7 rating, reflecting sustained efforts in floodplain administration, public outreach, and hazard mitigation, and providing flood insurance premium reductions for policyholders.

CRS participation is complemented by local resilience initiatives, including:

- Public-facing flood hazard information on the Town website
- Flood zone determinations and elevation certificate records
- Documentation of historical storm damage
- A Hazard Mitigation Updates webpage
- A self-guided Coastal Flood Risk and History Walking Tour (StoryMap)

The Town has also advanced targeted, place-based resilience initiatives to address recurring flooding and water-quality challenges, particularly within the Silver Creek watershed, where tidal influence and drainage network capacity constraints contribute to repeated flooding. The Silver Creek drainage study evaluated flood conditions under multiple storm events and identified improvement options, including drainage upgrades and sediment management to increase system capacity.

Together, these efforts demonstrate Bristol's commitment to combining public education, watershed-based planning, and capital improvement planning to address both existing and future climate-related hazards.

State-Identified Priority Assets and Vulnerabilities

Statewide Planning data and analyses further underscore Bristol's vulnerability to flooding and sea level rise, particularly with respect to transportation infrastructure and low-lying coastal areas. Rhode Island Statewide Planning municipal transportation vulnerability fact sheets estimate that approximately seven miles of roadway in Bristol are projected to be inundated under high sea level rise scenarios, with a majority of exposure occurring on locally maintained roads. Statewide analyses also identify multiple bridges in Bristol as vulnerable to both sea level rise and storm surge.

(Source: Rhode Island Division of Statewide Planning, Ready, Set, Rhody: Strategies to Improve Resilience, Draft, January 2026.)

Statewide climate resilience planning efforts have identified several assets in or directly affecting Bristol as particularly vulnerable to flooding and climate-related impacts. The State of Rhode Island's Resilient Rhody 2025 planning work identifies priority transportation, utility, and community facilities that warrant focused

resilience planning and coordination. Assets identified within or affecting Bristol include Route 114, Poppasquash Road, the shoreline sewer main along Ferry Road, the Everready Fire Station, and Mt. Hope High School. These assets are critical to emergency response, transportation connectivity, public services, and long-term community resilience. Identification of these assets informs local planning, capital investment, and coordination with state and regional partners, and supports prioritization of mitigation and adaptation strategies consistent with statewide resilience objectives.

Public Engagement and Community Priorities

Public engagement conducted as part of the Comprehensive Plan update demonstrated strong community awareness of and concern about flooding, sea level rise, and long-term climate impacts. Residents consistently identified recurring flooding in low-lying and coastal areas, particularly within the Silver Creek watershed and along waterfront roadways.

Community priorities identified through surveys and outreach include:

- Improving stormwater infrastructure
- Protecting wetlands and natural buffers
- Limiting development in hazard-prone areas
- Expanding green infrastructure and nature-based solutions
- Planning proactively for sea level rise

There was also strong interest in positioning Bristol as a leader in climate adaptation. These concerns and priorities directly inform the goals, policies, and actions of this element, which seek to reduce risk to people and property, enhance adaptive capacity, and align land use and infrastructure decisions with long-term climate conditions.

Historic Resources

Bristol's historic resources, particularly within the Bristol Waterfront Historic District, are among the community assets most vulnerable to sea-level rise and coastal flooding. Detailed assessment of historic resource vulnerability, including building-level analysis and preservation-based resilience strategies, is addressed in the Historic and Cultural Resources Element of this Plan. This Natural Hazards and Climate Change element builds on that work by integrating hazard mitigation and climate resilience considerations into broader land use, infrastructure, and capital planning decisions.

Relevant State Guide Plan Elements, Reference Documents & Consistency

This element aligns with and supports several components of the Rhode Island State Guide Plan that address natural hazards and climate change. The following State Guide Plan elements and reference documents provide the policy framework with which this Comprehensive Plan is consistent:

1. **Element 121 – Land Use 2025**-State's overarching land use policy framework directing growth while conserving resources and protecting community character, historic landscapes, and scenic roadways
2. Rhode Island Rising: A Plan for People, Places and Prosperity
3. Rhode Island Water 2030