Towns of Exeter and West Greenwich, RI

2025 Hazard Mitigation and Floodplain Management Plan Update

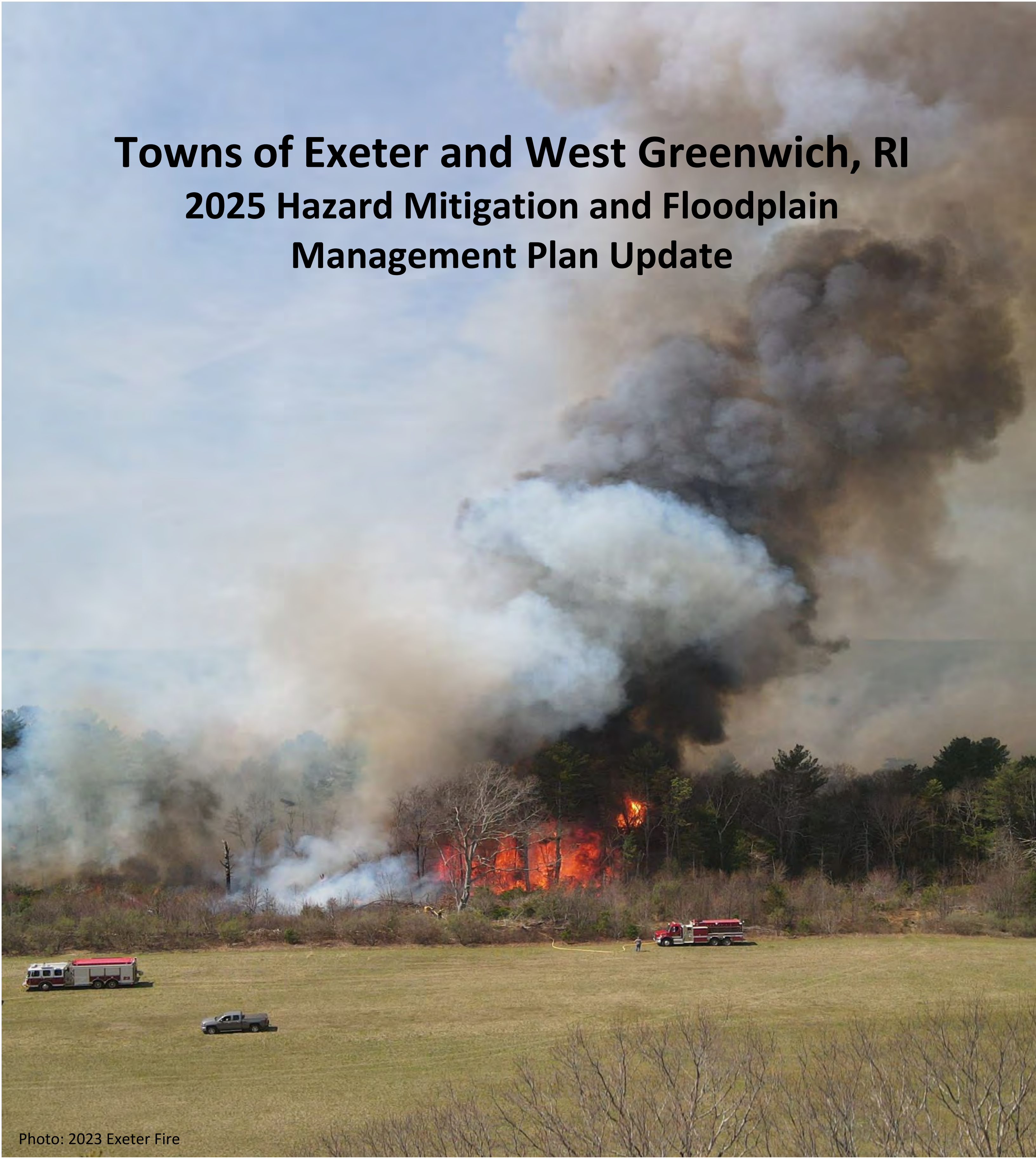

Photo: 2023 Exeter Fire

Dates Active: August 21, 2025 – August 20, 2030

FAIRWEATHER SCIENCE

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Acronyms/Abbreviations

ACF	Administration for Children and Families
AFG	Assistance to Firefighters Grants Program
AI	Artificial Intelligence
ARC	American Red Cross
B2S	Build to Scale Grants
BLM	Bureau of Land Management
BMP	Best Management Practices
BWRF	Narragansett Bay Water Restoration Fund
CDBG	Community Development Block Grant
CF	Critical Facility
CFAP	Community Forest and Open Space Conservation Program
CFR	Code of Federal Regulations
CFRP	Collaborative Forest Restoration Program
CIG	Conservation Innovation Grants
ClimRR	Climate Risk and Resilience Portal- Argonne National Laboratory
COOP	Continuity of Operations Plan
COPS	Community Oriented Policing Services
CPAW	Community Planning Assistance for Wildfire
CRS	Community Rating System
CSBG	Community Services Block Grant
CSSLP	Community Septic System Loan Program
CWDGP	Community Wildfire Defense Grant Program
CWSRF	Clean Water State Revolving Fund
DHHS	Department of Health and Human Services
DMA 2000	Disaster Mitigation Act Of 2000
DOE	US Department of Energy
DOJ	Department of Justice
DOT	Department of Transportation
DPW	Department of Public Works
EC4	Rhode Island Executive Climate Change Coordinating Council
EDA	Economic Development Administration
EDI	Economic Development Integration
EECBG	Energy Efficiency and Conservation Block Grant
EF Scale	Enhanced Fujita Scale
EMA	Emergency Management Agency
EMA	Emergency Management Agency
EMPG	Emergency Management Performance Grant
EMS	Emergency Management System
EOC	Emergency Operations System
EPA EJSG	Environmental Protection Agency Environmental Justice Small Grants Program
EPA OSC SGS	Environmental Protection Agency Office of Sustainable Communities Smart Growth Support
EQIP	Environmental Quality Incentives Program
ERP	Emergency Relief Program
FEMA	Federal Emergency Management Agency
FEMAER	Federal Emergency Management Agency Ecosystem Restoration
FEMASFC	Federal Emergency Management Agency Small Flood Control

Acronyms/Abbreviations

FIRMs	Flood Insurance Rate Maps
FMA	Flood Mitigation Assistance Program
FMAGP	Flood Mitigation Assistance Grant Program
FMS	Floodplain Management Services
FP&S	Fire Prevention and Safety Grants Program
g	gravity
GIS	Geographic Information Systems
HAZUS-MH	HAZUS-Multi Hazard GIS tool from FEMA
HHPD	High Hazard Potential Dam
HM&FMP	Hazard Mitigation and Floodplain Management Plan
HMA	Hazard Mitigation Assistance
HMGP	Hazard Mitigation Grant Program
HMP	Hazard Mitigation Plan
HMPC	Hazard Mitigation Planning Committee
HSGP	Homeland Security Grant Program
HSIP	Highway Safety Improvement Program
HSPTAP	Homeland Security Preparedness Technical Assistance Program
HUD	Housing and Urban Development
ICS	Incident Command System
IIJA	Infrastructure Investment and Jobs Act
LiDAR	Light Detection and Ranging
LIHEAP	Low Income Home Energy Assistance Program
MAP	Mitigation Action Plan
MJ	Multi-Jurisdictional
MMI	Modified Mercalli Intensity Scale
mph	miles per hour
MRBRF	Municipal Road & Bridge Revolving Loan Fund
MRP	Municipal Resiliency Workshop
NAWQA	National Water Quality Assessment
NCEI	National Centers for Environmental Information
NFIP	National Flood Insurance Program
NIDIS	National Integrated Drought Information System
NIST	National Institute of Standards and Technology
NOAA	National Oceanic and Atmospheric Administration
NPS	Nonpoint Source
NWQMN	National Water Quality Monitoring Network
NWS	National Weather Service
PFAS	Per- and Polyfluoroalkyl Substances
PGA	Peak Ground Acceleration
RCPP	Regional Conservation Partnership Program
REF	Renewable Energy Fund
RICRMCCEHRPTF	Rhode Island Coastal Resources Management Council Coastal and Estuary Habitat Restoration Program and Trust Fund
RICSRP	Rhode Island Commerce Site Readiness Program
RIDEM	Rhode Island Department of Environmental Management
RIDEMOSCARF	Rhode Island Department of Environmental Management Ocean State Climate Adaptation

	and Resilience Fund
RIDEMTERIGP	Rhode Island Department of Environmental Management Tree Equity RI Grant Program
RIEFECP	Rhode Island Energy Foundation Empowering Communities Program
RIEMA	Rhode Island Emergency Management Agency
RIFCG	Rhode Island Foundation Catalyst Grant
RIIB	Rhode Island Infrastructure Banks
RIIB EBF	Rhode Island Infrastructure Bank Efficient Buildings Fund
RILTAP	Rhode Island Local Technical Assistance Program
RIRRC	Rhode Island Resource Recovery Corporation
RIS	Regional Innovation Strategies
RISG	Rhode Island Sea Grant
SEP	State Energy Program
SETO	Solar Energy Technologies Office
SFHA	Special Flood Hazard Area
SLHSGP	State and Local Cybersecurity Grant Program
SRIASFG	ServeRI Americorps State Formula Grants
SS4A	Safe Streets and Roads for All
Stafford Act	Robert T. Stafford Disaster Relief and Emergency Assistance Act
STBG	Surface Transportation Block Grant
STIP	State Transportation Improvements Program
TAP	Transportation Alternatives Program
TIP	Transportation Improvement Program
Town	Town of Exeter or Town of West Greenwich
UHI	Urban Heat Island Program
USACE	US Army Corps of Engineers
USDA CIG	United States Department of Agriculture Conservation Innovation Grant
USDA CSP	United States Department of Agriculture Conservation Stewardship Program
USDA EQIP	United States Department of Agriculture Environmental Quality Incentives Program
USDA NRCS	United States Department of Agriculture Natural Resource Conservation Service
USDA RCPP	United States Department of Agriculture Regional Conservation Partnership Program
USFS	United States Forest Service
USGS	United States Geologic Survey
WIFIA	Water Infrastructure Finance and Innovation Act
WPWA	Wood-Pawcatuck Watershed Association
WRDA	Water Resources Development Act
WRRA	Water Resources Research Act
WSCG	Wild and Scenic Community Grants

EXECUTIVE SUMMARY

The 2025 Towns of Exeter and West Greenwich, Rhode Island Multi-Jurisdictional Hazard Mitigation and Floodplain Management Plan (MJHM&FMP) is a product of the Towns of Exeter and West Greenwich Hazard Mitigation Planning Committees (HMPCs).

The purpose of hazard mitigation planning is to reduce or eliminate long-term risk to people and property from natural hazards. This plan was prepared following the requirements of the Disaster Mitigation Act of 2000 (DMA 2000) so that the Town would be eligible for FEMA's Hazard Mitigation Assistance (HMA) grant programs and other federal programs.

The HMPCs' overview of past natural hazard events verifies that the Towns are still vulnerable to diverse natural hazards including severe thunderstorm (high wind, lightning, hail), dam failure, flooding, tropical and extratropical storms (hurricane and Nor'easter), severe winter weather (snow storm and ice storm), brushfire, drought, extreme temperatures, tornadoes, and earthquake. The Towns also included information on the following man-made hazards: hazardous materials incident, water quality (PFAS, cyanobacteria), and cybersecurity threats.

This Plan provides a description of the hazard, historical events, vulnerable locations, the extent (magnitude and severity) of the hazard, past and potential impacts of events, probability of future occurrence, and information on how future climate conditions are influencing the hazard and its impacts to future populations and land use.

In recognition of the Towns' current and projected vulnerability to flooding, the Towns opted to intensify their focus on flooding within this HMP Update. Further, as the Towns are in the process of participating in FEMA's Community Rating System (CRS) program, it was advantageous to integrate CRS Activity 510 - Floodplain Management Planning into the HMP Update.

As such, this document was developed according to the FEMA's updated Local Mitigation Planning Guidance and the CRS Activity 510 Planning Process into a single plan that meets the goals, intent, and requirements of each program.

The risk assessment portion of the Plan confirms that the Towns have many assets vulnerable to natural hazard events. Some vulnerable assets include government, emergency response, medical, educational, utility, community, and vulnerable populations facilities as well as High and Significant hazard dams.

The HMPCs reviewed and reaffirmed the following goals from the 2005 HMPs for the 2025 MJHM&FMP Update:

Town of Exeter Goals

1. Implement actions which protect the lives and property of Exeter's residents
2. Implement actions which protect Exeter's critical facilities and infrastructure
3. Implement actions which protect Exeter's cultural, historical, natural and economic resources
4. Implement actions to achieve effective emergency communications
5. Implement public outreach/educational actions to increase awareness of hazards and promote overall preparedness

Town of West Greenwich Goals

1. Protection of life and property
2. Protection from social and economic hardship
3. Protection of critical infrastructure and public safety
4. Promote public outreach/educational actions to increase awareness of hazards and promote overall preparedness

The 2025 MJHM&FMP Update establishes a series of specific mitigation strategies for each Town that were developed collaboratively with the intent to meet the identified mitigation goals. These strategies provide a basis for continued planning to develop specific action plans. These actions will be implemented over time and can provide a means to measure the Towns' progress towards hazard reduction. The Plan also describes future update and maintenance procedures.

Executive Summary- Town of Exeter

	Estimated Losses						
	# of CF	$ of CF	# of People	# of Residences	$ of Residences**	Extent	Probability
Severe Thunderstorm	180 + 103 road miles + 2 rail miles	$600,884,080	6,581	2,353	$1,099,843,319	Limited-Negligible	Highly Likely-Possible
Dam Failure	47 + 2 road miles + 0.4 rail miles	$101,300,000	351*	148	$69,178,604	Significant	Possible
Flooding	37 + 7 road miles + 0.2 rail miles	$261,400,000	1,413*	596	$278,584,108	Significant	Likely
Tropical & Extratropical Storms	180 + 103 road miles + 2 rail miles	$600,884,080	6,581	2,353	$1,099,843,319	Limited	Possible
Severe Winter Weather	180 + 103 road miles + 2 rail miles	$600,884,080	6,581	2,353	$1,099,843,319	Limited	Highly Likely
Brushfire	180 + 103 road miles + 2 rail miles	$600,884,080	6,581	2,353	$1,099,843,319	Limited	Possible
Drought	180 + 103 road miles + 2 rail miles	$600,884,080	6,581	2,353	$1,099,843,319	Limited	Possible
Extreme Temperatures	180 + 103 road miles + 2 rail miles	$600,884,080	6,581	2,353	$1,099,843,319	Limited	Likely
Tornadoes	180 + 103 road miles + 2 rail miles	$600,884,080	6,581	2,353	$1,099,843,319	Limited	Possible
Earthquake	180 + 103 road miles + 2 rail miles	$600,884,080	6,581	2,353	$1,099,843,319	Negligible	Possible
Hazardous Materials Incident	69 + 29 road miles + 2 rail miles	$285,146,214	2,330*	983	$459,476,809	Limited	Highly Likely
Cybersecurity	180 + 103 road miles + 2 rail miles	$600,884,080	6,581	2,353	$1,099,843,319	Exeter – Limited West Greenwich - Negligible	Possible
Water Quality (PFAs, Cyanobacteria)	PFAS and Cyanobacteria in drinking water is a public health concern, but impacts are not anticipated to cause infrastructure damage.		6,581			PFAS: Exeter, Limited West Greenwich, Negligible Cyanobacteria: Negligible	Highly Likely

CF: Critical Facility

* number was determined by multiplying the number of affected residences by the average household size of 2.37.
** number was determined by multiplying the number of affected residences by the HUD replacement value of a 3-bedroom home in Narragansett, RI ($467,423).

Executive Summary- Town of West Greenwich

	Estimated Losses						
	# of CF	$ of CF	# of People	# of Residences	$ of Residences**	Extent	Probability
Severe Thunderstorm	118 + 120 road miles	$675,160,028	6,683	2,482	$1,160,143,886	Limited-Negligible	Highly Likely-Possible
Dam Failure	30 + 1 road mile	$58,000,000	64*	27	$12,620,421	Significant	Possible
Flooding	18 + 2 road miles	$116,000,000	223*	94	$43,937,762	Significant	Likely
Tropical & Extratropical Storms	118 + 120 road miles	$675,160,028	6,683	2,482	$1,160,143,886	Limited	Possible
Severe Winter Weather	118 + 120 road miles	$675,160,028	6,683	2,482	$1,160,143,886	Limited	Highly Likely
Brushfire	118 + 120 road miles	$675,160,028	6,683	2,482	$1,160,143,886	Limited	Possible
Drought	118 + 120 road miles	$675,160,028	6,683	2,482	$1,160,143,886	Limited	Possible
Extreme Temperatures	118 + 120 road miles	$675,160,028	6,683	2,482	$1,160,143,886	Limited	Likely
Tornadoes	118 + 120 road miles	$675,160,028	6,683	2,482	$1,160,143,886	Limited	Possible
Earthquake	118 + 120 road miles	$675,160,028	6,683	2,482	$1,160,143,886	Negligible	Possible
Hazardous Materials Incident	47 + 28 road miles	$385,354,299	107*	45	$21,034,035	Limited	Highly Likely
Cybersecurity	118 + 120 road miles	$675,160,028	6,683	2,482	$1,160,143,886	Exeter – Limited West Greenwich - Negligible	Possible
Water Quality (PFAs, Cyanobacteria)			6,683			PFAS: Exeter, Limited West Greenwich, Negligible Cyanobacteria: Negligible	Highly Likely

CF: Critical Facility

* number was determined by multiplying the number of affected residences by the average household size of 2.37.
** number was determined by multiplying the number of affected residences by the HUD replacement value of a 3-bedroom home in Narragansett, RI ($467,423).

FEMA APPROVAL LETTER

U.S. Department of Homeland Security
FEMA Region 1
220 Binney Street
Cambridge, MA 02142

FEMA

August 22, 2025

Marc R. Pappas, Director
Rhode Island Emergency Management Agency
645 New London Avenue
Cranston, Rhode Island 02920

Director Pappas:

The U.S. Department of Homeland Security, Federal Emergency Management Agency (FEMA) Region 1 Mitigation Division has approved the *2025 Towns of Exeter and West Greenwich Multi-Jurisdictional Hazard Mitigation and Floodplain Management Plan Update* effective **August 21, 2025** through **August 20, 2030** in accordance with the planning requirements of the Robert T. Stafford Relief and Emergency Assistance Act (Stafford Act), as amended; the National Flood Insurance Act of 1968, as amended; the National Dam Safety Program Act, as amended; and Title 44 Code of Federal Regulations (CFR) Part 201.

Mitigation plans may include additional content to meet Element H: Additional State Requirements or content the local government included beyond applicable FEMA mitigation planning requirements. FEMA approval does not include the review or approval of content that exceeds these applicable FEMA mitigation planning requirements.

This plan approval includes the following participating jurisdictions that provided copies of their resolutions adopting the plan. (Newly approved jurisdictions are highlighted in **bold**.)

- **Exeter, Town of**
- **West Greenwich, Town of**

With this plan approval, the communities listed above are eligible to apply to the Rhode Island Emergency Management Agency for mitigation grants administered by FEMA. Requests for funding will be evaluated according to the eligibility requirements identified for each of these programs. A specific mitigation activity or project identified in this community's plan may not meet eligibility requirements for FEMA funding; even eligible mitigation activities or projects are not automatically approved.

The plan must be updated and resubmitted to the FEMA Region 1 Mitigation Division for approval every five years to remain eligible for FEMA mitigation grant funding.

Thank you for your continued commitment and dedication to risk reduction demonstrated by preparing and adopting a strategy for reducing disaster losses. Should you have any questions, please contact Alexis Meehan at (202) 394-6439 or alexis.meehan@fema.dhs.gov.

Sincerely,

Christopher Markesich
Floodplain Management and Insurance Branch Chief
Mitigation Division | DHS, FEMA Region 1

cc: Melinda Hopkins, Planning Branch Chief, RIEMA
Rae-Anne Culp, State Hazard Mitigation Officer, RIEMA
Richard Verville, Mitigation Division Director, DHS, FEMA Region 1
Alexis Meehan, Community Planner, DHS, FEMA Region 1

PLAN DISTRIBUTION LIST

The Towns of Exeter and West Greenwich's 2025 Hazard Mitigation and Floodplain Management Plan Update is distributed to:

- Town of Exeter
- Town of West Greenwich
- Rhode Island Emergency Management Agency (RIEMA)
- Federal Emergency Management Agency (FEMA)

RECORD OF CHANGES

Hazard Mitigation Plans should be continually updated as circumstances change, new data becomes available, hazards are mitigated, etc. This Record of Changes Table is included to summarize and document changes to this document as they are made throughout time.

Change ID	Description of Changes	Date
01	Updated 2005 Town of Exeter and 2005 Town West Greenwich HMPs to create an updated Multi-Jurisdictional HMP including Floodplain Management Plan for CRS credit	Exeter: 6/2/2025 West Greenwich: 6/11/2025

1. PLAN INTRODUCTION AND BACKGROUND

Hazard mitigation planning is required under the Disaster Mitigation Act of 2000 (DMA 2000) which identified the need for Tribal, Local, and State jurisdictions to coordinate mitigation planning and implement mitigation efforts. It also provided the legal basis for the Federal Emergency Management Agency's (FEMA) mitigation plan requirements for mitigation grant assistance.

1.1 Plan Purpose

Disasters may cause loss of life, damage buildings and infrastructure, and have devastating effects on a community's economic, social, and environmental well-being. The Towns of Exeter and West Greenwich intend to reduce or eliminate the long-term risk to life and property from hazards by implementing a Hazard Mitigation Plan. The Plan is intended to reduce community risk and promote long-term sustainability by:

- Protecting the public and preventing loss of life and injury.
- Reducing harm to existing and future community assets.
- Preventing damage to a community's cultural, economic, and environmental assets.
- Minimize downtime and speed up recovery following disasters.
- Reducing the costs of disaster response and recovery and the exposure of first responders to risk.
- Helping accomplish other community objectives, such as leveraging capital improvements, infrastructure protection, and economic resiliency.

1.2 Community Rating System (CRS) Program

The Community Rating System (CRS) is a voluntary incentive program that recognizes and encourages community floodplain management practices that exceed the minimum requirements of the National Flood Insurance Program (NFIP). Over 1,500 communities participate nationwide.

In CRS communities, flood insurance premium rates are discounted to reflect the reduced flood risk resulting from the community's efforts that address the three goals of the program:

1. Reduce and avoid flood damage to insurable property
2. Strengthen and support the insurance aspects of the National Flood Insurance Program
3. Foster comprehensive floodplain management

Table 1 outlines the CRS credit system, classes, and premium discount associated with each class. Exeter and West Greenwich do not currently participate in CRS and therefore are Class 10 communities.

Table 1- CRS Credit Points, Classes, and Premium Discount

CRS Credit Points	CRS Class	CRS Discount for SFHAs (Premium Reduction)
4,500+	1	45%
4,000 - 4,499	2	40%
3,500 - 3,999	3	35%
3,000 - 3,499	4	30%
2,500 – 2,999	5	25%

CRS Credit Points	CRS Class	CRS Discount for SFHAs (Premium Reduction)
2,000 – 2,499	6	20%
1,500 – 1,999	7	15%
1,000 – 1,499	8	10%
500 - 999	9	5%
0 - 499	10	0%

Through the development of this MJHM&FMP, the Towns of Exeter and West Greenwich intend to join CRS. By joining CRS, the Towns hope to encourage more residents in flood impacted areas to purchase flood insurance.

Table 2 shows the comparison of the standard elements of a HMP and CRS Planning Steps. While there are many similarities between these two guidelines, additional steps and information are required in a Floodplain Management Plan to meet CRS criteria.

Table 2- Comparison of Hazard Mitigation Planning Elements and CRS Planning Steps

Hazard Mitigation Planning Elements	CRS Planning Steps
Planning Process	1. Organize and prepare the plan
	2. Involve the public
	3. Coordinate
	10. Implement, evaluate, revise
Hazard Identification and Risk Assessment	4. Assess the hazard
	5. Assess the problem
Mitigation Strategy	6. Set goals
	7. Review possible activities
	8. Draft an action plan
Plan Update	10. Implement, evaluate, revise: 5-year update
Plan Adoption	9. Adopt the plan

1.3 Hazard Mitigation & Floodplain Management Plan Layout Description

The Towns of Exeter and West Greenwich’s 2025 Multi-Jurisdictional MJHM&FMP Update consists of the following sections and appendices:

- **Section 1- Plan Introduction and Background**

  Defines what a MJHM&FMP is and its benefits. Provides general history and background, including historical trends for population, the demographic and economic conditions that have shaped the area, as well as the government and leadership within each Towns.

- **Section 2- Planning Process**

  Describes the planning process for the MJHM&FMP Update, identifies the HMPCs members, lists the meetings held as part of the planning process, and lists the key collaborators within the surrounding area. This section documents public outreach activities performed by the Towns of Exeter and West Greenwich (supporting documents are in Appendix D- Public Outreach Activities); including document reviews and relevant plans, reports, and other appropriate information and data utilized for this MJHM&FMP update.

- **Section 3- Risk Assessment**

  Describes the process through which the HMPCs identified, screened, and selected the hazards for profiling in this version of the MJHM&FMP Update. The hazard analysis includes the nature of the hazard, previous occurrences (history), location, extent, and impact of past events, and future event recurrence probability for each hazard. The influence of future climate conditions are also discussed within each hazard profile.

  The Risk Assessment identifies the Towns' potentially vulnerable assets—people, critical facilities, critical infrastructure, and residential and non-residential buildings. The resulting information identifies the full range of hazards that each Town could face and the potential damages, economic losses, and social impacts. Land use and development trends are also discussed.

- **Section 4- Programmatic Capabilities**

  This section lists the Towns' policies, programs, available resources, and governmental authorities. State programs, National Flood Insurance Program (NFIP) participation activities, subdivision/land development, and zoning ordinances are discussed.

- **Section 5- Mitigation Strategy**

  Defines the Towns of Exeter and West Greenwich's mitigation strategies which provide a blueprint for reducing the potential losses identified in the vulnerability analysis.

  The HMPCs developed a list of specific mitigation goals and potential actions to address the risks in Exeter and West Greenwich. Mitigation actions include structural projects, emergency services, natural resource protection strategies, property protection techniques, preventive initiatives, and public information and awareness activities. The status of mitigation actions identified in the 2005 HMPs are provided.

- **Section 6- Plan Maintenance**

  Describes the formal Plan maintenance process to ensure that the MJHM&FMP remains an active and applicable document. This section includes an explanation of how the HMPCs intend to organize their efforts to ensure that updates and revisions to the MJHM&FMP occur in an efficient, well-managed, and coordinated manner.

- **Section 7- Plan Update**

  This section describes hazard events that have occurred and changes in development since 2005; changes in mitigation priorities; and describes how the mitigation plan was integrated into other planning mechanisms.

- **Section 8- Plan Adoption**

  Describes the Towns of Exeter and West Greenwich's adoption processes of the MJHM&FMP Update. Supporting documentation can be found in Appendix A- Adoption Resolution.

- **Section 9- References**

  Lists reference materials and resources used to update this MJHM&FMP.

- **Section 10- Appendices**

  Appendix A- Adoption Resolution: Provides the Towns' adoption resolutions.

  Appendix B- FEMA Plan Review Tool, Local Hazard Mitigation Plan: Provides the FEMA Local Mitigation Plan Review Tool, which documents compliance with FEMA guidelines.

  Appendix C- CRS Activity 510: Floodplain Management Planning Checklist: Provides the FEMA CRS Activity 510- Floodplain Management Planning Checklist, which documents compliance with FEMA guidelines for CRS credit.

  Appendix D- Public Outreach Activities: Provides public outreach information, including survey results.

  Appendix E- HMP Annual Progress Report: Provides an annual progress report for the Towns to complete during the annual review of the MJHM&FMP.

  Appendix F- CRS Activity 510 Annual Progress Report: Provides an annual progress report for the Towns to complete during the annual review of the MJHM&FMP for CRS annual recertification.

  Appendix G- Funding Resources for Mitigation Projects: Delineates federal, state, and other potential mitigation funding sources. This section will aid the Towns of Exeter and West Greenwich with researching and applying for funds to implement their mitigation strategy.

  Appendix H- Exeter MRP August 2024 Summary of Findings: Provides Exeter's MRP Summary of Findings report.

  Appendix I- West Greenwich MRP June 2023 Summary of Findings: Provides West Greenwich's MRP Summary of Findings report.

  Appendix J- Wood-Pawcatuck Watershed Maps: Provides detailed maps of the Wood-Pawcatuck Watershed, priority for upgrade/replacement recommendation of bridges and culverts, recommendation for specific dam repair and removal, and other recommended actions to protect the Watershed and surrounding Towns, including Exeter and West Greenwich.

  Appendix K- Hazard Area Maps: Provides maps of identified hazard areas and critical facilities in Exeter and West Greenwich.

  Appendix L- FEMA Flood Insurance Rate Maps (FIRMs): Provides the current FEMA FIRMs to depict flood hazard areas in Exeter and West Greenwich.

  Appendix M- Hazus Results: Provides the results from the Hazus scenarios for flooding and hurricane impacts in Exeter and West Greenwich.

1.4 Planning Area

For this MJHM&FMP, the Planning Area consists of Exeter and West Greenwich's Town boundaries (Figure 1)

Figure 1- Planning Area

1.4.1 Exeter

The Town of Exeter is centrally located in the state of Rhode Island, in Washington County. The Town is composed of a total area of 58.4 square miles. Exeter extends east from the Connecticut border towards the Town of North Kingstown and is bordered to the north by West Greenwich and East Greenwich, to the south by the Towns of Hopkinton, Richmond, and South Kingstown. Exeter is situated about 25 miles southwest of Providence.

1.4.1.1 History

The land that is now recognized as the Town of Exeter was inhabited long before the colonists arrived. Native Americans lived and thrived on this land for thousands of years. When Roger Williams left the Massachusetts Bay Colony in 1636, he formed a settlement named Providence in a region that would ultimately become the state of Rhode Island. He was befriended by the Narragansett Native American tribe and their sachem (Chief) Canonicus. The Narragansetts were highly respected as the most powerful tribe in the area by Roger Williams. However, the mutual respect of the Native Americans and the settlers would soon disappear as colonists coveted their valuable lands.

Roger Williams moved south and established a trading post at the intersection of two major Native American thoroughfares, the Pequot Path (now Post Road) and the major east-west route of Narragansett People between their winter and summer villages (now Stony Lane). In 1643, Williams decided to make the "Narragansett Country," as it was then known (present day North Kingstown) his permanent home. In 1651, Roger Williams, needing funds for a trip to England to secure the Rhode Island and Providence Plantations Colony's Charter, sold his land to Richard Smith.

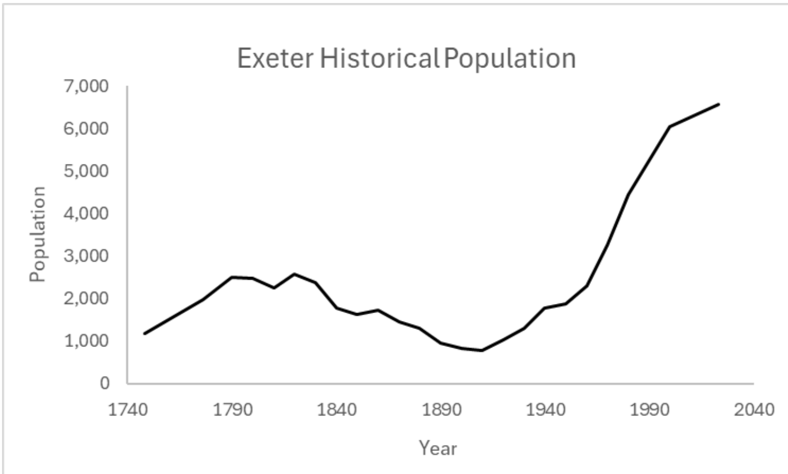
In 1657, what is now the eastern end of Exeter was bought as part of the Pettaquamscutt Purchase from the Narragansetts. In 1674, Kings Towne was founded by the colonial government. The area contained much of the old "Narragansett Country" and included the present-day Towns of North Kingstown, South Kingstown, Exeter, and Narragansett. Kings Towne got off to a rocky start, as by virtue of its strategic location and Richard Smith's growing allegiance with the Connecticut Colony, it became the center of turmoil that was the King Phillip's War. A conflict between the Narragansett and Wampanoag People and the inhabitants of the Connecticut, Plymouth, and Massachusetts Bay Colonies, was fought in 1675-1676. When the dust settled, Kings Towne was in the sole possession of the colonists and the expansion began. Settlement in all areas of Kings Towne increased at such a rapid velocity that in 1722 the colonial government decided to split the land into two towns, North Kingstown and South Kingstown.

In 1742, North Kingstown's western section was dissected to form the Town of Exeter. Exeter flourished during the 1800s. Farms and villages grew up around the rivers and streams, providing power for textile manufacturing, saw mills, and grist mills. Stores, taverns, schools, a library, churches, and a bank were all established within the town.

Exeter continues to be an active rural community, with abundant farms, forests, and open spaces for the community to enjoy.

1.4.1.2 Demographics

Exeter has historical population data dating back to 1748. The US Census estimates that Exeter's population was 6,581 in 2023.



Additional demographic information for Exeter's residents is below.

Population (2023)	6,581
% White race	88%
Median Age	38.2
Employment Rate	62.5%
Total Housing Units	2,647
Total Households	2,339
Average Family Size	3.38
Median Household Income	$99,236
Below the poverty level	732
Bachelor's Degree or Higher	45.0%
Has Healthcare Coverage	99.0%
Source: US Census (2025)	

Snapshots from Exeter's 2024-2044 Comprehensive Plan (included below) break down additional demographic information.

1.4.1.3 Government

Exeter is governed by an elected five (5) member council.

1.4.1.4 Public Safety

Exeter is the only Town in Rhode Island that does not have a police department. Exeter had a volunteer police department that dissolved in the late 1960s. Since 1998, police service has been provided to the Town primarily through the state police, who have two barracks located adjacent to Exeter's borders.

There are two volunteer fire departments in Exeter with a total of 4 stations.

1.4.1.5 Forest and Open Space

Exeter is recognized for its high-quality environmental resources. There are more than 13,500 acres of protected land, which represents 35% of all Town land. 266 parcels, or nearly 40% of land is enrolled in the State's Farms, Forests and Open Spaces program, a tax incentive program for maintaining properties as farms, forests, or open spaces.

Other information on Exeter's forest and open spaces include:

- Unfragmented forest blocks of more than 500 acres make up approximately 50% of Exeter's land.
- Nearly 2,000 acres are designated as "Better" or "Best": for ecological diversity, according to Ecological Land Unit (ELU) data.
- 13 Natural Heritage areas in Exeter are believed to be quality habitat for 24 animals and 48 plants that are of concern, threatened, or endangered in Rhode Island.
- In 2017, Exeter established the Rural Land Preservation Trust to locate areas suitable for both conservation and passive recreation, preserve working farmland, protect sensitive environmental areas from development, and provide collaborative opportunities with environmental organizations and other groups to foster natural resource awareness and education.
- Over 1/3rd of land in Exeter is protected from development.

1.4.1.6 Water Resources

Groundwater quality in Exeter meets the state's two highest grade ratings. The Wood River, Queen River, and the eastern portions of Beach Pond and Tippecansett Pond are state designated Special Resource Protection Waters. Approximately 1/6th of the Town is wetlands.

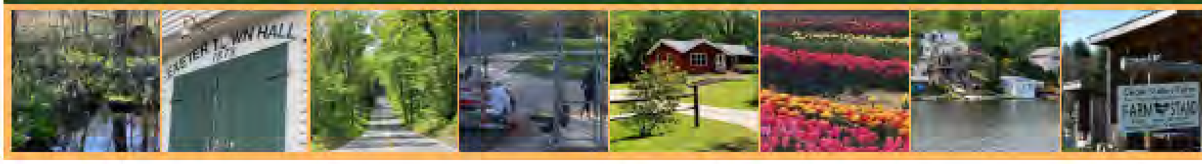
Other information on Exeter's water resources include:

- The Wood-Pawtucket Watershed is Rhode Island's only federally recognized area in the Wild and Scenic River Program, making it eligible for federal preservation funding.
- Approximately 14% of Exeter is composed of soils that are non-hydric but have seasonal water tables between 19 inches and 42 inches from the surface. The proximity of the water table to the surface increases susceptibility for groundwater pollution within these areas.
- Exeter's surface water drains to 6 different watersheds.
- Exeter includes 3 groundwater-reservoir recharge areas, and 4 Community Wellhead Protection Areas rated at the state's highest quality level, Class GAA denoting groundwater systems suitable for drinking water without treatment. These areas can be found along the Wood River, the Queen River, and the Chipuxet River.

EXETER 2044
COMPREHENSIVE PLAN
One community moving forward together

Exeter at a Glance

Planning for our future in 2044 means understanding where we are today.

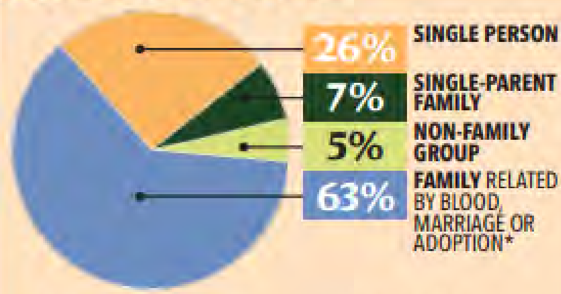


WHO WE ARE Demographics

OVERVIEW

- Small, low-density population
- From the **2020 census:**
  - > 6,460 residents
  - > 2,293 households
  - > 2.78 average people per household
- **Race:** 93% white, non-Hispanic
- **Median age:** 41 years
  - > **17.6%:** population **under 18 years old** *(statewide: 19%)*
  - > **18.9%:** population **65 years and older** *(statewide: 18%)*
  - > **23.1%:** households with **people under 18** *(statewide: 33%)*
  - > **50.7%:** households with **people 60 and older** *(statewide: 42.3%)*
- **Education:** 50% of residents aged 24 to 64 hold a **bachelor's degree or higher** *(statewide: 35%)*

HOUSEHOLD TYPES

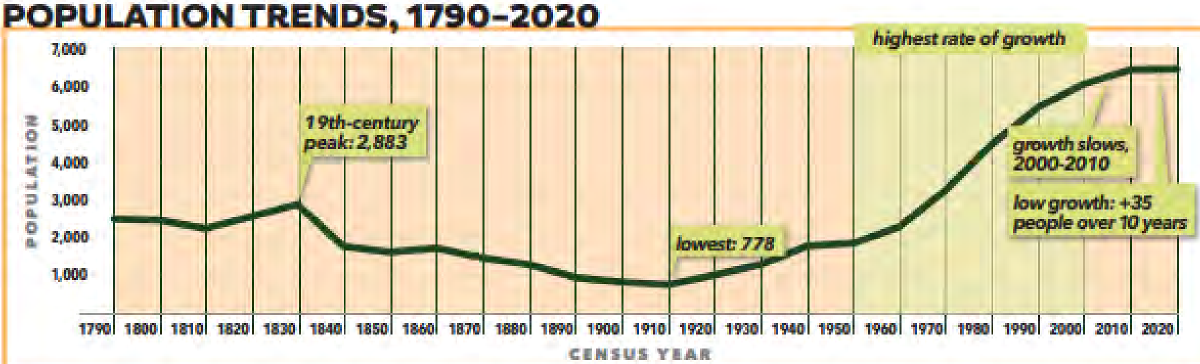


* *Family households may or may not include children.*

INCOME

- **Median household income** (2020 estimate)**: $83,750** *(statewide income, 2020 estimate: $70,305)*
- 26% of households make **$50,000 or less**
- 25% of households make **$150,000 or more**

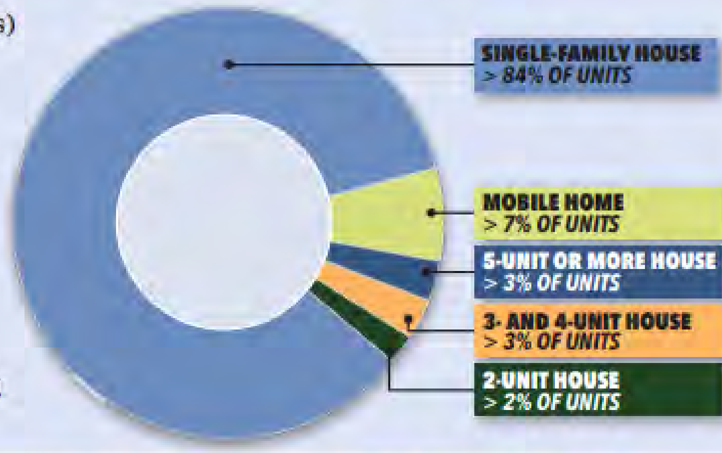
POPULATION TRENDS, 1790–2020



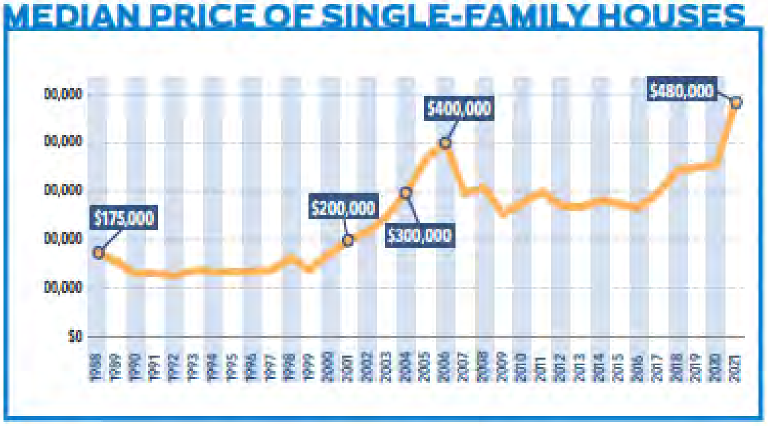
HOW WE LIVE Housing

HOUSING STOCK

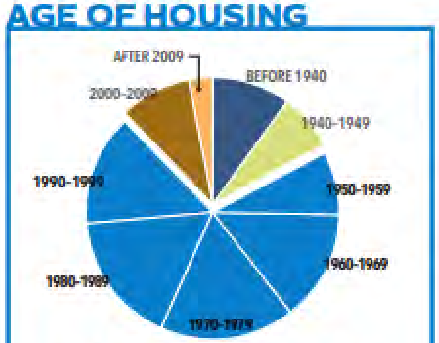
- **2,647 housing units** (2020 Census)
- Median **age** of housing: 42 years
- **Owner-occupied** housing: 83%
- 33% of households **pay more than 30% of income** for housing.
- 9% of households **pay more than 50% of income** for housing.
- Median **house value** in 2022: $537,800
- 7.28% of housing qualifies as **affordable** under RI's Low- and Moderate-Income Housing Act *(R.I. Gen. Laws 45-53)* as of 2023.



MEDIAN PRICE OF SINGLE-FAMILY HOUSES



AGE OF HOUSING



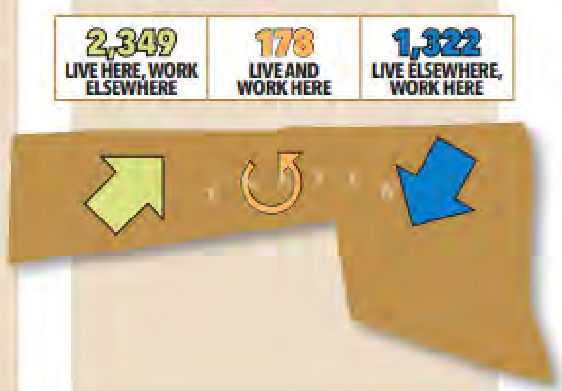
Nearly 75% of all Exeter's housing stock was built 1950-1999.

HOW WE LIVE Economy

HOW WE MAKE A LIVING

- Exeter has **small agricultural and business sectors** and functions primarily as a bedroom community.
- About **1,500 private-sector jobs are located in town;** 88% are held by people who live outside of Exeter.
- The **average annual wage** for private-sector jobs is about $45,000.
- The Town's 2022 tax rolls contain **252 business enterprise** owners.
- The vast majority of residents who are employed **work outside of town.**
- The **average commute** is 25.5 minutes.
- There are about **twenty small commercial farms,** of which three are certified organic.

PRIVATE-SECTOR JOBS FLOW



GREEN SYSTEMS

ENVIRONMENT, OPEN SPACE & RECREATION

Exeter is recognized for its high-quality environmental resources

- Exeter has more than **13,500 acres of protected land,** which represents about 35% of all town land.
- **Three-fourths of the protected land is managed by the State;** conservation groups such as The Nature Conservancy and the Audubon Society manage most of the remainder.
- A majority of the town's protected open space is **publicly accessible.**
- Groundwater meets the state's two highest grades for **water quality.** The highest-quality areas account for one-third of all groundwater.

- The **Wood River** is designated as "wild" and the **Queen and Beaver rivers** are designated as "scenic."
- The Wood River, Queen River, and the eastern segment of Beach Pond and Tippencasett Pond have been designated by the state as **Special Resource Protection Waters.**
- 12 state-identified lakes, ponds, or reservoirs and 30 state-identified rivers or streams.

- Approximately one-sixth of town is **wetlands.**
- A majority of land is an **upland forest** mix of conifers and deciduous trees.
- 19 **Natural Heritage Areas** indicate sites where noteworthy, rare or threatened species have been observed.

- **Agricultural soils** include state-designated "prime agricultural soils" or soils of "statewide importance."
- About 39% of land—266 parcels—is enrolled in the state's **Farms, Forests and Open Space program**, which provides tax incentives for owners to maintain property as farms, forests, or open space. Most owners don't depend on these resources for their income.
- **Nature recreation** includes hunting, fishing, boating, and about 60 miles of trails. The town maintains sports fields at Reynolds Field and Wawaloam School and a playground at Chelsea Park.

1.4.2 West Greenwich

The Town of West Greenwich is centrally located in the state of Rhode Island, in Kent County. The Town is composed of a total area of 51.3 square miles. West Greenwich extends east from the Connecticut border towards the Town of East Greenwich and is bordered to the north by Coventry, and to the south by the Town of Exeter. West Greenwich is situated about 25 miles southwest of Providence.

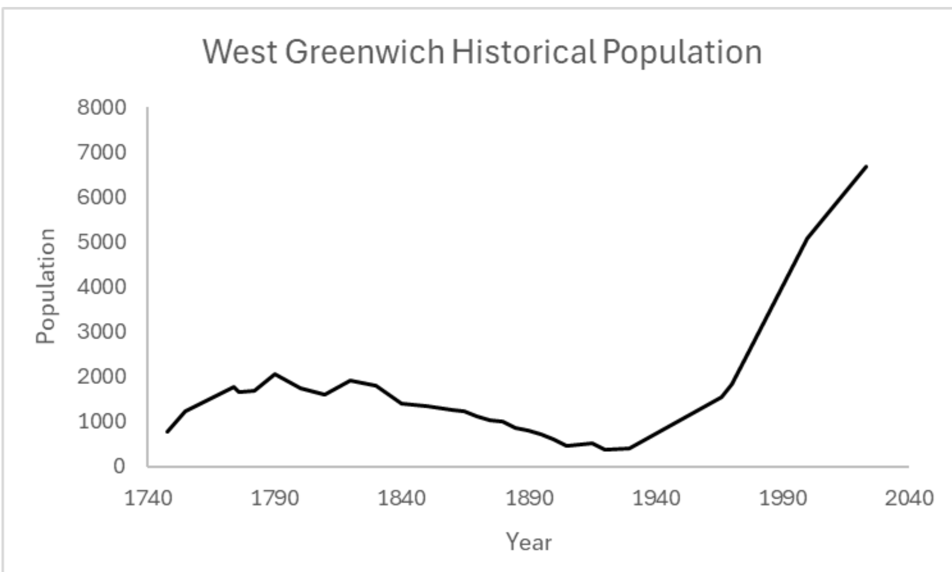
1.4.2.1 History

The Town of West Greenwich was separated from East Greenwich and incorporated by the General Assembly April 6, 1741. In 1790, the population of the Town was 2,054. In 1920 it had dropped to 387 but in 1970 it had increased to 1,841. The 2000 census data listed the population at 5,085.

The original deed was executed June 30, 1709, for 1,100 pounds (~equivalent to $1,426 US Dollars). It divided West Greenwich, some 35,000 acres of land, from the vacant land in the Narragansett country tract. A petition was submitted in October 1740 to Governor Richard Ward, requesting that this area be detached as a separate town. It wasn't until April 1741 that the General Assembly for the Colony of Rhode Island and Providence Plantations at the request of freemen of this area incorporated West Greenwich as a separate town.

1.4.2.2 Demographics

West Greenwich has historical population data dating back to 1748. The US Census estimates that West Greenwich's population was 6,683 in 2023.



Additional demographic information for West Greenwich's residents is below.

Total Population (2023)	6,683
% White race	88%
Median Age	43.7
Employment Rate	62.7%
Total Housing Units	2,509
Total Households	2,401
Average Family Size	2.89

Median Household Income	$137,485
Below the poverty level	1.8%
Bachelor's Degree or Higher	34.6%
Has Healthcare Coverage	98.9%

Source: US Census (2025)

1.4.2.3 Government

West Greenwich is governed by an elected five (5) member council.

1.4.2.4 Public Safety

West Greenwich has a police department and three volunteer fire departments to assist with public safety.

1.4.2.5 Forest and Open Space

The sense of openness in the Town is due to large areas dedicated to public use. These areas total nearly 13,000 acres.

- Arcadia Management Area (14,000+ acres)
- University of Rhode Island W. Alton Jones Campus (2,327 acres)
- Big River Wildlife Management Area (8,319 acres)
- Wickaboxet Wildlife Management Area (722 acres)
- Beach Pond State Park (372 acres)
- Other public lands

1.4.2.6 Water Resources

There are several water bodies in West Greenwich that provide groundwater recreational resources to residents and visitors. Specific examples include:

- The Wood-Pawtucket Watershed is Rhode Island's only federally recognized area in the Wild and Scenic River Program, making it eligible for federal preservation funding.
- Big River Management Area: A large area managed by the Rhode Island Department of Environmental Management, encompassing Carr Pond and other water bodies.
- Mishnock Aquifer: A rich groundwater resource located under and around Lake Mishnock, serving as a drinking water source for residents in West Greenwich and Coventry.

2. PLANNING PROCESS

This section provides an overview of the planning process; identifies the key collaborators and HMPCs members, documents public outreach efforts, and summarizes the review and incorporation of existing plans, studies, and reports used to update this MJHM&FMP. Meeting information regarding the HMPCs and public outreach efforts are included below, and outreach support documents are provided in Appendix D- Public Outreach Activities.

This section addresses Element A of the Local Mitigation Plan regulation checklist.

Regulation Checklist- 44 Code of Federal Regulations (CFR) § 201.6 Local Mitigation Plans
ELEMENT A. Planning Process
A1. Does the plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement 44 CFR § 201.6(c)(1)) A1-a. Does the plan document how the plan was prepared, including the schedule or time frame and activities that made up the plan's development, as well as who was involved? A1-b. Does the plan list the jurisdiction(s) participating in the plan that seek approval, and describe how they participated in the planning process? A2. Does the plan document an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development as well as businesses, academia, and other private and non-profit interests to be involved in the planning process (Requirement 44 CFR § 201.6(b)(2)) A2-a. Does the plan identify all stakeholders involved or given an opportunity to be involved in the planning process, and how each stakeholder was presented with this opportunity? A3. Does the plan document how the public was involved in the planning process during the drafting stage and prior to plan approval? (Requirement 44 CFR § 201.6(b)(1)) A3-a. Does the plan document how the public was given the opportunity to be involved in the planning process and how their feedback was included in the plan? A4. Does the plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement 44 CFR § 201.6(b)(3)) A4-a. Does the plan document what existing plans, studies, reports and technical information were reviewed for the development of the plan, as well as how they were incorporated into the document?
Source: FEMA 2025 (Local)

CRS Activity 510 Planning Process- Credit Checklist
Step 1. Organize and Prepare the Plan (Max 15 credits)
1a. Involve your community's land use and comprehensive planning office (4 credits) 1b. Include your community departments that implement the activities listed in Step 7 in the planning committee, such as building department, code enforcement, engineering, land use planning, zoning, public works, emergency management, public safety, public information, environmental protection, public health, parks and recreation, housing and community development, and council members (9 credits) 1c. Formally recognize the planning process and/or committee through the governing body (2 credits)
Step 2. Involve the Public (Max 120 credits)
2a. Planning process conducted through a planning committee (60 credits) 2b. Public meetings held at the beginning of the planning process (15 credits) 2c. Public meeting held on draft plan (15 credits) 2d. Other public information activities to encourage input (Up to 30 credits)
Step 3. Coordinate with Other Agencies

CRS Activity 510 Planning Process- Credit Checklist
3a. Review of existing studies and plans (required) (5) 3b. Coordinate with communities and other agencies (Up to 30)
Source: FEMA NFIP CRS Coordinator's Manual (2017), 2021 Addendum

2.1 Overview of the Planning Process

This MJHM&FMP Update follows the following FEMA Guidance for Planning:

- FEMA 2025 Local Mitigation Planning Policy Guide (Effective April 11, 2025)
- FEMA 2021 Addendum to the 2017 CRS Coordinator's Manual

Exeter and West Greenwich each completed HMPs in 2005 and are now creating a Multi-Jurisdictional Hazard Mitigation Plan update to include meeting Floodplain Management Plan requirements.

The Towns of Exeter and West Greenwich initiated this planning effort on September 11, 2024. This HM&FMP Update is the result of a dedicated group of individuals working on an expedited timeline (~9 months) to identify natural hazards and propose ways to improve Exeter and West Greenwich's resilience to these events.

The Towns hired a consultant, Fairweather Science, LLC, to assist with this planning effort. The Resolution Collaborative, LLC, joined the team to assist with public engagement and local meeting facilitation. All meetings complied with Rhode Island's Open Meetings policies, and the public was notified of all meetings at least 48 hours in advance of the meeting and were invited to participate virtually or in-person. Two dedicated public meetings/workshops were held during the planning process.

Table 3 provides a summary of the HMPC meeting dates and the activities that were conducted to update this MJHM&FMP.

Table 3- Overview of Project Meetings and Other Important Dates

Date	Agenda
9/11/2024	**Internal Introduction Meeting** Team introductions; project overview and expedited schedule; discuss HMPC members/players; set date for formal kickoff + risk assessment workshop with HMPCs. In attendance: Dori Boardman (Exeter), Brooke Lawrence (West Greenwich), Chief Richard Ramsay (West Greenwich), Laura Young, Olivia Kavanaugh, Mason Page (Fairweather Science, LLC)
9/30/2024	Fairweather Science met with Michael Walsh, English Teacher and Senior Capstone Coordinator, at the Exeter-West Greenwich High School to discuss student engagement in the HMP planning process. While most of the senior class have already selected their capstones for the year, Mr. Walsh offered to present the HMP Update project to the class to see if anyone was interested in joining the Planning Team as a student representative or assisting with community engagement in the planning process. Hard copies of the project survey were delivered to the Exeter Library and Louttit Library in West Greenwich to engage the vulnerable/underserved populations in the community in the planning process.
10/2/2024 1pm	**HMPC Kickoff + Risk Assessment Workshop** Project overview; project goals review and update; hazard screening; RI disaster declarations since 2005 and impacts to the Towns of Exeter and West Greenwich; High Hazard Potential

Date	Agenda
	Dams; status of mitigation projects from 2005 HMPs; new projects; critical facilities; community lifelines, underserved/vulnerable populations, neighboring communities, project collaborators; methods of engaging the public (Town websites, social media, email lists), public survey/ArcGIS StoryMap; project schedule. The purpose of this meeting was to introduce the project to the HMPCs and gather information from the HMPCs to inform the Risk Assessment. This meeting was held in the Community Room behind the Louttit Library in West Greenwich. Members of the public/collaborators in attendance: Nicholas Johnson (RIDOT Planning- flood), Jacob Friederich (WG resident)
10/2/2024 6pm	**Public Kickoff + Risk Assessment Workshop** Project overview; project goals review and update; hazard screening; RI disaster declarations since 2005 and impacts to the Towns of Exeter and West Greenwich; High Hazard Potential Dams; status of mitigation projects from 2005 HMPs; new projects; critical facilities; community lifelines, underserved/vulnerable populations, neighboring communities, project collaborators; methods of engaging the public (Town websites, social media, email lists), public survey/ArcGIS StoryMap; project schedule. The purpose of this meeting was to introduce the project to the public and gather information from the public to inform the Risk Assessment. This meeting was held in the Community Room behind the Louttit Library in West Greenwich. Members of the public/collaborators in attendance: Erin Ingebretsen (Boone Lake Dam Management District- Exeter)
11/1/2024	Loraine Della Porta of The Resolution Collaborative conducted in person interviews and data collection in West Greenwich and Boone Lake. The purpose of these interviews was to complete surveys with residents that may not have access to the electronic survey. Six surveys were completed noting that several residents declined to fill out a survey but did provide information regarding hazard events, loss of power during storms, and appreciation of the Town's response to restoring power and plowing roads. Many expressed pride in their local officials.
1/1/2025	**Internal Review of Draft Risk Assessment** Address any HMPC comments or edits on the Draft Risk Assessment before it is available for public/collaborator review.
1/16/2025 – 2/14/2025	Public Risk Assessment review period
1/21/2025 1pm	**HMPC Mitigation Strategy Workshop** Discuss statuses of actions identified in the 2005 HMPs; review and prioritize a comprehensive list of mitigation projects; discuss capability assessment; plan maintenance/annual review and continued public involvement strategy. Members of the public/collaborators in attendance: Charlene Butler (WG resident), Robert Butler (WG resident)

Date	Agenda
1/21/2025 5:30 pm	**Public RA Review + Mitigation Strategy Workshop** This meeting was an opportunity for the public to provide comments on the Draft Risk Assessment and suggest mitigation actions. A summary of selected/prioritized mitigation actions was discussed with the public. Members of the public/collaborators in attendance: Stephen Salisbury (WG Town Council Member, Susan Mayo (WG resident), Dennis Mayo (WG resident)
3/21/2025- 4/2/2025	**Internal Review of Draft MJHM&FMP** Address any comments or edits on the Draft MJHM&FMP before it is available for public/ collaborator review.
4/3/2025 – 5/20/2025	Draft MJHM&FMP public review period
5/14/2025 5 pm	**Public Review of Draft MJHM&FMP and Scavenger Hunt** This meeting was an opportunity for the public to provide comments on the Draft MJHM&FMP before it was submitted to the Town Councils for adoption and to RIEMA/FEMA for formal review and approval. The results/survey responses of the Draft HM&FMP Scavenger Hunt were presented, and prizes were awarded. Members of the public/collaborators in attendance: While no members of the public attended the meeting, four public members participated in the Scavenger Hunt.

2.2 Exeter and West Greenwich Hazard Mitigation Planning Committees

This Multi-Jurisdictional Hazard Mitigation and Floodplain Management Plan Update is a product of the Exeter and West Greenwich HMPCs, which was formally created by the Towns of Exeter and West Greenwich Town Councils. The Exeter HMPC was led by the Town EMA Director, Dori Boardman, and the West Greenwich HMPC was led by the Town EMA Director, Brooke Lawrence, and the Chief of Police, Richard Ramsay.

The HMPC Leads invited current Town Employees and members of the public to participate in the HMPC based on their roles in the Town EMAs, subject matter expertise, and the specific participation requirements for CRS Activity 510.

HMPC members included:

Table 4- Towns of Exeter and West Greenwich Hazard Mitigation HMPCs

Name	Role/Position	HMPC Meeting Attendance						
		10/2/24 1pm	10/2/24 6pm	1/15/2025	1/21/25 1pm	1/21/25 6pm	3/28/25	5/14/25
Exeter HMPC								
Dori Boardman	Exeter HMPC Lead, EMA Director	x	x	x	x	x	x	x
Ken Findlay	Exeter Town Council Liaison							
Calvin Ellis	Town Council Member							
James Angi	IT Director							
Tien Tran	Exeter Library Director	x		x				
Jessica DeMartino	Social Services Director, PIO	x						
Bill DePasquale	Town Planner, Community Development/ Zoning, Permitting, NFIP/Floodplain Administrator	x						
Rob Shappy	Building Official, Public Works, Building/Plumbing/Electrical/Mechanical Inspector	x		x				
Kerri Petrarca	Tax Assessor/GIS Specialist	x						
Lynn Hawkins	Town Clerk							
Maria Lawler	Treasurer	x					x	
Sue Hawksley	Exeter Fire Marshal	x		x	x		x	
Ron DeFrancesco	Building Official							
Scote Miller	Town Sergeant							
Tom McMillan	Resident, Former EMA Director	x		x	x			
Bonnie Blair	Resident							
Sam Adams	University of Rhode Island EMA Director				x			
West Greenwich HMPC								
Brooke Lawrence	West Greenwich HMPC Lead, EMA Director	x	x	x	x	x	x	x
Richard Ramsey	Chief of Police, PIO, Public Safety Commissioner	x			x	x	x	x
David Provonsil	Town Planner, Zoning, Engineer, NFIP/Floodplain Administrator	x		x	x			
David Tacey	Building Official, Public Works, Permitting, Plumbing & Zoning Inspector	x		x			x	

Name	Role/Position	HMPC Meeting Attendance						
		10/2/24 1pm	10/2/24 6pm	1/15/2025	1/21/25 1pm	1/21/25 6pm	3/28/25	5/14/25
Charlene Randall	Tax Assessor/Collector, IT, GIS							
Claude Wright	DPW Director	x			x			
Kevin Breene	Town Administrator	x			x			
Michael DeRosa	Fire Marshal	x					x	
James Tiernan	Police Officer	x		x			x	
Josh Wildes	Hianloland Fire Co	x						
Peter Gardner	Lake Mishnock Fire Dept	x						
Dave Andrews Jr.	West Greenwich Fire Dept	x						
Rich Patterson	Fire Chief- Hianloland Fire Co		x					
Mark Cary	West Greenwich EMS	x						
HMP Consultants								
Laura Young	Project Manager- Fairweather Science, LLC	x	x	x	x	x	x	x
Olivia Kavanaugh	Mitigation Planner- Fairweather Science, LLC	x	x	x	x	x	x	x
Mason Page	Mitigation Planner- Fairweather Science, LLC	x	x	x	x	x	x	x
Cooper Calahan	Mitigation Planner- Fairweather Science, LLC							x
Malcolm Yerkes	Mitigation Planner- Fairweather Science, LLC							x
Elizabeth Dean	Mitigation Planner- Fairweather Science, LLC							
Loraine Della Porta	Public Engagement- The Resolution Collaborative, LLC			x	x	x		x

Several planning team members did not attend the scheduled meetings but did support the project and coordinated directly with the planning team leads and contractor.

2.3 Opportunities for Collaborators and Other Interested Parties to Participate

The HMPCs extended an invitation to all individuals and entities identified on the project mailing list in which they described the planning process and announced the upcoming planning activities. The announcement was emailed to relevant academia, nonprofits, and local, state, and federal agencies on 9/24/2024. A notification of availability and request for review of the Draft Risk Assessment was emailed on 1/17/2025. A notification of availability and request for review of the Draft HMP Update was emailed on 5/7/2025.

The following agencies, neighboring communities, and community collaborators were invited to participate in and review the MJHM&FMP Update:

Federal Agencies		
American Red Cross, RI Chapter	HUD- Rhode Island	USACE- New England District
BLM- Northeastern States	NWS Boston Office	USDA- Natural Resource Conservation Service
EPA- Rhode Island	Rhode Island National Guard	USGS- Rhode Island
FEMA Region 1	HUD- Rhode Island	USACE- New England District
State Agencies		
Crossroads Rhode Island	RI Department of Public Utilities	RIDEM- Wildland Fire Supervisor
Kent County Water	RI Department of Transportation (RIDOT)	State Fire Marshal's Office
Northern RI Chamber of Commerce	RI Division of Statewide Planning	State Floodplain Coordinator
Providence Water Supply Board	RI Energy	State Mitigation Planning Supervisor
RI Coastal Resources Management Council	RI Housing	State Planning Branch Chief
RI Department of Commerce	RI Rehabilitation Code Board	State Representative- Julie Casimiro
RI Department of Education	RI Water Resources Board	State Representative- Justine Caldwell
RI Department of Health	RIDEM- Chief Resiliency Officer	State Representative- Megan Cotter
RI Department of Human Services	RIDEM- Dam Safety	State Representative- Sherry Roberts
RI Department of Public Safety	RIDEM- Department of Parks and Recreation	University of Rhode Island
Local Agencies/Partners		
Boone Lake Management District	Exeter-West Greenwich Junior High School	Reynolds Charitable Trust
Chestnut Hill Baptist Church	Exeter-West Greenwich Schools Administration	The Greene School (Charter)
Coventry-West Greenwich Lions Club	Exeter-West Greenwich Senior High School	Wawaloam Elementary School
Exeter Chapel	Genesis Church	West Greenwich Rural Land Trust
Exeter Food Bank	Lineham Elementary School	West Greenwich Town Council
Exeter Grange	Metcalf Elementary School	
Exeter Town Council	Pine View Apartments	

Throughout the planning process, project collaborators were contacted for information to update this HM&FMP. Specific outreach activities included:

Contact Date	Agency	Name and Position	Information Requested	Response?
10/18/24	RIEMA	**Morgan Reilly** State Floodplain Coordinator	Updated NFIP/Repetitive Loss data for Section 4.3	Yes- 10/23/24
10/21/24	RIDEM	**Stacey Pinto** Environmental Engineer III/Dam Safety Compliance	Information on historical dam failures, particularly Boone Lake Dam	Yes- 10/22/24
10/22/24	RIDEM	**Jason Caswell** Oil Hazardous Materials Specialist II	Hazardous materials spill/ release data	Yes - 10/31/24
10/31/24	RIDOT	**Christos Xenophontos** Assistant Director of Administrative Services	Hazardous materials spill/ release data	Yes - 10/31/24, referral to Stephen Kut
10/31/24	RIDOT	**Stephen Kut** Office of Asset Information Systems	Hazardous materials spill/release data	Yes - 11/1/24
11/7/24	RIDOH	**Amy Parmenter** Chief Administrator Division of Environmental Health	Information on PFAS in Rhode Island	Yes- 11/7/2024
11/7/24	RIDOH	**Dr. Zachary Shepard** Environmental Health Risk Assessment Toxicologist	Information on PFAS in Rhode Island	Yes - 11/8/2024
11/7/24	Wood Pawcatuck Watershed Association	**Christopher J. Fox** Executive Director	Information on 2010 flood impacts in Exeter	Yes- Provided information on the WPWA Flood Management Plan
11/8/24	RIDOT	**Craig Nazareth** Bridge Inspection and Load Ratings Database Information Manager	Inventory of bridges and culverts in Exeter & West Greenwich	Yes- 11/8/24
11/12/24	RIDOT	**Craig Nazareth** Bridge Inspection and Load Ratings Database Information Manager	Replacement values of roads, bridges, and culverts	Yes- 11/20/24

Neighboring Communities

While the Towns of Exeter and West Greenwich are independent communities that are self-sufficient, in the event of a disaster, they rely on neighboring communities to assist with response efforts.

Like all municipalities in Rhode Island, the Towns of Exeter and West Greenwich are included in a statewide mutual aid agreement, including communities across the Connecticut State Line, to aid one another in the event of a disaster, as necessary.

The following neighboring communities were invited to participate in the planning process as collaborators:

- Coventry, RI
- East Greenwich, RI
- Hopkinton, RI
- North Kingstown, RI
- Richmond, RI
- South Kingstown, RI
- West Warwick, RI
- Voluntown, CT

2.4 Public Input

This MJHM&FMP benefits from multiple public input strategies that were utilized by the HMPCs during the drafting process and prior to its adoption by the Town Councils. Public input for the 2025 MJHM&FMP was collected primarily through a public survey, project webpage (ArcGIS StoryMap), public meetings, and an invitation to comment on the draft risk assessment and draft MJHM&FMP.

Project Survey and Webpage/ArcGIS StoryMap

An ArcGIS StoryMap was created for this project to serve as a public outreach and education tool. The StoryMap provided a brief overview of the project, links to the 2005 HMPs, information on how the new plan will be utilized, a summary of each identified hazard along with relevant maps, an overview of the selected and prioritized mitigation strategy, a link to the project survey, and information on past and upcoming project meetings/workshops.

The StoryMap was regularly updated throughout the planning process and will serve as a tool to continue public involvement once the project is completed.

The online public survey was shared on each of the Towns' websites, available social media accounts, and the link was attached to each public meeting notification and invitation. Residents also shared the survey in various private Facebook groups.

Loraine Della Porta of The Resolution Collaborative conducted in person interviews and data collection in West Greenwich and Boone Lake. The purpose of these interviews was to complete surveys with residents that may not have access to the electronic survey.

The survey was active from September 24, 2024, to May 20, 2025. A total of 35 survey responses were received.

Public Meetings

For CRS requirements, three dedicated public meetings were held throughout the planning process.

The first public meeting was held on October 2, 2024, to introduce the project to the public and gather information from the public to inform the Risk Assessment.

The second public meeting was held on January 21, 2025, to provide an opportunity for the public to provide comments on the Draft Risk Assessment and suggest mitigation actions.

The third public meeting was held on May 14, 2025, to provide an opportunity for the public to provide comments on the Draft MJHM&FMP before it was submitted to the Town Councils for adoption and to RIEMA/FEMA for formal review and approval.

In compliance with Rhode Island's Open Meetings Act, all HMPC meetings were open to the public. Meetings had the option of in-person participation as well as a Microsoft Teams link to join the meeting virtually.

Public Review Periods

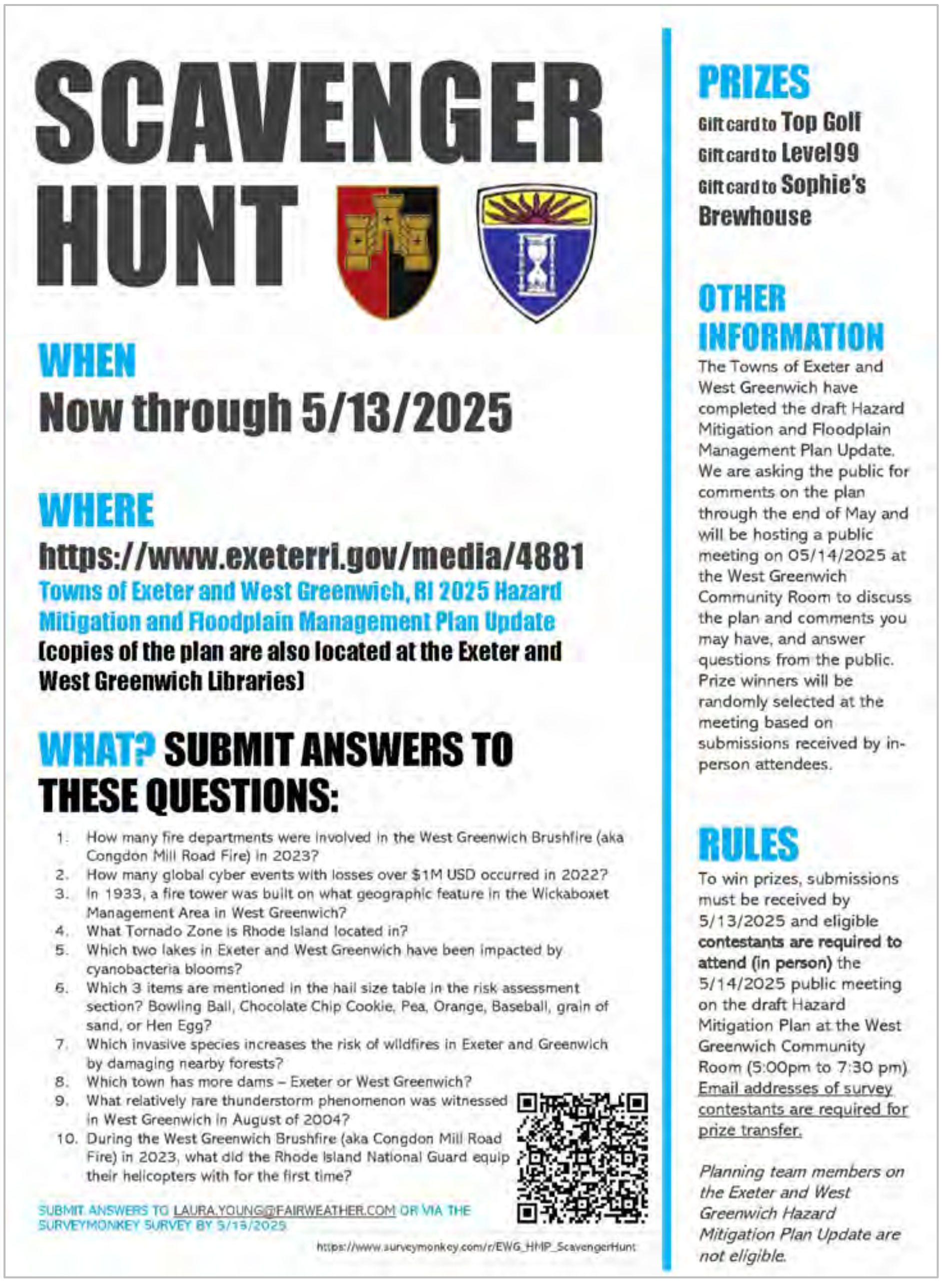
The public was provided with two (2) opportunities to comment on the draft plan before it was submitted to RIEMA and FEMA for review.

The first public review period was for the Draft Risk Assessment, which lasted from January 16, 2025, to February 14, 2025. Notifications of the availability of the Draft Risk Assessment were made through the Towns' website, social media, and applicable mailing lists. The Draft Risk Assessment was available on the Towns' website and hard copies along with comment logs were available at the Exeter Public Library and Louttit Library in West Greenwich.

The second public review period was of the Draft MJHM&FMP, which lasted from April 3, 2025, to May 20, 2025. The public was notified of these review periods through the Towns' websites as well as through posts on the Towns' Facebook page(s). The Draft MJHM&FMP was available on the Towns' website and hard copies along with comment logs were available at the Exeter Public Library and Louttit Library in West Greenwich.

The Towns created a Draft MJHM&FMP scavenger hunt for the public to submit responses to enter a drawing for gift cards to local establishments. The goal of the scavenger hunt was to increase public involvement during the final public review period. The scavenger hunt consisted of 10 questions with answers to be found in the Draft MJHM&FMP. The scavenger hunt was available from April 30, 2025, through the final public meeting on May 14, 2025.

Public notifications of the scavenger hunt were made on the Towns's website and Facebook pages, as well as through paper notices in the Town Libraries. Additionally, The Resolution Collaborative team handed out and posted nearly 100 paper flyers in both Towns, including coffee shops, diners, liquor and convenience stores, pre-school/daycare centers, a nursing home, and a gym. The team was able to introduce the project to the public as they were handing out flyers and answered questions to those interested in the process. A total of four (4) scavenger hunt responses were received.



Underserved & Vulnerable Populations

The Town of Exeter defines their underserved and vulnerable populations as the elderly, those with limited or no access to transportation or technology, the teen resource center, and the mental health center. There are no senior/assisted living facilities in Exeter.

The Town of West Greenwich defines their underserved and vulnerable populations as the elderly, those who live in the western portion of the Town, west of I-95. These residents are mostly older in age and are "cut off" from the developed areas in the eastern portion of the Town. This area is the first to lose power during a hazard event and emergency services are ~15 minutes away. In addition, houses in this area have long and windy driveways, making it difficult for emergency services to navigate.

More information on underserved/vulnerable populations in West Greenwich is described below:

> *West Greenwich does not contain any environmental justice communities, per se. As a rural, outlying Town, incorporated in 1741, the historic and previous uses of the lands were farming and logging, which did not inflict any significant harm to the environment. There is not a particular segment of our population that would be considered an underserved, marginalized or adversely affected group. After Route 95 sliced through the Town in the late 1960's, the west side, out to the Connecticut border, remained rural, with sparse residential development. The east side, supported by Route 95 interchanges, had significant commercial development and the Mishnock area became the Town's only true neighborhood, through beach house conversion.*

Underserved populations were engaged in the planning process by being provided with paper copies of the survey to provide input on natural hazards in their Town. Printed surveys were available at the Exeter Public Library and Louttit Library in West Greenwich.

In efforts to engage the underserved and vulnerable populations and residents with limited internet usage in the public review periods, paper copies of the Draft Risk Assessment and Draft MJHM&FMP along with comment forms were available at the Town Libraries for the public to review and provide comments.

On November 1, 2024, additional outreach was conducted to collect survey responses from the vulnerable population in Western West Greenwich. It is reported that many in this area are older and some may not have access to technology, and few survey responses had been received from this population. HMP consultant, Lorraine Della Porta, targeted this area on foot and was able to get survey responses from 5 West Greenwich residents and 1 resident that lives in Exeter who happened to be walking her dog with a friend.

Feedback received from the public was used in confirming natural hazards that impact the Towns, level of concern of each hazard, and critical facilities that the public relies on. Additionally, the HMPCs reviewed the list of mitigation projects that the public suggested and selected/prioritized those that the HMPCs wanted to pursue.

Outreach support documents and survey results are provided in Appendix D- Public Outreach Activities.

2.5 Review and Incorporation of Existing Plans, Studies, and Reports

During this MJHM&FMP update, the HMPCs reviewed and incorporated pertinent information from available resources since the 2005 HMPs were completed. Newly collected data included available plans, studies, reports, and technical research listed in Table 5. The new data was reviewed and referenced throughout the document.

Table 5- Documents Reviewed

Plans, studies, reports, ordinances, etc.	Contents Summary	Data Incorporation
2005 Town of Exeter Hazard Mitigation Plan	Review past hazard events, mitigation activities, and planning processes.	Compared hazard profiles, history, and impacts of events for the hazard profiles.
2005 Town of West Greenwich Hazard Mitigation Plan		
2024 State of Rhode Island Hazard Mitigation Plan (SHMP)	Defines statewide hazards and their potential impacts.	Compared hazard profiles, history, and impacts of events for hazard profiles. Source of most current statewide hazard information.

Plans, studies, reports, ordinances, etc.	Contents Summary	Data Incorporation
West Greenwich Municipal Resilience Program Community Resilience Building Summary of Findings: June 2023	Summarizes the top hazards, concerns and challenges from hazards, strengths and assets, and recommendations to improve resilience in the Town.	Information was used throughout the hazard profiles specifically historical impacts, and as a foundation to develop the mitigation strategy and critical facilities list.
Exeter Municipal Resilience Program Community Resilience Building Summary of Findings: August 2024		
Rhode Island 2022 Climate Update Report	Provides future climate conditions trends in Rhode Island.	Used information in hazard profiles to discuss the influence of future climate conditions on the hazard.
2018 Resilient Rhody- An Actionable Vision for Addressing the Impacts of Climate Change in Rhode Island	A comprehensive report outlining the State's climate resilience action strategy.	Used information in hazard profiles to discuss the influence of future climate conditions on the hazard.
2016 EC4 STAB Current State of Climate Science in Rhode Island report	Provides an overview of statewide impacts of future climate conditions.	Used information in hazard profiles to discuss the influence of future climate conditions on the hazard.
2024-2044 Exeter Comprehensive Plan	Sets forth a vision and goals for the Towns' future and provides the overall foundation for all land use regulation in the community.	Cited information from the Plan throughout the MJHM&FMP such as community background information, land use information, future goals of the Towns, and various figures and maps.
2025 Draft West Greenwich Comprehensive Plan (in progress)		
West Greenwich Brushfire aka Congdon Mill Road Fire After-Action Report/ Improvement Plan	Provides information on the incident, key findings, and areas for improvement for future events.	Information used in Brushfire hazard profile; suggested actions used in mitigation strategy
Exeter Brushfire a.k.a. Queens River Preserve Fire After-Action Report/ Improvement Plan		
RIDEM Cyanobacteria Monitoring Program Reports (2011-2023)	Provides details of annual activities for the cyanobacteria monitoring program.	Information used in the Water Quality profile to describe historical cyanobacteria issues in Exeter and West Greenwich.
USACE National Inventory of Dams Database	Database that provides information on all dams in the United States	Database references during drafting of MJHM&FMP to document dam information.
RIDEM 2019-2023 Annual Reports to the Governor on the Activities of the Dam Safety Program (RIDEM 2020b, 2021a, 2022, 2023 2024)	Provides an overview of dams in Rhode Island, activities performed since 2018, details on unsafe dam conditions, limitations of the State Dam Safety program.	Information on dams in Exeter and West Greenwich cited in the Dam Failure section.
Boone Lake Dam Reservoir Dam Downstream Impact Analysis (RIDEM 2002a)	Summarizes downstream impact area, downstream description, hazard potential assessment, and inundation mapping.	Used information on potential downstream impacts due to a dam failure, Inundation mapping used as basis of dam failure loss estimation.
Yorker Mill Pond Dam Downstream Impact Analysis (RIDEM 2002b)		
Slocum Reservoir Dam Downstream Impact		

Plans, studies, reports, ordinances, etc.	Contents Summary	Data Incorporation
Analysis (RIDEM 2007a)		
Metcalf Wildlife Marsh Dam Downstream Impact Analysis (RIDEM 2007b)		
Browning Mill Pond Dam Downstream Impact Analysis (RIDEM 2007c)		
Edward's Pond Dam Downstream Impact Analysis (RIDEM 2007d)		
Edward's Pond Dam Visual Inspection/ Evaluation Report (RIDEM 2012)		
Browning Mill Pond Dam Visual Inspection/ Evaluation Report (RIDEM 2014)		
Slocum Reservoir Dam Visual Inspection/ Evaluation Report (RIDEM 2019)		
Yorker Mill Pond Dam Visual Inspection/ Evaluation Report (RIDEM 2021a)		
Metcalf Wildlife Marsh Dam Visual Inspection/Evaluation Report (RIDEM 2021b)		
Boone Lake Dam Visual Inspection/ Evaluation Report (RIDEM 2022a)		
Boone Lake Dam Emergency Action Plan (RIEMA 2022)	Outlines emergency procedures and communication protocols in the event of a dam failure.	Reviewed during the development of the Dam Failure hazard profile.
FEMA NFIP CRS Coordinator's Manual (2017), 2021 Addendum	Provides the framework to develop a Floodplain Management Plan for CRS credit for Activity 510.	Information referenced throughout planning process to develop the Floodplain Management Plan portion of the document for CRS credit and to support the Flood hazard profile.
FEMA Floodplain Maps	Documents FEMA mapped flood hazard areas	
Developing a Repetitive Loss Area Analysis for Credit under Activity 510 (Floodplain Management Planning) of the Community Rating System (2017)	Provides details on how to map repetitive loss areas.	
FEMA Mitigation Planning and the Community Rating System: Key Topics Bulletin (October 2018)	Provides a comparison of requirements of a HMP and a FMP to achieve CRS credits.	
A Short History of Exeter Rhode Island by Florence Parker Simister (1978)	History of the Towns of Exeter and West Greenwich; historical hazard events and impacts, including pictures.	Information on historical events referenced throughout hazard profiles and community profile.
Historical newspapers (2004-2023)		
Bits and Pieces of West Greenwich Memoranda by Roberta Baker (1976)		
Images of America: West Greenwich by Kathleen A. Swann (2011)		
In the Shadow of the Trees by Mathias P.		

Plans, studies, reports, ordinances, etc.	Contents Summary	Data Incorporation
Harpin and Waite Albro (2003)		
A Stitch in Time: A Historical Sampler of Exeter and West Greenwich by the Talented and Gifted Program of Metcalf School (1989)		
Eminent Domain Violated in Rhode Island: The Big River Reservoir Project by Victor Moffitt (2015)	Historical context of the Big River Reservoir Project in the 1960s.	Reviewed during the development of the Dam Failure hazard profile.

A complete list of references used to update this MJHM&FMP is provided in Section 9.

3. RISK ASSESSMENT

This section identifies and profiles the natural hazards that could affect the Towns of Exeter and West Greenwich, as well as other hazards that are unique to each jurisdiction.

This section addresses a portion of Element B and Element G of the Local Mitigation Plans regulation checklist.

Regulation Checklist- 44 CFR § 201.6 Local Mitigation Plans
ELEMENT B. Risk Assessment
B1. Does the plan include a description of the type, location, and extent of all natural hazards that can affect the jurisdiction? Does the plan also include information on previous occurrences of hazard events and on the probability of future hazard events? (Requirement 44 CFR § 201.6(c)(2)(i)) B1-a. Does the plan describe all natural hazards that can affect the jurisdiction(s) in the planning area, and does it provide the rationale if omitting any natural hazards that are commonly recognized to affect the jurisdiction(s) in the planning area? B1-b. Does the plan include information on the location of each identified hazard? B1-c. Does the plan describe the extent for each identified hazard? B1-d. Does the plan include the history of previous hazard events for each identified hazard? B1-e. Does the plan include the probability of future events for each identified hazard, including the type, location and range of anticipated intensities? B1-f. For participating jurisdictions in a multi-jurisdictional plan, does the plan describe any hazards that are unique to and/or vary from those affecting the overall planning area? B2. Does the plan include a summary of the jurisdiction's vulnerability and the impacts on the community from the identified hazards? Does this summary also address NFIP-insured structures that have been repetitively damaged by floods? (Requirement 44 CFR § 201.6(c)(2)(ii)) B2-b. For each participating jurisdiction, does the plan describe the potential impacts of each of the identified hazards on each participating jurisdiction?
Source: FEMA 2025 (Local)

Regulation Checklist- 44 CFR § 201.6 Local Mitigation Plans
ELEMENT G. High Hazard Potential Dams (HHPD) (Optional)
HHPD2. Did the plan address HHPDs in the risk assessment?
Source: FEMA 2025 (Local)

CRS Activity 510 Planning Process- Credit Checklist
Step 4. Assess the Hazard (Max 35 credits)
4a. Plan includes an assessment of the flood hazard (REQUIRED) with: (1) A map of known flood hazards (5 credits) (2) A description of known flood hazard (5 credits) (3) A discussion of past floods (5 credits) 4b. Plan includes assessment of less frequent floods (10 credits) 4c. Plan includes assessment of areas likely to flood (5 credits) 4d. The plan describes other natural hazards (REQUIRED FOR DMA) (5 credits)
Step 5. Assess the Problem (Max 52 credits)
5a. Summary of each hazard identified in the hazard assessment and their community impact (REQUIRED) (2 credits) 5b. Description of the impact of the hazards on: (Max 25 credits)

CRS Activity 510 Planning Process- Credit Checklist
(1) Life, safety, health, procedures for warning and evacuation (5 credits)
(2) Public health including health hazards to floodwaters/mold (5 credits)
(3) Critical facilities and infrastructure (5 credits)
(4) The community's economy and tax base (5 credits)
(5) Number and type of affected buildings (5 credits)
5c. Review of all damaged buildings/flood insurance claims (5 credits)
5d. Areas that provide natural floodplain functions (5 credits)
5e. Development/redevelopment/Population Trends (7 credits)
5f. Impact of future flooding conditions outlined in Step 4, item c (8 credits)
Source: FEMA NFIP CRS Coordinator's Manual (2017), 2021 Addendum

3.1 Overview

Hazard identification is the process of recognizing any natural events that may threaten an area. Natural hazards result from uncontrollable or unexpected natural events of sufficient magnitude. This plan does include select man-made hazards including: High-Hazard Potential Dams, Hazardous Materials Incidents, Water Quality (PFAs and Cyanobacteria Blooms), and Cybersecurity. This plan does not include other man-made technological or terrorism related hazards. Historical hazards are noted, but all natural hazards that have the potential to affect the study area are considered.

A hazard analysis includes the identification, screening, and profiling of each hazard.

Hazard profiling entails describing hazards in terms of their nature, history, location, magnitude, frequency, extent, and probability. Hazards are identified through historical and anecdotal information collected by members of the community, previous mitigation plans, studies, and study area hazard map preparations/reviews, when appropriate. Hazard maps are then used to define the geographic extent of a hazard, as well as define the approximate boundaries of the risk area within each jurisdiction.

3.2 Hazard Identification and Screening

The 2005 Exeter Hazard Mitigation Plan, the 2005 West Greenwich Hazard Mitigation Plan, and the 2024 State of Rhode Island Hazard Mitigation Plan were used as a starting point for identifying hazards that pose a threat to the Towns of Exeter and West Greenwich. Some standalone hazards identified in the 2005 HMPs were combined into a single hazard profile to align with the 2024 State of Rhode Island HMP. These are noted below.

The following table summarizes the hazards identified by the HMPCs and their impact on the Towns of Exeter and West Greenwich.

Table 6- Hazards Identified by the Exeter and West Greenwich HMPCs

<table>
<tr><th rowspan="2">Hazard</th><th colspan="2">Applicable?
Updated hazard from 2005 HMP or new hazard?</th><th rowspan="2">Hazard Summary</th></tr>
<tr><th>Exeter</th><th>WG</th></tr>
<tr><td>Severe Thunderstorm (Wind, Lightning, Hail)</td><td>✓
Updated</td><td>✓
Updated</td><td>All of Exeter and West Greenwich are susceptible to impacts from severe thunderstorms.
The entire State of Rhode Island falls in the 18-27 thunderstorms per year category. Exeter falls in the category of 1-2 lightning strikes per square kilometer per year and West Greenwich falls in the category of 2-4 lightning strikes per square kilometer per year.</td></tr>
<tr><td>Dam Failure</td><td>✓
Updated</td><td>✓
New</td><td>There are a total of 36 dams in Exeter (4 High hazard, 2 Significant hazard, 30 Low hazard) and 27 in West Greenwich (27 Low hazard).
A High Hazard dam is one whose failure or mis-operation will result in a probable loss of human life. A Significant Hazard dam is one whose failure or mis-operation results in no probable loss of human life but may cause major economic loss, disruption of lifeline facilities or impact other concerns detrimental to the public’s health, safety, or welfare. A Low Hazard dam is one whose failure or mis-operation results in no probable loss of human life and low economic losses.</td></tr>
<tr><td>Flooding</td><td>✓
Updated</td><td>✓
Updated</td><td>Exeter and West Greenwich are threatened by riverine flooding. Exeter and West Greenwich are located over 18 miles inland from the Atlantic Ocean and are not directly threatened by coastal flooding, storm surge, or sea level rise.</td></tr>
<tr><td rowspan="2">Tropical & Extratropical Storms
(Hurricane & Nor’easter)</td><td>✓
Updated</td><td>✓
Updated</td><td rowspan="2">Although Exeter and West Greenwich are not coastal communities, the Towns’ relative proximity to the Atlantic Ocean renders them particularly susceptible to hurricanes and Nor’easters, which may result in the loss of human life and property. All of Exeter and West Greenwich are susceptible to the impacts of a hurricane or Nor’easter.</td></tr>
<tr><td colspan="2">These hazards were profiled separately in the 2005 HMPs, but are now combined into one hazard profile</td></tr>
<tr><td>Severe Winter Weather (Snow Storm, Ice Storm)</td><td>✓
Updated</td><td>✓
Updated</td><td>Exeter and West Greenwich are impacted annually by snow and ice storms. These events regularly cause downed powerlines which result in power outages for hours to days at a time.
On average, Exeter and West Greenwich receives 25-40 inches of snow per year. Ice storms pose driving hazards due to unsafe road conditions.</td></tr>
<tr><td>Brushfire</td><td>✓
Updated</td><td>✓
Updated</td><td>The forested areas of Exeter and West Greenwich are at the highest risk of fire.
In 2023, within days of each other, Exeter and West Greenwich each had record setting brushfires/wildfires.
The West Greenwich Brushfire aka Congdon Mill Road Fire occurred from April 12-14, 2023, and marked a significant and unprecedented event in the state's history. After more than five decades without a major wildfire, Rhode Island faced an immense challenge due to the brushfire's size and complexity. The West Greenwich brushfire consumed over 150 acres and posed a significant threat to thousands of acres of woodland. It was a historic event, not only for its size but also for the response it necessitated.
The 2023 Exeter Brushfire aka Queen River Preserve Fire occurred from April 14-16, 2023. The fire occurred just two days after the West Greenwich brushfire which was the first major brushfire in the state since the 1950s. This created both benefits and challenges as that fire brought significant resources into the state and provided a more rapid response to this incident, but it also created shortfalls</td></tr>
</table>

Hazard	Applicable? Updated hazard from 2005 HMP or new hazard?		Hazard Summary
	Exeter	WG	
			in needed resources such as wildland forestry hose. Due to the direct efforts and defensive actions of the firefighters, no homes were lost. They protected 30 homes that were threatened by the fire. Only a small hunting cabin was lost. The Exeter fire resulted in a state disaster declaration: FM-5464-RI
Drought	✓ New	✓ New	All of Exeter and West Greenwich are susceptible to droughts. Droughts increase the potential for brushfires/wildfires and negatively impact the agricultural industry in the Towns.
Extreme Temperatures	✓ New	✓ New	Extreme high/cold temperatures could have a serious impact on private and public structures, as well as the general population throughout Exeter and West Greenwich. Those most at risk of extreme temperatures are the elderly and those who work outside, or those that are experiencing homelessness.
Tornadoes	✓ Updated	✓ New	Tornadoes have not historically severely impacted Exeter and West Greenwich, but the HMPCs noted that tornadoes are increasing in frequency in Rhode Island. Available historical tornado data suggests that Rhode Island can expect future tornadoes to range from EF0 to EF2 on the Enhanced Fujita Scale (EF Scale).
Earthquake	✓ Updated	✓ Updated	Rhode Island is located on the North Atlantic tectonic plate and is in a region of historically low seismicity. Structures in Exeter and West Greenwich may be particularly vulnerable to the effect of a moderate to large earthquake as seismic design criteria are not required for either new building construction or old building renovation. Buildings that are most at risk from earthquakes are the old masonry buildings and large structures such as those in the Historic Districts.
Hazardous Materials Incident	✓ New	✓ New	Exeter and West Greenwich are at risk of being impacted by a hazardous materials incident as I-95 runs through both of the Towns. There are other major transportation routes through the communities, as well as truck stops. While there has not been a major incident in either community, there are smaller spills or incidents annually.
Water Quality (PFAS, Cyanobacteria)	✓ New	✓ New	In 2023, public water systems in Exeter and West Greenwich were tested for PFAS. No PFAS were detected in West Greenwich, but several systems in Exeter were detected above the interim state standard of 20 ppt and EPA drinking water standard of 70 ppt. RIDEM began monitoring for cyanobacteria in 2011, with biweekly monitoring for ponds that frequently bloom beginning in 2017. Since the cyanobacteria monitoring program began in 2011, an advisory was issued for Boone Lake in Exeter for the first time in 2023 and Lake Mishnock for the first time in 2024.

Hazard	Applicable? Updated hazard from 2005 HMP or new hazard?		Hazard Summary
	Exeter	WG	
Cybersecurity	✓ New	✓ New	Cyberattacks on critical infrastructure such as dams, traffic lights, and power grids have the potential to cause significant harm to public safety, the economy, the environment, and national security. Between 2019 and 2020, at least seven Rhode Island municipalities have fallen victim to a ransomware attack, according to Rhode Island State Police. One of those towns spent six figures unlocking its data. The Town of Exeter was included in this string of attacks. The Town of West Greenwich has not been impacted by a cybersecurity attack. In December 2024, the State of Rhode Island's health and social services program, RIBridges System, which is the state's program for Medicaid and SNAP benefits, was subject to a ransomware attack that has compromised personal information of hundreds of thousands of residents.

3.2.1 Hazards Not Profiled in this MJHM&FMP Update

- Coastal Flooding/Storm Surge: Coastal flooding/storm surge is not included in this MJHM&FMP due to Exeter and West Greenwich's inland location in central western Rhode Island.
- Coastal Erosion: Coastal erosion is not included in this MJHM&FMP due to Exeter and West Greenwich's inland location in central western Rhode Island.
- Riverine Erosion: Riverine erosion is not included in this MJHM&FMP. Minimal erosion occasionally occurs after flooding events but is not a concern for the Planning Team at this time. If the extent of erosion increases in the future, this hazard may be included in a future update of this Plan.

3.3 Hazard Profiles

The hazards selected by the HMPCs for profiling have been examined based on the following factors:

- Description (description/nature of the hazard)
- Location (hazard areas)
- History (previous occurrences)
- Extent (magnitude and severity)
- Impact (general/historical impacts associated with the hazard)
- Probability of Future Occurrence (annual likelihood of hazard occurring)
- Future Climate Conditions (how future climate conditions are influencing the hazard, changes in future population patterns, and changes in future land use development)

Each hazard is assigned a rating based on the following criteria for magnitude/severity (Table 7) and probability of future events (Table 8). Estimating magnitude and severity are determined based on historic events using the criteria identified in the following tables, which are consistent with the State of Rhode Island 2024 HMP Update.

Table 7- Hazard Magnitude/Severity Criteria

Magnitude/ Severity	Criteria
Significant	• Multiple deaths and severe injuries • Medium shutdown of some critical infrastructure and facilities • 20% to 50% of residential and 10-25% of commercial structures are severely damaged • Large impacts to local operations for long amounts of time
Limited	• Some injuries • Short shutdown of some critical infrastructure and facilities • Fewer than 10% of residential and commercial structures damaged • Small number of local operations impacted for short amounts of time
Negligible	• Minor injuries • No shutdown of critical infrastructure and facilities • Scattered incidental residential and commercial structure damages • Few or no operations impacted for short amounts of time

Table 8- Hazard Probability of Future Events Criteria

Probability	Criteria
Highly Likely	• Greater than 90% annual probability of occurring.
Likely	• Between 50-89.9% annual probability of occurring.
Possible	• Between 1-49.9% annual probability of occurring.
Unlikely	• Less than 1% annual probability of occurring.

The hazards profiled for the Towns of Exeter and West Greenwich are presented throughout the remainder of this section. The presentation order does not signify their importance or risk level.

Future Climate Conditions

Each HMPC decided to incorporate the influence of future climate conditions into each individual hazard rather than profile it as standalone hazard. General background information regarding future climate conditions in Rhode Island is described below.

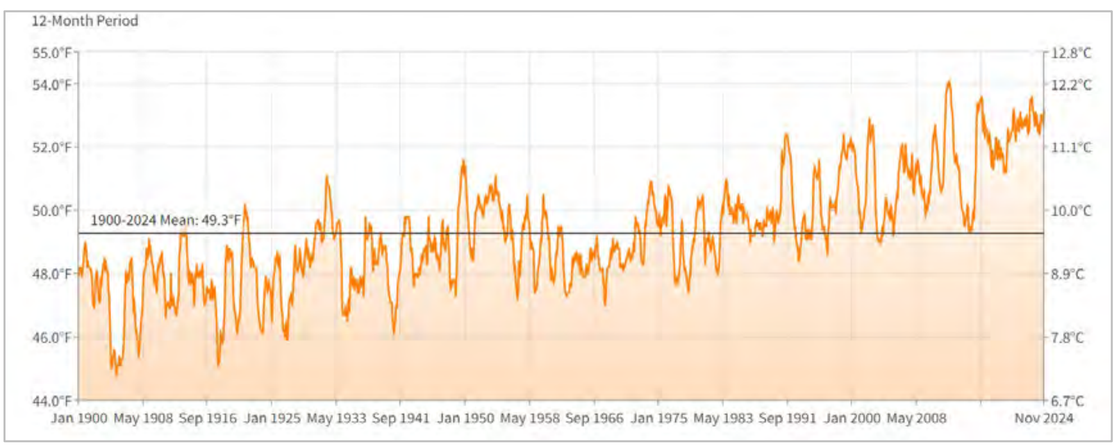
The NOAA National Centers for Environmental Information State Climate Summaries 2022 for Rhode Island (NCEI 2022) states:

Rhode Island's geographic position in the mid-latitudes often places it near the jet stream, particularly in the late fall, winter, and spring. The state's frequently changing weather is a result of the regular passing of low-pressure storms associated with the jet stream. In addition, Rhode Island's location on the East Coast of North America exposes it to the cold winter and warm summer air masses of the continental interior and the moderate and moist air masses of the western Atlantic Ocean. In winter, the contrast between the frigid air masses of the continental interior and the relatively warm Atlantic Ocean provides the energy for occasional intense storms known as nor'easters. In Providence, average temperatures in July are around 74°F and in January about 29°F. Statewide annual average precipitation is about 46 inches. The driest year on record (28 inches of precipitation) was 1965, while the wettest year on record (63 inches of precipitation) was 1972. Average accumulated snowfall ranges from 20 inches on Block Island and along the southeastern shores of Narragansett Bay to between 40 and 55 inches in the western portion of the state.

Temperatures in Rhode Island have risen almost 4°F since the beginning of the 20th century. The number of hot days has been above the long-term average since the 1990s with the greatest number occurring *during the most recent 6-year period of 2015–2020. The greatest number of warm nights also occurred during the 2015–2020 period. Very cold nights have been mostly below average since the mid-1980s, and the* [2015–2020 period] *was about average.*

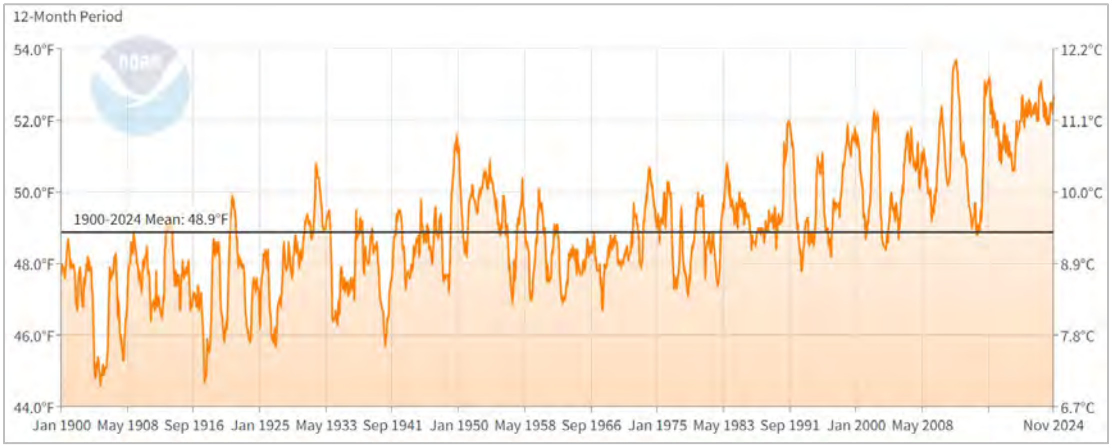
Total annual precipitation for Rhode Island has generally been above average in recent decades. The driest multiyear periods were the 1940s and the latter half of the 1960s and the wettest period was the 2000s, although precipitation has been predominantly above average since the 1970s. The driest consecutive 5 years was the 1962–1966 interval, and the wettest 5-year period was 2005–2009, with an annual average of 54 inches of precipitation, which was about 8 inches more than the long-term average. Since 2000, summer precipitation was above average until [2015–2020,] *which was below average. Rhode Island experienced the largest number of 2-inch extreme precipitation events in the 10-year period of 2005–2014. In 2010, major rainfall from a nor'easter in late March caused the worst flooding in the state's history. This event set an all-time monthly precipitation record in Providence of 16.34 inches, superseding the previous record of 15.38 inches, which was recorded in October 2005. The flooding of 2010 resulted in an estimated $43 million in national flood insurance claims in the state. Rhode Island experienced severe drought in 2016 and extreme drought in 2020, straining water supplies.*

Extreme weather events common to Rhode Island include severe storms (coastal, winter, and thunderstorms), often accompanied by flooding, and on occasion, tropical storms, and hurricanes. The state's coastline is highly vulnerable to flood damage from winter and hurricane events. Landfalling hurricanes produced hurricane-force winds in Rhode Island 6 times from 1900 to 2019. The Great New England Hurricane (Category 3) of 1938 was one of the most destructive and powerful storms ever to impact southern New England. Storm tides of 12 to 15 feet were recorded for Narragansett Bay, and downtown Providence was submerged under a storm tide of 20 feet. In October 2012, Superstorm Sandy (a post-tropical storm) caused a storm surge 9.4 feet above normal high tide in Providence, resulting in extensive coastal flooding. One year earlier, Hurricane Irene brought heavy rainfall and strong southeast winds of up to 70 mph, knocking down power lines and leaving half of Rhode Island's one million residents without power. Both hurricanes demonstrated the region's vulnerability to extreme weather events. (NCEI 2022)



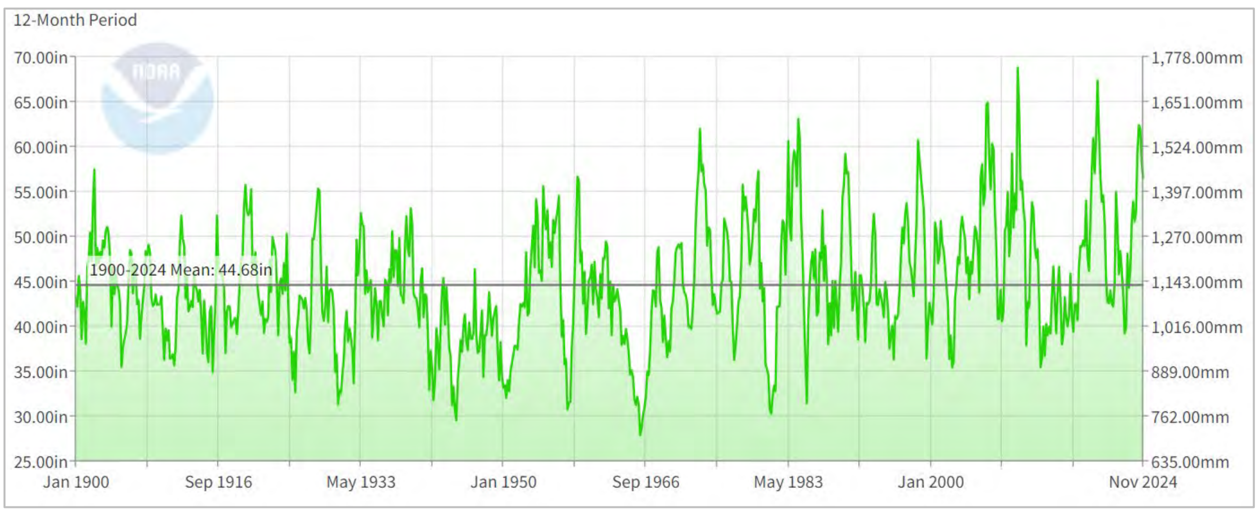
Source: NCEI 2024

Figure 2- Washington County Average Temperature, 1900-2024



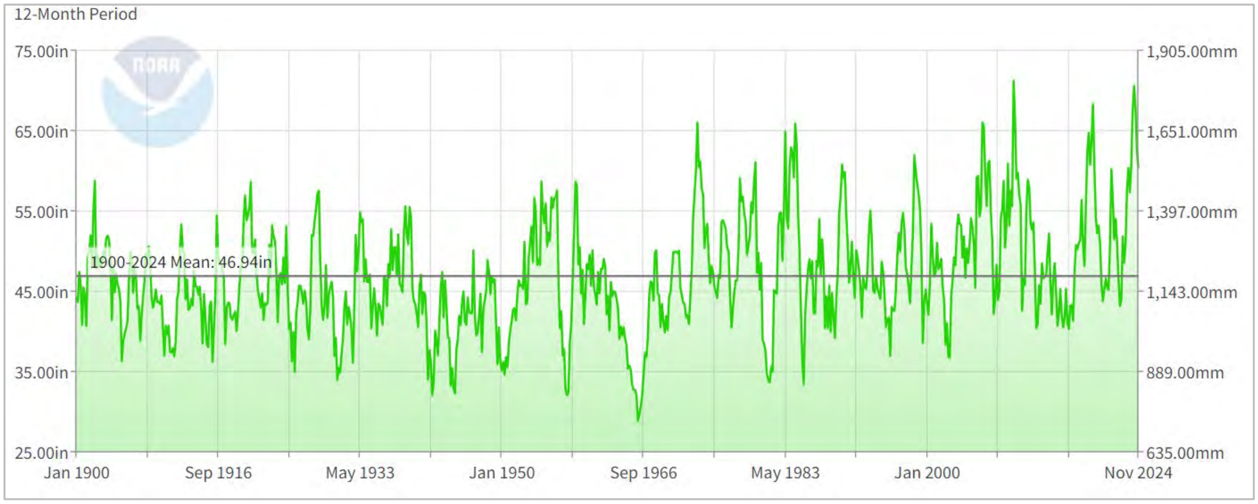
Source: NCEI 2024

Figure 3- Kent County Average Temperature, 1900-2024



Source: NCEI 2024

Figure 4- Washington County Precipitation, 1900-2024



Source: NCEI 2024

Figure 5- Kent County Precipitation, 1900-2024

An upward trend in the average temperatures is clearly visible throughout the 1900-2024 period represented, with particularly elevated average temperatures since 2016. However, the precipitation data shows a more subtle change. It is clear in the graphs that the intensity and length of below average precipitation have fallen. Additionally, since the 1962-1966 dry period, periods of elevated precipitation have become more intense.

In each hazard profile, the influence of future climate conditions will be discussed regarding each aspect of the hazard, including the nature of the hazard, location, extent, probability of future events, impact, land use, and population. It is important to note that future climate conditions may have influence on a specific aspect, such as the extent of future events or probability of future events but may have little to no influence on other aspects of the hazard, such as the nature of the hazard or location of future events.

3.3.1 Severe Thunderstorm (High Wind, Lightning, Hail)

This hazard profile includes information on high wind, lightning, and hail events.

3.3.1.1 Description

Thunderstorms are formed when the right atmospheric conditions combine to provide moisture, lift, and warm unstable air that can rise rapidly. Thunderstorms occur at any time of the day and in all months of the year but are most common during summer afternoons and evenings and in conjunction with frontal boundaries. The NWS classifies a thunderstorm as severe if it produces hail at least one inch in diameter, winds of 58 mph or greater, or a tornado. About 10% of the estimated 100,000 annual thunderstorms that occur nationwide are considered severe. Thunderstorms affect a smaller area compared with winter storms or hurricanes, but they can be dangerous and destructive for several reasons. Storms can form in less than 30 minutes, giving very little warning; they have the potential to produce lightning, hail, tornadoes, powerful straight-line winds, and heavy rains that produce flash flooding.

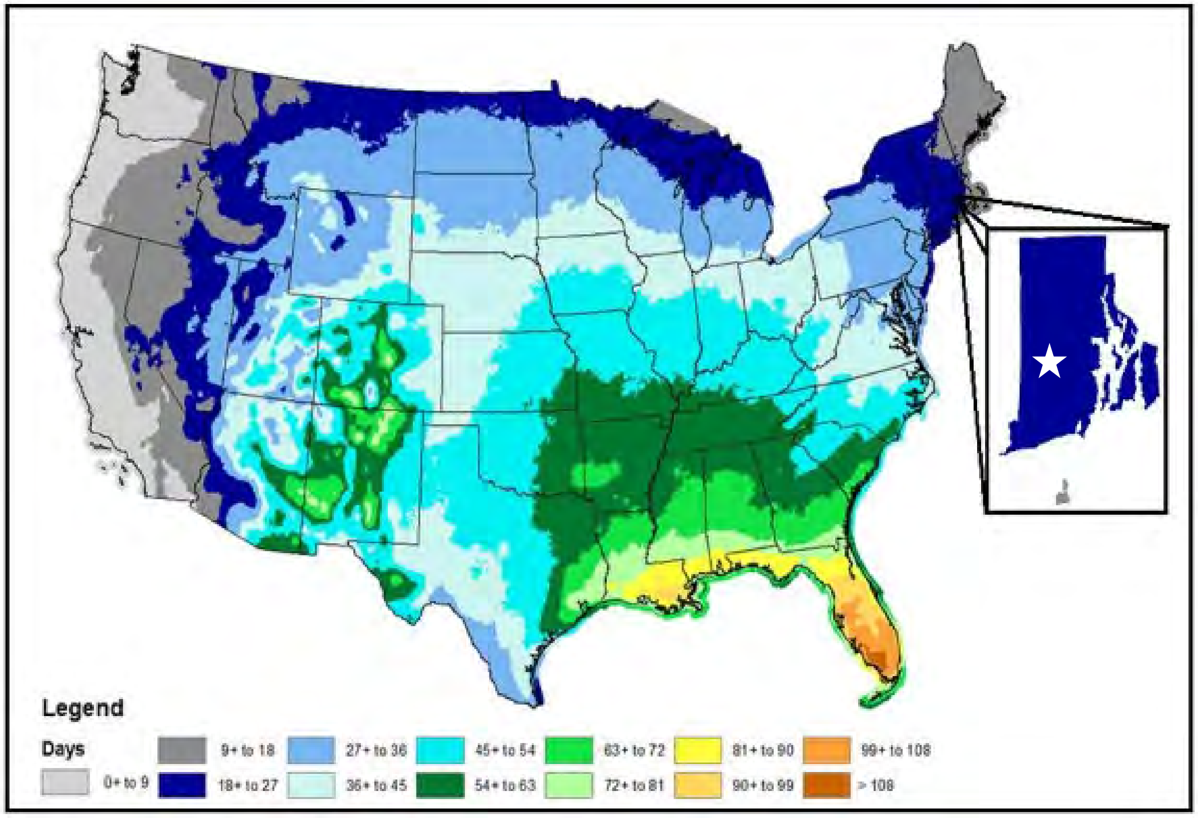
High Wind	Wind is the movement of air caused by a difference in pressure from one place to another. Local wind systems are created by the immediate geographic features in a given area such as mountains, valleys, or large bodies of water. National climatic events such as high gale winds, tropical storms, thunderstorms, Nor'easters, hurricanes, and low-pressure systems produce wind events in Rhode Island. Wind effects can include blowing debris, interruptions in

	elevated power and communications utilities, and intensification of the effects of other hazards related to winter weather and severe storms.
Lightning	All thunderstorms contain lightning. Lightning is a giant spark of electricity in the atmosphere between clouds, the air, or the ground. In the early stages of development, air acts as an insulator between the positive and negative charges in the cloud and between the cloud and the ground. When the opposite charges build up enough, this insulating capacity of the air breaks down and there is a rapid discharge of electricity that we know as lightning. The flash of lightning temporarily equalizes the charged regions in the atmosphere until the opposite charges build up again. Lightning can occur between opposite charges within the thunderstorm cloud (intra-cloud lightning) or between opposite charges in the cloud and on the ground (cloud-to-ground lightning).
Hail	Hail is a form of precipitation consisting of solid ice that forms inside thunderstorm updrafts. Eventually, these ice particles become too heavy for the updraft to hold up, and they fall to the ground at speeds of up to 120 mph. In the United States, hail causes billions of dollars in damage to property each year (RIEMA 2024). Vehicles, roofs of buildings and homes, and landscaping are most commonly damaged by hail. Hail has been known to cause injury and the occasional fatality to humans, often associated with traffic accidents.

3.3.1.2 Location

All of Exeter and West Greenwich are susceptible to severe thunderstorms, including high wind, lightning, and hail.

Figure 6 shows the nationwide average number of thunderstorm days from 1993 through 2018 by location. The entire State of Rhode Island falls in the 18-27 thunderstorms per year category.



Source: NOAA 2023b

Figure 6- Annual Average Thunderstorm Days in Rhode Island (1993-2018)

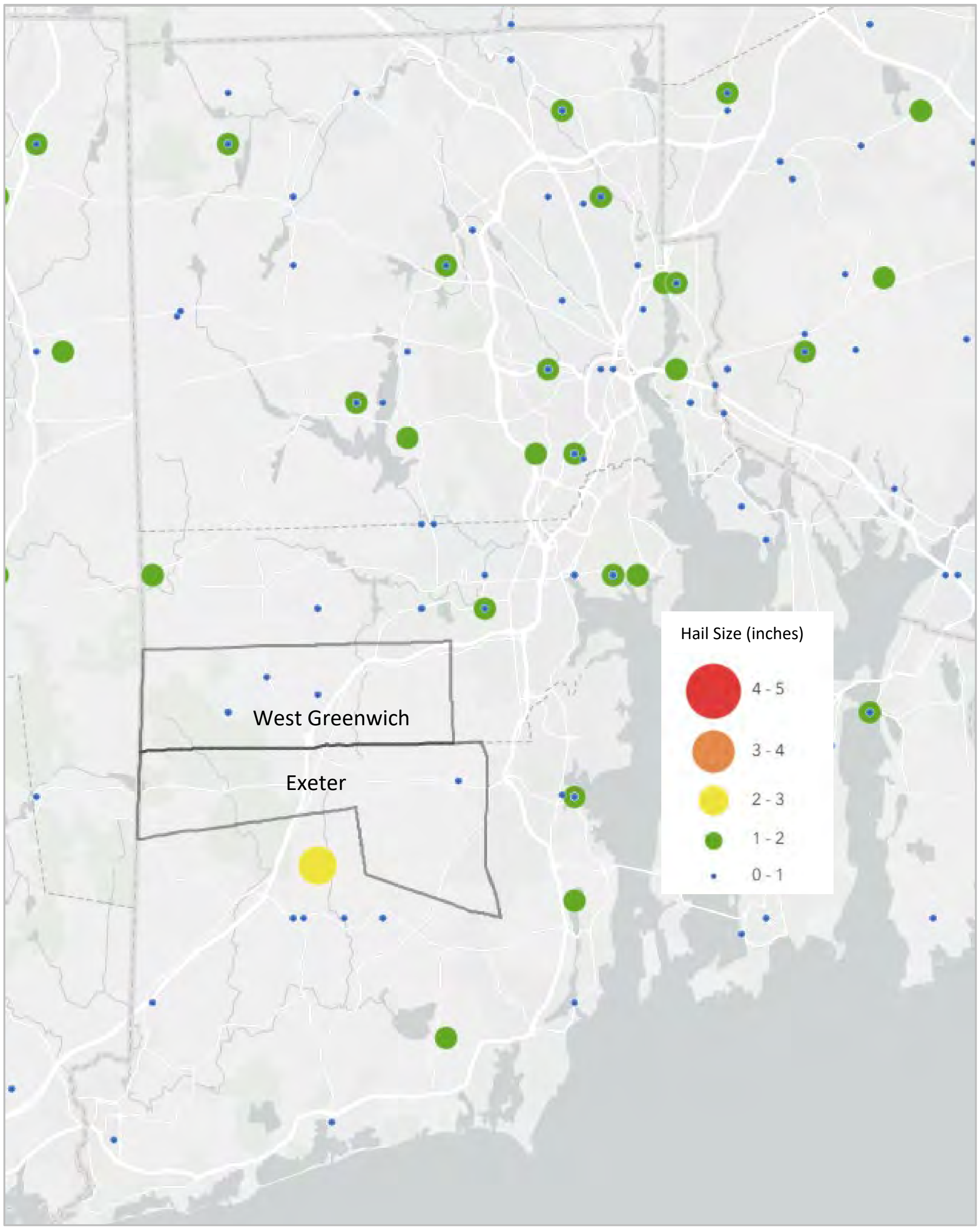
Figure 7 depicts the average annual lightning events per square kilometer per year, from 2016 through 2022. Exeter falls in the category of 1-2 strikes per square kilometer per year and West Greenwich falls in the category of 2-4 strikes per square kilometer per year.

3.3.1.3 History

Figure 8 shows the location and magnitude (size) of historical hail events in Rhode Island from 1955-2023.

Source: Vaisala per RIEMA 2024

Figure 7- Average Annual Lightning Events per Square Kilometer per Year (2016-2022)



Source: NWS Storm Predication Center 2024- Hail

Figure 8- Historical Hail Events in Rhode Island (1955-2023)

Table 9 and Table 10 identifies historical severe thunderstorm events (high wind, lightning, hail) in Exeter and West Greenwich from 1996 through June 2024.

Since the 2005 HMPs, there have been 8 thunderstorm events in Exeter and 6 thunderstorm events in West Greenwich.

Table 9- History of Severe Thunderstorms (High Wind, Lightning, and Hail) in Exeter

Date	Event Type	Event Description
6/30/1998	Hail	A slow-moving warm front with an abundance of tropical moisture produced several hours of torrential rain with amounts totaling 3 to 6 inches during the morning and early afternoon.

Table 9- History of Severe Thunderstorms (High Wind, Lightning, and Hail) in Exeter

Date	Event Type	Event Description
		Showers and thunderstorms produced the torrential rainfall across northern Rhode Island. Dime size hail fell in Exeter and North Kingstown.
9/29/2005	Strong Wind	A powerful cold front with a sharp temperature gradient moved across Rhode Island during the late morning and early afternoon hours of 29 September 2005. This cold front produced high winds that caused power outages, and knocked down trees, limbs, power poles, and wires across the region. Wind gusts between 40 and 60 mph were common during this event. High wind gusts knocked a large tree down across a road in Exeter. No known injuries directly resulted from this high wind event.
10/25/2005	High Wind Nor'easter	A strong coastal storm (i.e. a nor'easter) entrained with energy and moisture from the remnants of Hurricane Wilma brought rainfall between 2 and 2.5 inches and damaging winds to portions of Rhode Island. The high winds brought down limbs, trees, and wires, resulting in scattered power outages. Several trees, wires, and limbs were reported down in Woonsocket, West Greenwich, Exeter, and Tiverton. No known injuries directly resulted from this nor'easter.
1/25/2010	High Wind	Unseasonably warm temperatures moved into southern New England ahead of a cold front which allowed for excellent atmospheric mixing. This resulted in strong to damaging winds across much of eastern Massachusetts and Rhode Island. Trees were downed in Exeter and South Kingstown.
3/13/2010	High Wind	A stacked low-pressure system (surface low and upper level low on top of each other) moved southeast of Nantucket, spreading rain across Southern New England. This resulted in widespread rainfall totals of three to six inches. Numerous trees were downed in Exeter and South Kingstown.
11/27/2013	High Wind	An anomalously strong low level jet stream coupled with strong pressure falls associated with a low-pressure region approaching southern New England resulted in strong to damaging winds across southern New England. Damage was largely to trees. A utility pole was downed onto Route 102 in Exeter.
10/29/2017	High Wind	The remnants of Tropical Storm Phillipe merged with a mid-latitude system approaching the U.S. East Coast. This created an area of low pressure that moved north from the Carolinas through New York State on the 29th. The low-pressure system swung a cold front through Southern New England during the early morning of the 30th. The combined system generated strong to damaging winds. Tropical moisture flowing north ahead of the cold front contributed to heavy downpours, with between three and five inches of rain reported. A tree and wires were brought down on Yawgoo Valley Road, Partridge Drive, and Mail Road in Exeter.
7/28/2018	Lightning	A cold front moved through Southern New England late on July 28th. This created thunderstorms that moved across Southern Rhode Island. At 9:10 PM EST, lightning struck a house on Wolf Rock Road in Exeter. A large tree and wires were also brought down. No smoke was reported in the house.
9/26/2018	Lightning	A warm front approached from the south on Sept 25 and stalled just north of Massachusetts on Sept 26. This brought periods of heavy rain to Rhode Island with 3 to 5 inches observed in Providence County and Kent County. Amounts of 1 to 3 inches fell on Southern Rhode Island. At 11:30 PM EST on Sept 26, wires were reported down due to a lightning strike on Ten Rod Road (State Route 165) and Summit Road in Exeter.
8/25/2020	Thunderstorm Wind	A few severe thunderstorms formed during the evening hours, out ahead of a strong cold front which swept across southern New England at night.

Table 9- History of Severe Thunderstorms (High Wind, Lightning, and Hail) in Exeter

Date	Event Type	Event Description
		In Exeter, a tree was down on South Road at 645 PM EDT. A tree and wires were down on Yawgoo Valley Road at 657 PM EDT.
12/25/2020	Strong Wind	An anomalously deep, full-latitude mid-level trough over the Mississippi Valley caused a strong frontal system to move up the Appalachians. It brought strong to damaging winds, heavy rain with minor flooding, and well above normal temperatures to southern New England early on Christmas Day. Two to four inches of rain fell across the region, with the highest totals from central Rhode Island northwestward across northern Connecticut and portions of western and central Massachusetts. Winds generally were gusting to 50 to 55 mph. In Exeter at 910 AM EST, a tree was down on Route 102 (Ten Rod Road) near the Country Club.

Source: NOAA Storm Events Database- Storm Prediction Center Product (NWS 2024a), NWS 2024b

Table 10- History of Severe Thunderstorms (High Wind, Lightning, and Hail) in West Greenwich

Date	Event Type	Event Description
6/19/1998	Hail	Severe thunderstorms produced large hail and damaging winds in a few towns in Washington, Kent, and Providence Counties. Dime size hail fell in West Greenwich in Kent County.
7/23/1999	Thunderstorm Wind	An isolated severe thunderstorm, which caused extensive damage in Windham County Connecticut, weakened somewhat as it entered Rhode Island, but still produced damage in Kent County. In West Greenwich, trees, large branches, and wires were downed by thunderstorm winds.
7/25/1999	Hail	Severe thunderstorms brought damaging winds and large hail to Rhode Island. Hail as large as quarters fell in West Greenwich and Warwick.
5/24/2000	Hail	Severe thunderstorms moved across central and southern Rhode Island ahead of a cold front. The storms, which had a history of producing large hail in northeast Connecticut, also dropped large hail in Kent, Washington, and Newport Counties during the evening. Dime size hail was reported in West Greenwich.
8/7/2004	Funnel Cloud	A trained spotter reported two funnel clouds while driving along Route 102 in West Greenwich. The cold air funnel clouds did not touch down and were associated with a band of showers moving through Rhode Island at that time.
10/25/2005	High Wind Nor’easter	A strong coastal storm (i.e. a nor'easter) entrained with energy and moisture from the remnants of Hurricane Wilma brought rainfall amounts between 2 and 2.5 inches and damaging winds to portions of Rhode Island. The high winds brought down limbs, trees, and wires, resulting in scattered power outages. Several trees, wires, and limbs were reported down in Woonsocket, West Greenwich, Exeter, and Tiverton. No known injuries directly resulted from this nor'easter.
1/31/2013	High Wind	A warm front moved northward across southern New England. This brought a period of rain and warm temperatures. In addition, a strong low level jet (up to 80 kts) resulted in high winds across much of southern New England. A tree was downed blocking a road in West Greenwich.
10/22/2014	Strong Wind	Low pressure moving up the east coast brought soaking rain and strong winds to much of southern New England. In addition, both downed leaves from the storm and naturally fallen leaves from before the storm clogged storm drains which resulted in street flooding. In West Greenwich, a large tree and power lines were downed onto Fry Pond Road.

Table 10- History of Severe Thunderstorms (High Wind, Lightning, and Hail) in West Greenwich

Date	Event Type	Event Description
2/25/2016	Thunderstorm Wind	Low pressure tracked north through New York bringing a warm front through southern New England. Unseasonably deep moisture accompanied this front. This was a very complicated weather situation as a strong low level inversion was in place over the area with a very strong low level jet just above the inversion. As showers and thunderstorms developed, the storms and heavy rain allowed the stronger winds to mix down to ground surface. In other areas, temperatures warmed enough at ground surface to break the inversion and allow the stronger winds to mix down. This resulted in a complicated combination of severe thunderstorm winds and high winds. To add to the historical nature of this event, it occurred in February all during the overnight hours. A tree in West Greenwich was downed by thunderstorm winds, blocking a road.
9/5/2016	Strong Wind	Hermine was named on August 31st as it intensified to a tropical storm in the Gulf of Mexico. While classified as a tropical system, Hermine's effects on southern New England were rather minimal. Rainfall added up to less than an inch for most locations and winds were generally below tropical storm force. Because trees were still fully leaved and higher wind gusts occurred, there was some wind damage. Storm surge was highest during low tide, so there were minimal coastal flooding impacts. A tree was downed onto Wickaboxet Drive in West Greenwich. A tree was downed on Route 102.
10/16/2019	Strong Wind	A powerful coastal storm developed along the NJ coast then moved northeast across southern New England Wednesday night into Thursday. This brought periods of very heavy rain and strong to damaging winds to the region. In West Greenwich, there was a tree down on Liberty Hill Rd.
6/17/2022	Thunderstorm Wind	A cold front moved through during the mid-afternoon, triggering isolated severe thunderstorms in eastern Connecticut and Rhode Island. The presence of dry air aloft helped keep the storm coverage isolated. In West Greenwich, two trees were down on Robin Hollow Road. Report relayed by amateur radio.

Source: NOAA Storm Events Database- Storm Prediction Center Product (NWS 2024a), NWS 2024b

3.3.1.4 Extent

High Wind	The Beaufort Wind Scale (Table 11) is a 13-level scale used to describe wind speed and observed wind conditions at sea and on land. A wind classification of 0 has wind speeds of less than 1 mile per hour (mph) and winds are considered calm. On the other end, a classification of 10 with wind speeds reaching 63 mph can blow down trees and cause considerable damage. Wind gusts of nearly 60 mph have been recorded in Exeter and West Greenwich. Based on the extent of past events and the criteria identified in Table 7, the extent of high winds in Exeter and West Greenwich are considered **Limited**, with potential for some injuries; short shutdown of some critical infrastructure and facilities; fewer than 10% of residential and commercial structures damaged; and a small number of local operations impacted for short amounts of time.
Lightning	There is no universally accepted standard for measuring the strength or magnitude of lightning. Similar to modern tornado characterizations, lightning events are often measured by the damage they produce. Building construction, location, and nearby trees or other tall structures will have a large impact on how vulnerable an individual facility is to a lightning strike. A rough estimate of a structure's likelihood of being struck by lightning can be calculated using the structure's ground surface area, height, and striking distance between the downward-moving tip of the stepped leader (negatively charged channel jumping from cloud to earth [the initial streamer of a lightning

	discharge]) and the object. In general, buildings are more likely to be struck by lightning if they are located on high ground or if they have tall protrusions such as steeples or poles which the stepped leader can jump to. There is currently no scale to indicate the severity of a lightning strike, but data from NOAA indicates that there approximately 25,000,000 cloud-to-ground lightning strikes per year in the United States (RIEMA 2024). Based on the extent of past events and the criteria identified in Table 7, the extent of lightning/thunderstorms in Exeter and West Greenwich are considered **Limited**, with potential for some injuries; short shutdown of some critical infrastructure and facilities; fewer than 10% of residential and commercial structures damaged; and a small number of local operations impacted for short amounts of time.
Hail	Hail falls along paths called swaths, which can vary from a few square acres to up to 10 miles wide and 100 miles long. Hail larger than 0.75 inch in diameter can do great damage to both property and crops, and some storms produce hail over two inches in diameter. Table 12 provides the size and descriptions of hail. Hail in Exeter and West Greenwich are usually 1 inch in diameter or smaller. Based on the extent of past events and the criteria identified in Table 7, the extent of hail in Exeter and West Greenwich are considered **Negligible** with the potential for minor injuries; no shutdown of critical infrastructure and facilities; scattered incidental residential and commercial structure damages; and few or no operations impacted for short amounts of time.

Table 11- Beaufort Wind Scale

Force	Speed (mph)	Description	Impacts on land
0	0-1	Calm	Calm: smoke rises vertically.
1	1-3	Light Air	Direction of wind shown by smoke drift, but not by wind vanes.
2	4-7	Light Breeze	Wind felt on face; leaves rustle; ordinary vanes moved by wind.
3	8-12	Gentle Breeze	Leaves and small twigs in constant motion; wind extends light flag.
4	13-18	Moderate Breeze	Raises dust and loose paper; small branches are moved.
5	19-24	Fresh Breeze	Small trees in leaf begin to sway; crested wavelets form on inland waters.
6	25-31	Strong Breeze	Large branches in motion; whistling heard in telegraph wires; umbrellas used with difficulty.
7	32-38	Near Gale	Whole trees in motion; inconvenience felt when walking against the wind.
8	39-46	Gale	Breaks twigs off trees; generally, impedes progress.
9	47-54	Severe Gale	Slight structural damage occurs (chimneypots and slates removed)
10	55-63	Storm	Seldom experienced inland; trees uprooted; considerable structural damage occurs.
11	64-72	Violent Storm	Very rarely experienced; accompanied by wide-spread damage.
12	72-83	Hurricane	Equivalent to a Category 1 Hurricane

Table 12- Hail Size

Hail Size and Description		
1/4" Pea Size		1 3/4" Golf Ball Size
1/2" Mothball Size		2" Hen Egg Size
3/4" Penny Size		2 1/2" Tennis Ball Size
7/8" Nickel Size		2 3/4" Baseball Size
1"Quarter Size		3" Teacup Size
1 1/4" Half Dollar Size		4" Grapefruit Size
1 1/2" Ping Pong Ball Size		4 1/2" Softball Size

FEMA's National Risk Index states that Exeter and West Greenwich have the following planning significance related to severe thunderstorms:

Jurisdiction	Hail NRI	Hail EAL	Lightning NRI	Lightning EAL	Strong Wind NRI	Strong Wind EAL
Exeter	Very Low	Very Low	Relatively Moderate	Relatively Moderate	Relatively Low	Relatively Low
West Greenwich	Very Low	Very Low	Relatively Moderate	Relatively High	Relatively Low	Relatively Low

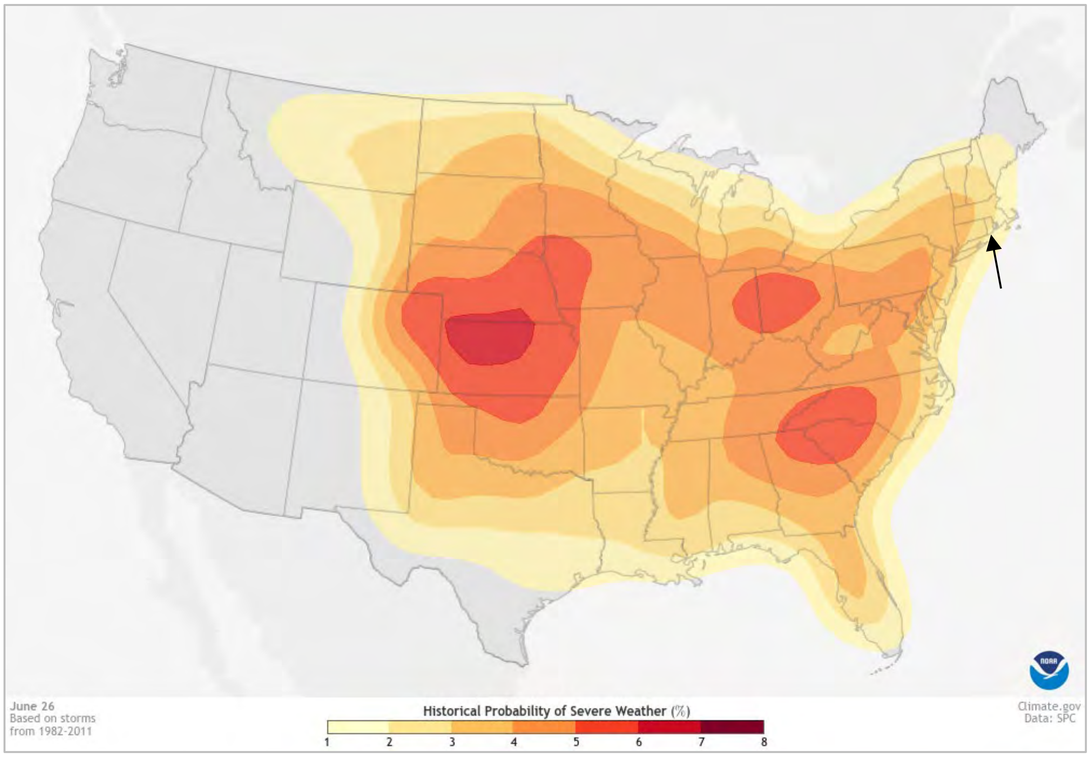
Source: FEMA National Risk Index (www.hazards.fema.gov/nri/map)

EAL: Expected Annual Loss

NRI: National Risk Index= (Expected Annual Loss x Social Vulnerability) ÷ Community Resilience

3.3.1.5 Probability of Future Occurrence

High Wind	Exeter and West Greenwich experiences high wind events annually. Based on previous occurrences and the criteria identified in Table 8, it is **Highly Likely** that Exeter and West Greenwich will experience a high wind event within the calendar year; there is a greater than 90% annual probability of occurring.
Lightning	NOAA's National Severe Storms Laboratory (NSSL) uses multiple tools to forecast thunderstorms. Their Storm Prediction Center in Oklahoma monitors and forecasts the potential for severe weather across the continental U.S. Using computer forecast models, ensemble forecasting (when the weather becomes atypical), and satellite images, the Storm Prediction Center informs of severe weather conditions. Data from NOAA indicates that Rhode Island can expect between 18 to 27 thunderstorms per year (RIEMA 2024). Figure 9 provides a snapshot for the probability of a severe weather event on a summer day. Based on previous occurrences, the criteria identified in Table 8, and the data provided in Figure 7, it is **Highly Likely** that Exeter and West Greenwich will experience a lightning event within the calendar year; there is a greater than 90% annual probability of occurring.
Hail	Based on previous occurrences and the criteria identified in Table 8, it is **Possible** that Exeter and West Greenwich will experience a hail event in the calendar year; there is a between 1-49.9% annual probability of occurring.



Source: Climate.gov (2025)

Figure 9- Rhode Island Historic Probability of a Thunderstorm on a Summer Day (June 26)

3.3.1.6 Impact

High Wind	Strong wind gusts of 40 mph (Beaufort Scale of 8) can blow twigs and small branches from trees. Occasional gusts and sustained winds at this speed (and above) are of concern to the Towns. Damages from wind events range from power outages, property damage to vehicles and buildings and fallen trees/limbs. Power outages also influence access to potable water from private wells. In Exeter and West Greenwich, there are increasing concerns about the impacts of more frequent and intense windstorms that can cause widespread power outages for residents due to downed trees and limbs across power lines. Loss of power at the household level results in inability to draw and supply drinking water for residents (RIIB MRP 2023). Past high wind events in Exeter and West Greenwich have resulted primarily in power outages and downed tree limbs on local and State roads with minimal property damage. In Rhode Island, the utility companies are responsible for tree trimming.
Lightning	Lightning can strike buildings and accessory structures, often causing structure fires. Electrical and communications utilities are also vulnerable to direct lightning strikes. Damage to these lines has the potential to cause power and communication outages for businesses, residencies, and critical facilities. Dead trees are more likely to catch fire if struck by lightning and can quickly catch fire. Power outages also influence access to potable water from private wells. In Exeter, lightning has caused power failures and downed trees. Lightning has not caused significant impacts in West Greenwich.

<table>
<tr><td>Hail</td><td> Structure vulnerability to hail is determined mainly by construction and exposure. Metal siding and roofing is better able to stand up to the damage of a hailstorm than many other materials, although it may also be damaged by denting. Exposed windows and vehicles are also susceptible to damage. Crops are extremely susceptible to hailstorm damage, as even the smallest hail stones can rip apart unsheltered vegetation. Human vulnerability is largely determined by the availability and reception of early warnings for the approach of severe storms, and by the availability of nearby shelters. Swimming, boating, and fishing are particularly dangerous during periods of frequent lightning strikes, which can also cause power outages, topple trees, and spark fires. Individuals who immediately seek shelter in a sturdy building or metal- roofed vehicle are much safer than those who remain outdoors. Early warnings of severe storms are also vital for aircraft flying through the area. Power outages also influence access to potable water from private wells. Past hail events in Exeter and West Greenwich have not caused significant damage. </td></tr>
</table>

3.3.1.7 Future Conditions

Increased thunderstorm events may influence future land use development through water management systems as severe thunderstorms can lead to flooding; thus, future developments may need advanced stormwater management systems to handle heavy rainfall and reduce runoff, influencing site design and landscaping.

<table>
<tr><td rowspan="3">High Wind</td><td>Nature of the hazard</td><td>Future climate conditions are not likely to influence the nature of future high wind events in Exeter and West Greenwich.</td></tr>
<tr><td>Location</td><td>Future climate conditions are not likely to influence the location of future high wind events in Exeter and West Greenwich.</td></tr>
<tr><td>Extent</td><td> Table 13 shows Exeter’s historical and future projections for wind speed under different future climate conditions models. These models indicate that it is unlikely that future climate conditions will influence the extent of future wind speeds in Exeter. Table 13- ClimRR Climate Projection Report-Wind Speed (Exeter)
<table>
<tr><td></td><td></td><td colspan="2">Mid-Century</td><td colspan="2">End-Of-Century</td></tr>
<tr><td>Wind_Speed</td><td>Hist.</td><td>RCP 4.5</td><td>RCP 8.5</td><td>RCP 4.5</td><td>RCP 8.5</td></tr>
<tr><td colspan="6">ANNUAL</td></tr>
<tr><td>Wind Speed (Mph)</td><td>7.75</td><td>7.73</td><td>7.75</td><td>7.87</td><td>7.64</td></tr>
</table>
Source: Climate Risk and Resilience Portal (ClimRR) 2024
<u>Mid-Century Wind Analysis</u>: The historical annual average wind speed is 7.75 mph. Under RCP 4.5 the annual average wind speed at mid-century is 7.73 mph which represents a -0.02 mph change from the baseline. Under RCP 8.5 the annual average wind speed at mid-century is 7.75 mph which represents a 0.00 mph change from the baseline.
<u>End-Century Wind Analysis</u>: The historical annual average wind speed is 7.75 mph. Under RCP 4.5 the annual average wind speed at end-century is 7.87 mph which represents a 0.12 mph change from the baseline. Under RCP 8.5 the annual average wind speed at end-century is 7.64 mph which represents a -0.11 mph change from the baseline. </td></tr>
</table>

<table>
<tr><td></td><td></td><td>
Table 14 shows West Greenwich's historical and future projections for wind speed under different future climate conditions models. These models indicate that it is unlikely that future climate conditions will influence the extent of future wind speeds in West Greenwich.
Table 14- ClimRR Climate Projection Report-Wind Speed (W. Greenwich)
<table>
<tr><th></th><th></th><th colspan="2">Mid-Century</th><th colspan="2">End-Of-Century</th></tr>
<tr><th>Wind_Speed</th><th>Hist.</th><th>RCP 4.5</th><th>RCP 8.5</th><th>RCP 4.5</th><th>RCP 8.5</th></tr>
<tr><td colspan="6">ANNUAL</td></tr>
<tr><td>Wind Speed (Mph)</td><td>7.47</td><td>7.44</td><td>7.47</td><td>7.58</td><td>7.36</td></tr>
</table>
Source: Climate Risk and Resilience Portal (ClimRR) 2024
<u>Mid-Century Wind Analysis</u>: The historical annual average wind speed is 7.47 mph. Under RCP 4.5 the annual average wind speed at mid-century is 7.44 mph which represents a -0.03 mph change from the baseline. Under RCP 8.5 the annual average wind speed at mid-century is 7.47 mph which represents a 0.00 mph change from the baseline.
<u>End-Century Wind Analysis</u>: The historical annual average wind speed is 7.47 mph. Under RCP 4.5 the annual average wind speed at end-century is 7.58 mph which represents a 0.12 mph change from the baseline. Under RCP 8.5 the annual average wind speed at end-century is 7.36 mph which represents a -0.10 mph change from the baseline.
</td></tr>
<tr><td></td><td>Impact</td><td>As Exeter and West Greenwich's future projected wind speeds are relatively similar to the historical speeds, it is not likely that future impacts will be significantly different than current impacts from high wind events.</td></tr>
<tr><td></td><td>Probability of Future Events</td><td>The probability of experiencing damaging winds is increasing with future climate conditions in those areas of the US that are impacted by tropical storm systems. However, based on future climate conditions models (Table 13 and Table 14), in Exeter and West Greenwich, future projected wind speeds are relatively similar to the historical speeds, it is not likely that future impacts will be significantly different than current impacts from high wind events.</td></tr>
<tr><td></td><td>Changes in Population Patterns</td><td> It is possible that future high wind events will cause changes in population patterns in Exeter and West Greenwich. An increase in population would likely have similar impacts as land use development increases (below) </td></tr>
<tr><td></td><td>Changes in Land Use Development</td><td> It is possible that future high wind events will cause changes in land use development in Exeter and West Greenwich. Increased land use development such as new housing developments may increase the potential of impacts from wind events due to clearing of trees, which act as natural wind breaks, and new power lines associated with increased housing will increase the potential of utility disruptions if trees are downed due to high winds. This would increase the potential for impacts to Exeter and West Greenwich's residents. </td></tr>
<tr><td rowspan="2">Lightning</td><td>Nature of the hazard</td><td>Future climate conditions are not likely to influence the nature of future lightning events in Exeter and West Greenwich.</td></tr>
<tr><td>Location</td><td>Future climate conditions are not likely to influence the location of future lightning</td></tr>
</table>

		events in Exeter and West Greenwich. The entire Planning Area is susceptible to lightning events.
	Extent	Future climate conditions are not likely to alter the severity of lightning strikes, but more lightning strikes is likely.
	Impact	As the probability of lightning strikes is likely to increase, potential impacts to Exeter and West Greenwich are likely to increase. Potential increased impacts include increased potential of brushfires/wildfires and downed trees leading to power outages.
	Probability of Future Events	For every 1°C of warming, lightning activity may increase by 12%. This could lead to a 50% increase in lightning strikes in the United States by the end of the century. Warmer air can hold more moisture, which increases the likelihood of thunderstorms. This can lead to more violent storms and more lightning strikes. It is likely that as temperatures increase, more lightning activity occurs.
	Changes in Population Patterns	It is possible that future lightning events will cause changes in population patterns in Exeter and West Greenwich. An increase in population would likely have similar impacts as land use development increases (below).
	Changes in Land Use Development	It is possible that future lightning events will cause changes in land use development in Exeter and West Greenwich. Increased lightning risks may lead to the implementation of more lightning protection systems in new developments, such as grounding systems and surge protection for electrical systems. Land use may emphasize managing vegetation to reduce the risk of lightning strikes in certain areas, especially in fire-prone areas. This could lead to guidelines for landscaping and tree maintenance.
Hail	Nature of the hazard	Future climate conditions are possible to influence the nature of future hail events as future climate conditions affect low-level moisture and convective instability, microphysical processes, and vertical wind shear, all of which are relevant to hail formation and properties (Raupach et al. 2021).
	Location	Future climate conditions are unlikely to influence the location of future hail events in Exeter and West Greenwich. The entire Planning Area is susceptible to hail events.
	Extent	Future climate conditions are possible to influence the conditions necessary for hail formation within thunderstorms. Warmer temperatures at the surface and greater instability in the atmosphere can contribute to larger and more damaging hailstones (RIEMA 2024).
	Impact	As hail storms are likely to become more frequent and the development of larger hailstones is also likely, future impacts to Exeter and West Greenwich from hail events are likely to increase. Larger hailstones will lead to more damage to vehicles, property, and critical facilities.
	Probability of Future Events	As a result of anthropogenic warming, it is likely that low-level moisture and convective instability will increase, raising hailstorm likelihood and enabling the formation of larger hailstones (Raupach et al. 2021).
	Changes in Population Patterns	It is possible that future hail events will cause changes in population patterns in Exeter and West Greenwich. An increase in population would likely have similar impacts as land use development

		increases (below).
	Changes in Land Use Development	It is possible that future hail events will cause changes in land use development in Exeter and West Greenwich. Increased hail events may influence future land use development through retrofitting as older buildings may need retrofitting to enhance their resistance to hail damage, while new developments may need to use more durable materials and enhanced maintenance practices to reduce future damages.

3.3.2 Dam Failure

The HMPCs recognize that a dam failure is not a natural hazard, but several of the hazards identified in this MJHM&FMP could influence a dam failure in the Towns of Exeter and West Greenwich. Additionally, updated FEMA guidelines require that for a jurisdiction to be eligible for FEMA's Rehabilitation of High Hazard Potential Dam (HHPD) Grant Program, they must address HHPDs in their Hazard Mitigation Plan.

Note: As of 2024, FEMA is only funding projects for the rehabilitation of HHPDs. The HMPCs chose to include information on the two (2) Significant Hazard dams (in addition to the 4 HHPDs) in Exeter in this section to explore non-FEMA funding available for the rehabilitation of non-HHPDs and in preparation in the event a Significant Hazard dam is reclassified to a HHPD before the next HMP update cycle.

3.3.2.1 Description

A dam is a barrier across flowing water that obstructs, directs, or slows down the flow, often creating a reservoir, lake, or impoundment. Most dams have a section called a spillway or weir, over or through, which water flows, either intermittently or continuously. Dams commonly come in two types, embankment (the most common) and concrete (gravity, buttress, and arch), as well as sizes. They also serve several purposes and provide essential benefits, including drinking water, irrigation, hydropower, flood control, and recreation (RIEMA 2024).

Large or small, dams have a powerful presence that is frequently overlooked until a failure occurs. Dams fail in two ways, a controlled spillway release done to prevent full failure, or the partial or complete collapse of the dam itself. In each instance, an overwhelming amount of water, and potentially debris, is released. Dam failures are rare, but when they do occur, they can cause loss of life and immense damage to property, critical infrastructure, and the environment (RIEMA 2024).

Dams are classified as High hazard, Significant hazard, or Low hazard. The classification is not based on whether a dam is deemed safe or unsafe, but rather the impact/magnitude of a potential failure.

- A **High Hazard** dam is one whose failure or mis-operation will result in a probable loss of human life.
- A **Significant Hazard** dam is one whose failure or mis-operation results in no probable loss of human life but may cause major economic loss, disruption of lifeline facilities or impact other concerns detrimental to the public's health, safety, or welfare.
- A **Low Hazard** dam is one whose failure or mis-operation results in no probable loss of human life and low economic losses.

Dams are periodically inspected and given condition ratings. Each dam's hazard classification determines the frequency of inspection. The higher the classification, the more frequently the inspection is conducted. As part of each Rhode Island Department of Environmental Management (RIDEM) inspection, the major components of the dam are subjectively rated as satisfactory, fair, or poor. The major components being inspected are the embankment, the spillway, and the low-level outlet.

The following outlines criteria for a given condition rating.

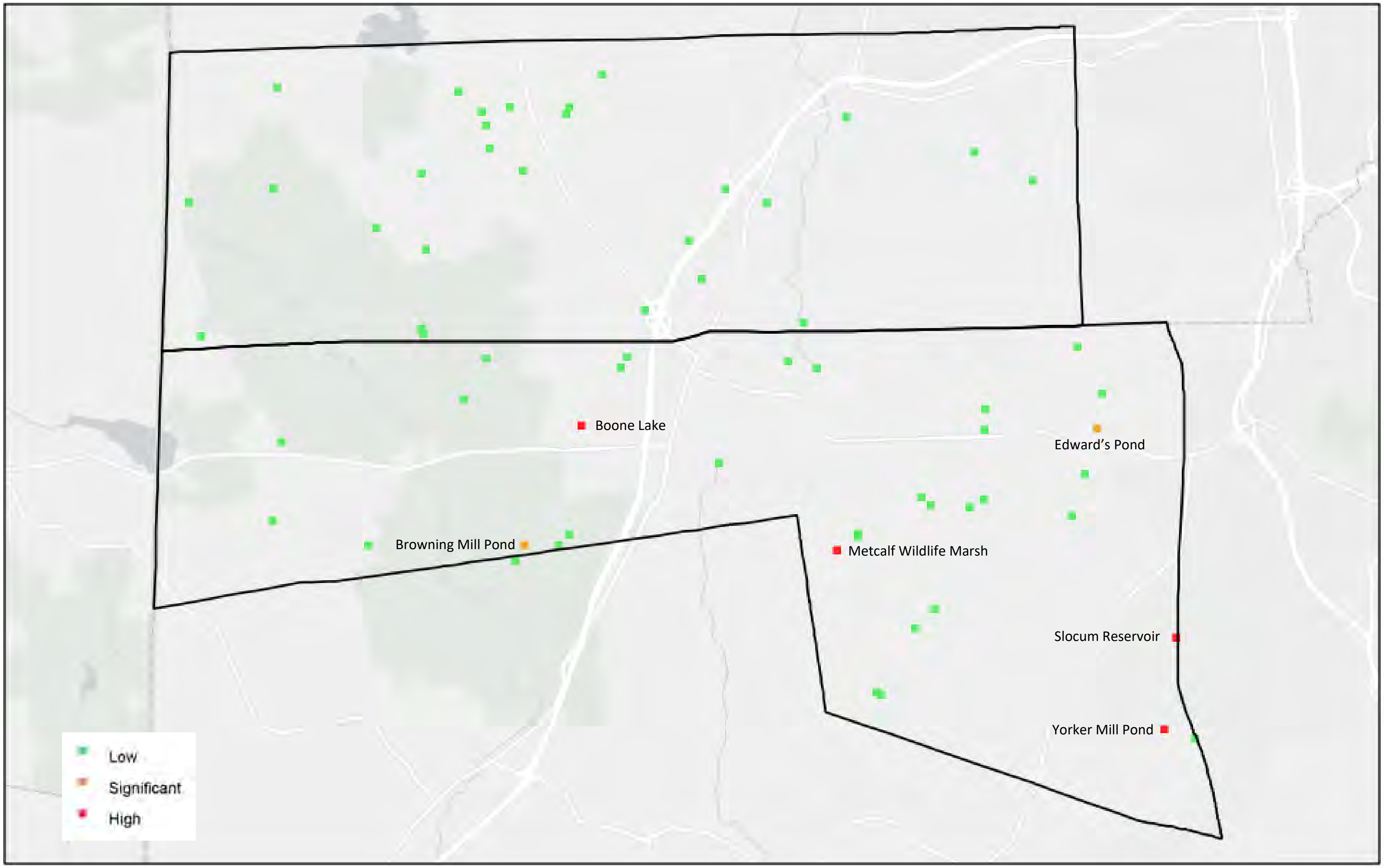
- **Satisfactory**: No existing or potential dam safety deficiencies are recognized.
- **Fair**: No existing or potential dam safety deficiencies are recognized for normal loading conditions. Rare or extreme hydrologic and/or seismic events may result in dam safety deficiency.
- **Poor**: A dam safety deficiency is recognized for loading conditions which may realistically occur. Remedial action is necessary. Poor may also be used when uncertainties exist as to critical analysis parameters which identify a potential dam safety deficient. Further investigations and studies are necessary. A dam safety deficiency is recognized as one that requires immediate or emergency remedial action for problem resolution.
- **Not rated**: The dam has not been inspected or has been inspected but, for unknown reasons, has not been rated.

The remainder of this hazard profile will focus on the dams where dam failure may impact human life and critical facilities in Exeter and West Greenwich.

3.3.2.2 Location

There are a total of 36 dams in Exeter (4 High hazard, 2 Significant hazard, 30 Low hazard) and 27 in West Greenwich (27 Low hazard) (RIDEM 2023a).

Figure 10 shows the locations and hazard potential categories of dams in Exeter and West Greenwich.



Source: RIDEM- Dam Safety (ArcGIS Online)

Figure 10- Location of Dams in Exeter and West Greenwich

Specifications on the four (4) High hazard and two (2) Significant hazard dams in Exeter are below. Information on Low hazard dams in Exeter and West Greenwich is not included.

219- Boone Lake Dam	
Hazard Classification	High
Owner	Boone Lake Dam Management District
Year Built	1880-1883, rebuilt in 2005
Dam Type/Purpose	Recreation
Length x Height	265 ft x 21 ft
Drainage Area	2 sq. miles
Last Inspection	May 19, 2022
Downstream Description	Boone Lake Dam is located on Roaring Brook, which flows through the Towns of Exeter and Hopkinton, eventually reaching its confluence with the Wood River. The immediate downstream area consists primarily of undeveloped wooded land. Approximately 1 mile downstream of Boone Lake Dam, Roaring Brook enters the Arcadia Management Area.
Downstream Area	The channel downstream of the low-level outlet consists of a wide channel overgrown with dense vegetation including trees and brush. No defined channel is present downstream of the spillway; however, the width of the channel appears to be sufficient to convey flow away from the dam without impacting discharge capacity. The channel downstream of the spillway passes through a wooded and overgrown area for approximately 500-feet before reaching West Shore Road. Beyond West Shore Road, the channel continues through a wooded area before flowing below the bridge at Route 165 and into the braided stream and wetland system east of Arcadia Road.
Downstream Dams	Several dams are located downstream of Boone Lake Dam, including: • Barberville Mill Pond Dam (220), a 300-ft long, 5-ft high earthen embankment dam located approximately 1.35 miles downstream of Boone Lake Dam. • Browning Mill Pond Dam (221), a 25-ft long, 13-ft high earth and masonry embankment dam located approximately 1.9 miles downstream of Boone Lake Dam.
Downstream Bridges	The West Shore Drive bridge is located approximately 300 feet downstream of Boone Lake Dam. There is an approximately 12 ft wide by 8 ft high box culvert beneath Route 165 Bridge (Ten Rod Road), located about 0.5 miles downstream of the dam. Old Ten Rod Road is located just upstream of Route 165 and crosses Roaring Brook via a 12 ft wide by 12 ft high culvert.
Reservoir Area	The impoundment is irregularly shaped with coves and variable shoreline. The impoundment is generally narrow in shape, limiting the size of a significant wave which may develop across the surface of the pond. The perimeter of the impoundment is

219- Boone Lake Dam	
	developed with residential structures and wooded areas between. The slopes are flat to moderate with no evidence of loose soils or slope instability.
Downstream Development	The land use of the floodplain of Roaring Brook downstream of the dam is predominantly undeveloped. A large wetland is located adjacent to the brook approximately 0.25 miles downstream of the dam. Residential development and a state warm-water fish hatchery are located downstream of Browning Mill Pond, approximately 2.5 miles downstream of Boone Lake Dam.
Overall assessment of the 2022 inspection	In general, Boone Lake Dam was found to have continued leakage within the downstream area.
Potential Effects of a Dam Break	Results of the analysis indicate a peak flood depth just downstream of the dam of about 12 feet. As the flood wave progresses downstream, it is expected to attenuate. Thus, peak flood depths are predicted to decrease to about 6 feet, ½ mile downstream of the dam. The extent of flooding due to the hypothetical dam break includes flooding on the overbanks and in adjacent wetland areas downstream of the dam, as well as potential damage and flooding to roadway crossings. Barberville Mill Pond Dam and Browning Mill Pond Dam are also likely to overtop and subsequently fail as a result of relatively limited reported.
Recommended Hazard Potential Classification	GZA (GZA GeoEnvironmental, Inc., The State of Rhode Island Dam inspection consultant) recommends that Boone Lake Dam be classified as High Hazard based on the aforementioned analyses, site / downstream valley reconnaissance, site-specific GIS mapping and other existing data, and professional judgment. A potential dam failure of Boone Lake Dam would likely result in probable loss of human life and flooding of local roadways, including possible inundation of West Shore Drive and damage to the Route 165 bridge embankment. Browning Mill Pond Dam, an 8-ft high earthen embankment dam associated with a state fish hatchery, would also likely overtop and fail as a result of the flood wave emanating from Boone Lake. There is at least one residence located downstream of Browning Mill Pond Dam which may be inundated as a result of the flood wave, jeopardizing human life.

Source: RIDEM 2002a, RIDEM 2022a, RIEMA 2024, NID 2024

Boone Lake Dam Management District

The Boone Lake Dam Management District (BLDMD) is a separate district that exists within the Town of Exeter that was created in 2008. The BLMD’s mission is to “protect, improve, and preserve the Boone Lake Dam, and district-owned properties while ensuring appropriate planning for the future through a fiscally responsible manner”. At the request of several Boone Lake residents, the Exeter Town Council approved the creation of the BLDMD in 2007 and appointed the initial members of the Board of Directors. The first official meeting was held in September 2008.

239- Slocum Reservoir Dam	
Hazard Classification	High
Owner	American Baptist Churches of Rhode Island

239- Slocum Reservoir Dam	
Year Built	1855
Dam Type	Recreation
Length x Height	220 ft x 8 ft
Drainage Area	2 sq. miles
Inspection Frequency	The owner performs informal monthly inspections (since 2016) of the dam following a two-page inspection checklist. Electronic and hard copies of the inspection are kept at the Camp Conanicus office.
Downstream Description	Slocum Reservoir Dam is located on Chipuxet River and within the Town of Exeter. The discharge channel flows through a residential section of Exeter to the Rodman Mill Pond about 0.8 miles downstream.
Downstream Area	The Lake Adams Dam structure discharges into the Chipuxet River, which flows towards the Yorker Mill Pond (RI Dam #240). The area downstream of the dam consists of camping areas, followed by Railroad Avenue and residential structures (about 1,500 feet downstream), followed by an active railroad and farm land (about 2,200 feet downstream).
Downstream Dams	The Yorker Mill Pond Dam (240-High Hazard) is located about 1.4 miles downstream of Slocum Reservoir Dam. A commercial building is attached to the downstream face of the dam.
Downstream Bridges	Liberty Road, a well-traveled local roadway, is located about 0.75 miles downstream. A 3-foot high by 5.5-foot wide twin box culvert conveys flows beneath Liberty Road.
Reservoir Area	The reservoir is irregularly shaped, with a general length (west to east) of approximately 2,000 feet and an average width of approximately 400 feet. The reservoir is surrounded by moderately steep slopes with several camping areas and structures. The slopes appear stable with no evidence or erosion that could be indicative of loose soils or potential slides. The depth of the impoundment was reported to be 12 to 15 feet in the center, but much shallower around the shorelines.
Downstream Development	Chipuxet River flows through woods abutting residential areas, though most of the buildings appear to be well above the stream channel. Near Liberty Road, there are two residences abutting the Chipuxet River, the structures appearing to be about 5 to 8 feet above the stream channel.
General findings of the 2019 inspection	In general, Slocum Reservoir Dam was found to have areas of seepage and soft saturated soils at the downstream toe of the dam, areas of thinning and non-uniform riprap coverage, leakage along the training walls at the primary spillway, unwanted vegetation along the upstream slope right of the spillway, areas of erosion along the crest, and other dam safety deficiencies.

239- Slocum Reservoir Dam	
Potential Effects of a Dam Break	Results of the analysis indicate a peak flood depth near the toe of the dam of about five feet. The peak flows and depths attenuate as the flood wave travels downstream. The flood wave would likely overtop Liberty Road near Railroad Avenue as a result of the limited capacity of the box culvert at this location. Two structures at the intersection of Liberty Road and Railroad Avenue may experience flooding and property damage. The railroad tracks crossing the Yawgoo Mill Pond may also experience shallow flooding. The peak dam breach flow at Yorker Mill Pond Dam of about 640 cfs exceeds the dam's reported maximum spillway capacity of 240 cfs. Therefore, overtopping and **domino failure** of the Yorker Mill Pond Dam is considered likely. Yorker Mill Pond Dam is a High Hazard Dam.
Recommended Hazard Potential Classification	GZA recommends that Slocum Reservoir Dam be classified as High Hazard based on the aforementioned analyses, site/downstream valley reconnaissance, site-specific GIS mapping and other existing data, and professional judgment. A potential dam failure of Slocum Reservoir Dam is anticipated to result in the "domino" failure of Yorker Mill Pond Dam, a High Hazard structure. Therefore, failure of Slocum Reservoir Dam is likely to result in the destruction of the occupied commercial building at the downstream face of Yorker Mill Pond Dam, which would lead to probable loss of life.

Source: RIDEM 2007a, RIDEM 2019, RIEMA 2024, NID 2024

240- Yorker (Yawgoo) Mill Pond Dam	
Hazard Classification	High
Owner	Dorset Mill Pond Property Owners Assoc., Inc.
Year Built	1855
Dam Type	Recreation
Length x Height	350 ft x 12 ft
Drainage Area	4 sq. miles
Downstream Description	Yorker Mill Pond Dam is located on the Chipuxet River, which flows through the Town of Exeter and South Kingstown. An old mill building, now occupied by Hardwood Design, Inc. is attached to a portion of the downstream face of the dam. Downstream of the mill building, the Chipuxet River flows through low-density residential and agricultural areas.
Downstream Area	The channel downstream of the spillway consists of a wide riprapped channel that becomes overgrown with dense vegetation including trees and brush once the channel transitions to a natural streambed. The width of the channel appears to be sufficient to convey flow away from the dam without impacting discharge capacity; however, it has been reported that when the culverts below the two downstream roads become choked with vegetation, the stream has a tendency to overrun its banks into the low lying areas surrounding the immediate downstream area.

240- Yorker (Yawgoo) Mill Pond Dam	
	The channel downstream of the spillway passes through a wooded and overgrown area for approximately 500-feet before reaching Dorset Mill Road. Beyond the roadway, the channel continues through a wooded area before flowing below the bridge at Yawgoo Valley Road and into the braided stream system that flows below Wolf Rocks Trail Road and into Hundred Acre Pond.
Downstream Dams	There are no significant dams immediately downstream of Yorker Mill Pond Dam.
Downstream Bridges	There are several bridges and/or culverts downstream of Yorker Mill Pond over the Chipuxet River. They include: • The concrete box culvert beneath Bridge Road, a secondary residential road about 500-ft downstream of the dam. • Yawgoo Valley Road is located about 0.32 miles downstream of the dam.
Reservoir Area	The impoundment is generally an elongated shape with a slight widening in the area of the dam. The impoundment is generally narrow in shape, limiting the size of the waves which may develop across the surface of the pond. The perimeter of the impoundment is dotted with residential structures and wooded areas between on the west and north sides and is bordered by a railroad embankment and turf fields along the east side. The slopes along the west side are moderate to steep while the slopes along the east side are flat to moderate with no evidence of loose soils or slope instability.
Downstream Development	The mill building attached to the downstream face of the dam is active and currently supports a wood working company. Downstream of the building, the floodplain is sparsely inhabited. The Chipuxet River is bordered by wooded wetlands up to about 100 ft in width with low-density residential development and/or turf farm development on its overbanks. In the area of the Yawgoo Valley Road culvert and Yawgoo Ski Area, there is a day care facility on the right overbank of the Chipuxet River, approximately 6 to 10 feet above the channel.
General findings of the 2021 inspection	Yorker (Yawgoo) Mill Pond Dam was found in a generally well-maintained condition with brush and woody vegetation developing along the upstream slope near the left abutment, leakage through the primary spillway, uncontrolled water release through the low level outlet, wet areas down gradient of the downstream toe right of the spillway, an irregular vertical alignment along the crest left of the spillway, a developing area of bare soil, and other dam safety deficiencies.
Potential Effects of a Dam Break	Results of the analysis indicate a peak flood depth at the immediate toe of the dam of about 7 feet. Since there is an occupied commercial building affixed to the downstream face of the dam, it is assumed that a potential dam break would result in severe damage to, if not the destruction of the facility. As the flood wave progresses downstream, it is expected to attenuate. Thus, peak flows about 1.0 miles downstream of the dam are predicted to decrease to about 1,100 cfs. By the time the flood reaches Hundred Acre Pond (1.8 miles downstream), the depth of flooding is expected to be about one foot. The extent of flooding due to the hypothetical dam break may include shallow flooding of the Chipuxet River overbanks, which includes the possibility of shallow flooding in the vicinity of Yawgoo Valley Road and the day care facility.
Recommended Hazard Potential Classification	GZA recommends that Yorker Mill Pond Dam be classified as High Hazard based on the aforementioned analyses, site / downstream valley reconnaissance, site-specific GIS mapping and other existing data, and professional judgment. A potential dam failure of Yorker Mill Pond Dam may cause the loss of one or more human lives due to the expected destruction of the

240- Yorker (Yawgoo) Mill Pond Dam	
	occupied mill building at the downstream face of the dam. The flood wave may also result in shallow flooding at the day care facility near Yawgoo Valley Road.

Source: RIDEM 2002b, RIDEM 2021a, RIDEM 2024a, NID 2024

527- Metcalf Wildlife Marsh Dam	
Hazard Classification	High
Owner	SCOBCO Associates
Year Built	1963
Dam Type	Recreation
Length x Height	970 ft x 18 ft
Drainage Area	2 sq. miles
Downstream Description	Metcalf Wildlife Marsh is located on Locke Brook in the Town of Exeter. Immediately downstream of the dam, the discharge channel flows through an agricultural and residential area. One home is located about 300 feet downstream of the dam in the right overbank area. Within about ½ mile downstream of the dam, the stream channel is impounded by two small dams.
Downstream Area	The area downstream of the dam consists of densely wooded areas, light residential developments and farmland. The nearest houses are approximately 1,600 feet downstream, followed by Tripps Corner Road (about 1,750 feet downstream), followed by Sheffield Hill Road (about 3,500 feet downstream). Locke Brook flows into the Queen River upstream of Glen Rock Reservoir approximately 4.5 miles downstream of the dam.
Downstream Dams	Failure of the Metcalf Wildlife Marsh Dam would likely impact several dams downstream along Locke Brook, Queen's River, and the Pawcatuck River. The table below lists the impacted dams in order from upstream to downstream.

Distance Downstream (mi)	Dam Name	ID Number
0.2	No Name	Unregistered
0.3	Sherman Shingle Mill Pond Dam	244
1.9	Grinnel’s Sawmill Pond Dam	400
5.7	Glen Rock Reservoir Dam	236
11.9	Kenyon Mill Pond Dam	248
12.8	Horseshoe Falls Dam	249
13.2	Shannock Mill Pond Dam	250
14.9	Carolina Pond Dam	252

527- Metcalf Wildlife Marsh Dam	
	With the exception of Carolina Pond Dam, all the dams listed above would likely overtop and subsequently fail as a result of the failure of Metcalf Wildlife Marsh Dam. At Carolina Pond Dam, the flood wave would be confined to the spillway and is not expected to overtop the dam.
Downstream Bridges	Several bridges along Locke Brook, Queen's River, and the Pawcatuck River may be affected by failure of the dam. Tripps Comer Road, Sheffield Hill Road, Mail Road, and Dugway Bridge Road would likely be overtopped and destroyed by the dam break flood wave. Numerous other bridges downstream along Queen's River and the Pawcatuck River may experience some scour damage but are not expected to be overtopped by the flood wave.
Reservoir Area	The depth of the reservoir reportedly averages 10 to 12 feet with pockets up to 50 feet deep. The perimeter of the impoundment is generally lined with moderate to steep wooded slopes. The slopes appear stable with no evidence of erosion that could be indicative of loose soils or potential slides.
Downstream Development	Locke Brook and Queen's River flow through a low-density residential and agricultural area downstream of the dam. Several homes are located along the stream channel overbank area, within the potential dam break hazard area. The Pawcatuck River flows through a moderate-density residential and commercial area. A few homes are located along the banks of the Pawtucket River, within the potential dam break hazard area.
General findings of the 2021 inspection	In general, Metcalf Wildlife Marsh Dam was found to have large areas of flowing seepage and soft saturated soils at the downstream toe of the dam, seasonal debris within the spillway approach and spillway/low-level outlet drop chamber, areas of scarping along the upstream slope, bare spots in the auxiliary spillway, and potential debris in front of the low- level outlet that would prevent closure if operated.
Potential Effects of a Dam Break	Results of the analysis indicate a peak flood depth of about twelve feet downstream of the dam near Tripps Comer Road. The dam break flood wave would likely destroy or damage many residential homes, buildings, bridges, and dams along Locke Brook, the Queen's River, and the Pawcatuck River. Loss of life is probable, in GZA's opinion. The dam break flood wave will also result in shallow flooding of many properties and roadways along the overbank area.

Source: RIDEM 2007b, RIDEM 2021b, RIEMA 2024, NID 2024

221- Browning Mill Pond Dam	
Hazard Classification	Significant
Owner	RIDEM Fish and Wildlife
Year Built	1885
Dam Type	Fish and Wildlife Pond, Recreation
Length x Height	250 ft x 12 ft

221- Browning Mill Pond Dam	
Drainage Area	6 sq. miles
Downstream Description	Browning Mill Pond Dam is located on Roaring Brook and within the Town of Exeter. The area immediately downstream of the dam is a fish hatchery, with several small ponds divided by earthen embankments and access roads. Discharge from the primary spillway flows through a wooded channel along the north side of the hatchery. Discharge from the low-level outlet structure flows into a small pond that is formed by a small earthen dam located near Arcadia Road. Downstream of the fish hatchery is a primarily residential area, with several homes along Bald Hill Road, Summit Road, Mill Road, and Arcadia Road.
Downstream Area	Based on a review of aerial imagery and an Emergency Action Plan developed for the structure in 2012 (updated August 2014), features and structures downstream of the dam include: The RIDEM Fish Hatchery, a small earthen dam near Arcadia Road, residential structures along Arcadia Road, Summit Road, Mill Road, Bald Hill Road, Barberville Pond Dam (RI No. 215), and residential structures along the Wood River upstream of Skunk Hill Road.
Downstream Dams	A small, unregistered dam is located downstream of the low-level outlet structure. Failure of the outlet structure at Browning Mill Pond Dam would likely lead to the overtopping and subsequent failure of the small earthen dam downstream. About 2.2 miles downstream of Browning Mill Pond, on the Wood River, is the Barberville Pond Dam (215). Barberville Pond Dam is an approximately 10-foot high stone masonry run-of-river dam with a primary spillway length of approximately 90 feet. Failure of the Browning Mill Pond Dam would likely lead to the overtopping and subsequent failure of the Barberville Pond Dam. About 5.0 miles downstream of Browning Mill Pond Dam is Wyoming Upper Pond Dam (216), an approximately 15-foot high stone masonry dam with an approximately 205- foot spillway. Failure of the Browning Mill Pond Dam is not expected to result in the overtopping of the Wyoming Upper Pond Dam.
Downstream Bridges	Roaring Brook crosses through twin 4-foot diameter circular culverts about 0.3 miles downstream of the dam at Bald Hill Road. About 2.3 miles downstream of the dam (just downstream of Barberville Pond Dam), Arcadia Road crosses over the Wood River on a concrete bridge. About 4.2 miles downstream of the dam, Skunk Hill Road crosses over the Wood River (Wyoming Pond). Failure of the dam would likely overtop and destroy Bald Hill Road at the stream crossing, and would likely overtop and damage Arcadia Road where it crosses the auxiliary spillway channel on the right side of Barberville Pond Dam. Failure of the dam is not expected to overtop Skunk Hill Road but may result in some scour damage to the bridge abutments.
Reservoir Area	The dam and dike are located along the western side of the impoundment. The dam and dike are in an area where they are exposed to the full fetch of the impoundment surface. The perimeter of the impoundment is generally undeveloped and wooded with moderate slopes.
Downstream Development	The area immediately downstream of the dam includes a RIDEM warm water fish hatchery, some residential homes, and a commercial scrap yard, all of which are within the potential dam break flood hazard area. Along the Wood River, a conservation office and approximately six residential homes are located within the potential dam break flood hazard area.

221- Browning Mill Pond Dam	
General findings of the 2014 inspection	The Browning Mill Pond Dam was found heavily overgrown with small to large trees, brush, other unwanted vegetation, and deadfall cover, which prevented a complete viewing and rendered a proper visual inspection of the ground surface difficult to nearly impossible. In addition to the heavy overgrowth, the Browning Mill Pond Dam was found with areas of erosion due to pedestrian traffic along the upstream slope, crest, and downstream slopes; steep downstream slopes; a deteriorated spillway with apparent irregularities along the control weir, and poor jointing and missing stones along masonry spillway/wall sections; a left outlet with shifted stop log supports and trash rack cleaning issues; a right outlet with a vertical crack through its left upstream wingwall; overgrown discharge channels; and other dam safety deficiencies.
Potential Effects of a Dam Break	The dam break flood wave would likely result in damage to the RIDEM Fish Hatchery and several homes downstream of the dam. Loss of life is anticipated to be probable, in GZA's opinion. Depending on the nature and location of the dam breach, the dam break flood wave may result in the failure of the small earthen dam downstream near Arcadia Road and shallow flooding of several homes along Arcadia Road, Summit Road, and Mill Road between the small dam and Roaring Brook. Failure of the dam would likely lead to the overtopping and destruction of Bald Hill Road where it crosses Roaring Brook. Along the Wood River, the dam break flood wave would likely result in the shallow flooding of the conservation office just upstream of Barberville Pond Dam. Failure of the dam would likely lead to the overtopping and failure of Barberville Pond Dam. Overtopping of the Barberville Pond Dam would result in the overtopping of Arcadia Road on the right side of the dam, where the auxiliary spillway channel crosses under the road. Downstream of Barberville Pond Dam, the dam break flood wave would likely result in the shallow flooding of approximately six homes along the Wood River upstream of Skunk Hill Road. The dam break flood wave may also result in the overtopping of a section of KG Ranch Road just north of its intersection with Nooseneck Hill Road.

Source: RIDEM 2007c, RIDEM 2014, RIEMA 2024, NID 2024

238- Edward's Pond Dam	
Hazard Classification	Significant
Owner	Exeter Country Club
Length x Height	440 ft x 8 ft
Drainage Area	2 sq. miles
Downstream Description	Edward's Pond Dam is located on a tributary to the Queen River and within the Town of Exeter. The discharge channel flows through the Exeter Country Club golf course about 0.5 miles downstream.
Downstream Area	Downstream of the dam is a lightly wooded area that extends downstream for 1,200 feet. The wooded area is directly around the channel and is surrounded by fields and very light residential development down to RI102. Discharge passes under RI-102

238- Edward's Pond Dam	
	via a culvert which was installed following a failure of the culvert in March 2010. After passing under RI-102, the channel enters the Exeter Country Club golf course where it is impounded to form three other bodies of water, two of approximately the same size as Edward's Pond, and one of a smaller size.
Downstream Dams	Exeter Country Club Dam (RIDEM 714) is downstream of Edward's Pond Dam and is reported to be an 8.5-foot high, and approximately 20-foot long earthen embankment dam. The dam includes a broad crested spillway of about 12 feet long. The dam impounds two ponds hydraulically connected by a narrow channel located in a golf course. The remnant of Dam 715, which appears to be breached, is located near William Reynolds Road, about 1.75 miles downstream of Edward's Pond Dam.
Downstream Bridges	Ten Rod Road (Route 102), a well-traveled state highway, is located about 0.2 miles downstream. An approximately 9 foot wide by 5.5 foot high box culvert conveys flows beneath Ten Rod Road. William Reynolds Road, a roadway located downstream of the golf course crosses the tributary to the Queen River about 1.4 miles downstream from Edward's Pond Dam.
Reservoir Area	The dam is located within the southern portion of the roughly 400 foot wide by 700 foot long impoundment. The perimeter of the impoundment is generally open fields with a wood area to the northwest. Flows enter into the impoundment from the north side via Queens Brook.
Downstream Development	The tributary to Queen River flows through the Exeter Country Club golf course, then through a wooded area with few abutting residences. In the vicinity of the unnamed dam, there is a residence, appearing to be about 5 feet above the stream channel.
General findings of the 2012 inspection	In general, Edward's Pond Dam was found to have minor seepage in the area of the pond drain outlet, minor deterioration and leakage at the spillway, growth of some trees in the area of the dam, displacement and areas of concerns of the gated sluiceway intake, and other dam safety deficiencies.
Potential Effects of a Dam Break	Results of the analysis indicate a peak flood depth near the toe of the dam of about four feet. The peak flows and depths attenuate as the flood wave travels downstream. The flood wave would likely overtop Ten Rod Road (Route 102) and William Reynolds Road as a result of the limited capacity of the culverts at these locations. The channel immediately downstream of the dam narrows, therefore the residence approximately 600 feet downstream may experience shallow flooding and some property damage. The golf course along the stream channel near Ten Rod Road may also experience shallow flooding and some property damage.

Source: RIDEM 2007d, RIDEM 2012, RIDEM 2024a, NID 2024

The 2019-2023 Annual Reports to the Governor on the Activities of the Dam Safety Program (RIDEM 2020b, 2021a, 2022, 2023 2024) provides information on dam safety activities of dams in Exeter from 2019-2023. No information is provided for dams in West Greenwich as there are no High or Significant hazard dams in the Town.

Year: 2019 (RIDEM 2020)	
Unsafe dams with known owners and overview of unsafe conditions	219- Boone (High)- Vegetation prohibited inspection, debris in spillway affected flow, leakage with sediment transport through spillway 221- Browning (High)- Vegetation prohibited inspection, vegetation may be impacting flow 238- Edward's (Significant)- Vegetation prohibited inspection
Dam No. 219- Boone (High)	The dam was inspected in 2013, and DEM issued a NOV to the owner in 2014 for the unsafe conditions. The owner's engineer submitted a report to address the unsafe conditions and also noted additional leakage through the embankment. DEM required that the engineer develop a monitoring plan for the leakage. In 2015, DEM approved the monitoring plan and entered a Consent Agreement with the owner, which resolved the NOV. The Consent Agreement required the leakage to be monitored for two years, and a report submitted to DEM on the findings. The report was submitted in March 2019 recommending no further action. In August 2019, DEM released the NOV.
Dam No. 221- Browning (High)	The dam was inspected in 2014. DEM owns the dam, DEM's Division of Planning and Development has this dam on its list to address the unsafe conditions. No change in status occurred in 2019.
Dam No. 238- Edward's (Significant)	The dam was inspected in 2012, and DEM issued a NOV to the owner in 2015 for the unsafe conditions. No change in status occurred in 2019.
Inspections completed	239- Slocum Reservoir (High) 240- Yorker Mill (High) 527- Metcalf Wildlife Marsh (High)
Repair approvals	219- Boone (High): Downstream slope stone protection
EAP approvals	221- Browning Mill (High)

Year: 2020 (RIDEM 2021c)	
Unsafe dams with known owners and overview of unsafe conditions	221- Browning (High)- Vegetation prohibited inspection, vegetation may be impacting flow 238- Edward's (Significant)- Vegetation prohibited inspection
Dam No. 221- Browning (High (2020)- Significant as of 2021)	The dam was inspected in 2014. The Department of Environmental Management (DEM) owns the dam. In 2020, the Dam Safety Program approved a hazard classification change from High Hazard to Significant Hazard and DEM's Division of Planning and Development continued to review engineering evaluations based on the new hazard classification.
Dam No. 238- Edward's (Significant)	The dam was inspected in 2012, and the Department of Environmental Management (DEM) issued a Notice of Violation (NOV) to the owner in 2015 for unsafe conditions. The owner did not file an appeal of the NOV with DEM's Administrative Adjudication Division and have not complied with the NOV. No change in status occurred in 2020.

Year: 2021 (RIDEM 2022b)	
Unsafe dams with known owners and overview of unsafe conditions	221- Browning (Significant)- Vegetation prohibited inspection, vegetation may be impacting flow 238- Edward's (Significant)- Vegetation prohibited inspection
Dam No. 221- Browning (Significant)	The dam was inspected in 2014. The Department of Environmental Management (DEM) owns the dam. In 2020, the Dam Safety Program approved a hazard classification change from High Hazard to Significant Hazard and DEM's Division of Planning and Development continued to review engineering evaluations based on the new hazard classification. No change in status in 2021.
Dam No. 238- Edward's (Significant)	The dam was inspected in 2012, and the Department of Environmental Management (DEM) issued a Notice of Violation (NOV) to the owner in 2015 for unsafe conditions. The owner did not file an appeal of the NOV with DEM's Administrative Adjudication Division and has not complied with the NOV. No change in status occurred in 2021.
Inspections completed	240- Yorker Mill Pond (High) 527- Metcalf Wildlife Marsh (High)
Repair approvals	239- Slocum Reservoir (High): Embankment and spillway

Year: 2022 (RIDEM 2023a)	
Unsafe dams with known owners and overview of unsafe conditions	221- Browning (Significant)- Vegetation prohibited inspection, vegetation may be impacting flow 238- Edward's (Significant)- Vegetation prohibited inspection
Dam No. 221- Browning (Significant)	The dam was inspected in 2014. The Department of Environmental Management (DEM) owns the dam. In 2020, the Dam Safety Program approved a hazard classification change from High Hazard to Significant Hazard and DEM's Division of Planning and Development continued to review engineering evaluations based on the new hazard classification. No change in status in 2022.
Dam No. 238- Edward's (Significant)	The dam was inspected in 2012, and the Department of Environmental Management (DEM) issued a Notice of Violation (NOV) to the owner in 2015 for unsafe conditions. The owner did not file an appeal of the NOV with DEM's Administrative Adjudication Division and has not complied with the NOV. No change in status occurred in 2022.
Potentially unsafe dams with known owners and overview of unsafe conditions	527- Metcalf Wildlife Marsh (High)- Possible inoperable low-level outlet
Dam No. 527- Metcalf Wildlife Marsh (High)	The dam was inspected in 2022. The Department of Environmental Management issued a notice to the owner on January 14, 2022. The owner addressed all potentially unsafe conditions.
Inspections completed	219- Boone Lake (High)

Year: 2023 (RIDEM 2024a)	
Unsafe dams with known owners and overview of unsafe conditions	221- Browning (Significant)- Vegetation prohibited inspection, vegetation may be impacting flow 238- Edward’s (Significant)- Vegetation prohibited inspection
Dam No. 221- Browning (Significant)	The dam was inspected in 2014. The Department of Environmental Management (DEM) owns the dam. In 2020, the Dam Safety Program approved a hazard classification change from High Hazard to Significant Hazard and DEM’s Division of Planning and Development continued to review engineering evaluations based on the new hazard classification. No change in status in 2023.
Dam No. 238- Edward’s (Significant)	The dam was inspected in 2012, and the Department of Environmental Management (DEM) issued a Notice of Violation (NOV) to the owner in 2015 for unsafe conditions. The owner did not file an appeal of the NOV with DEM’s Administrative Adjudication Division and has not complied with the NOV. No change in status occurred in 2023.
Inspections completed	239- Slocum Reservoir (High) 240- Yorker Mill Pond (High)
Repair approvals	219- Boone Lake (High): Sinkhole at spillway

3.3.2.3 History

Based on RIDEM records, there has never been a significant failure of a high hazard or significant hazard dam in Exeter and West Greenwich.

In 2008, the Town of Exeter created a district for the Boone Lake Dam (No. 219), which is a privately owned high hazard dam (RIDEM 2020). A file review with the State of Rhode Island was conducted in November 2024 to investigate accounts of a catastrophic failure. The association has been in existence since at least the 1960’s and there are file notes indicating issues with leakages as far back as the 1940’s (Rhode Island Department of Environmental Management (S. Pinto)). The file review indicated a breach or partial breach of the dam in the 1950’s caused by a storm event that was subsequently repaired.

A 2005 local newspaper article discusses ongoing repairs (since 1988) of the Yorker (Yawgoo) Mill Pond Dam in Exeter. In 2000, RIDEM inspected the dam, and the spill was repaired in 2022. The 2005 article states that neighbors would like to keep the pond, but if maintaining the dam became too expensive, they are open to coordinating with RIDEM on breaching the dam and draining the pond (The Standard Times 2005).

Based on the 2021 inspection, the Yorker (Yawgoo) Mill Pond Dam was found in a generally well-maintained condition with brush and woody vegetation developing along the upstream slope near the left abutment, leakage through the primary spillway, uncontrolled water release through the low level outlet, wet areas down gradient of the downstream toe right of the spillway, an irregular vertical alignment along the crest left of the spillway, a developing area of bare soil, and other dam safety deficiencies (RIDEM 2021a).

Prov. Journal 12-27-05

Looking back on 2005

Old dam: Asset or liability?

JOURNAL PHOTO / FRIEDA SQUIRES

Water pours over the Yorker Mill Pond dam in Exeter, also known as the Yawgoo Mill Pond, through large tubes to relieve pressure on the dam. Members of the Dorset Mill Partnership LLC have spent tens of thousands of dollars on repairs to the dam since 1988. Right, Bill Bivona of the Dorset Mill Partnership, stands by the pond as the water is pumped over the dam. The mill complex was built in 1949 as a grist mill; it was later converted into a textile mill and is now home for four businesses.

The owners of a dam in Exeter seek to share the cost of repairing it with neighbors

BY CHELSEA PHUA
JOURNAL STAFF WRITER

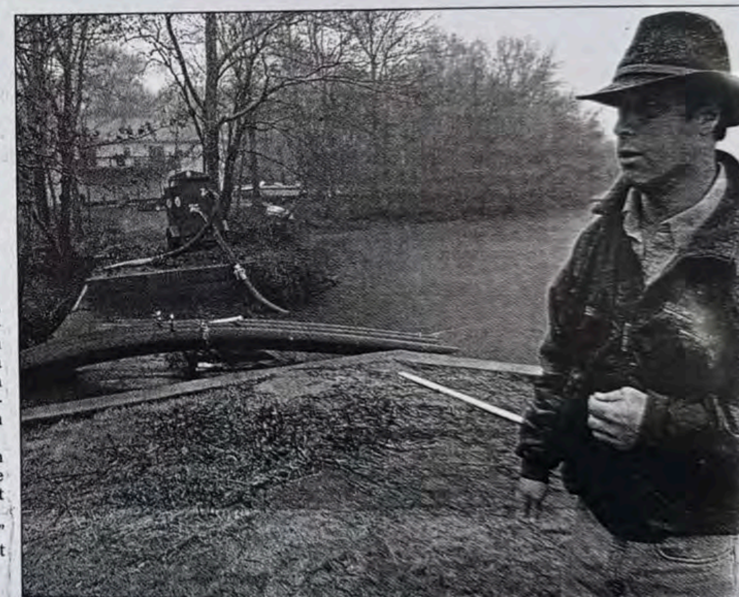
EXETER

EXETER — One day two years ago, William J. Bivona was having a meeting in his office with an architect from New York when both men spotted a beaver, having a shower under a waterfall only 15 feet from their window.

Standing on its hind feet, the beaver lifted one front paw and scrubbed beneath it with another.

"It was a cool little display," Bivona said. The New York architect

SEE **DAM, C2**



12-29-05

Dam

Continued from Page C1

was, without a doubt, also amused.

As the owner of a business on Dorset Mill Road whose offices occupy the site of a former mill, Bivona enjoys a serene view of a pond known variously as Yawgoo Mill Pond, Yorker Mill Pond, Yonker Mill Pond or Dorset Mill Pond.

From his second-floor conference room, Bivona, his wife Alice L. Buckley and his staff would sometimes catch sight of Canada geese or watch otters sitting on the ice in the winter eating fish.

Such a view comes with a price: maintaining the dam that created the pond.

The October rains flooded areas of Rhode Island and highlighted the state's six dams designated high-hazard by the state Department of Environmental Management. The Yorker Mill Pond Dam was identified as an unsafe structure in need of repair; it is the only dam in South County with such a designation.

If it failed, it could result in loss of life, said David Chopy, supervising engineer for the DEM's compliance office. A few residential houses downstream are not in danger, but the mill and Bivona's business could be severely undermined if there was a breach, he said.

The area of concern is the section of embankment adjacent to and south of the spillway, where excessive leakage is occurring, Chopy said. Repair and upgrade work, including the installation of a gate to regulate the water level, is scheduled for the summer. The work was originally scheduled for this fall but was postponed because of bad weather.

In the meantime, the DEM has instructed Bivona to keep the water level of the pond at 2 feet below the spillway. Chopy said this would reduce the water pressure and prevent more leakage.

Thomas McMillan, Exeter's assistant emergency management director, said DEM Director W. Michael Sullivan gave a satisfactory review of the Dorset Mill Dam in November. Because the owners were taking steps to improve the dam, the agency wasn't going to take them to court. The town, relying on the DEM's assessment, does not consider the dam to be a serious threat at this time, McMillan said.

In addition, neighbors say the flooding in October was caused by culverts choked with debris.

"We got some of the worst rainfalls, but the dam held," said Barbara L. Nowicki, former president of the Dorset Mill Pond Property Owners' Association.

The dam and the pond are part of the Chipuxet River system, which flows from the vicinity of the Rhode Island Veterans' Cemetery in Exeter to Worden Pond in South Kingstown. The dam was first built to provide power for the mill to grind corn and grain. It was later used to power a textile operation.

Bivona and his wife own about two-thirds of the 300-feet long dam in a partnership with another couple.

Between 2001 and 2004, about $35,000 to $40,000 worth of repairs have been made, Bivona said. His Dorset Mill Partnership has paid about two-thirds of it. Sodco, a turf farm with a field beside the pond, uses its water and is committed to paying a portion of the cost, he said. Nowicki said six of the eight lot owners belonging to the pond association have contributed a total of $19,970 between May 2001 and March 2003.

However, the partnership says it is paying a disproportionate amount of the repair cost. It filed a lawsuit in Washington County Superior Court against its neighbors, some of whom belong to the pond association.

Bivona and his partners argued in court documents that 15 lots abut the pond and a clause in the deeds of the abutters states: "This parcel is conveyed subject to the obligation to share on a pro rata basis the cost of maintenance or repair of the dam on Yonker Mill Pond also known as Yawgoo Mill Pond if any such repair is required."

In July, the court found in favor of the partnership and confirmed that the language of the deed still applied to the abutters, except for two sisters, whose situation was ambiguous. The pond association and other lot owners have filed an appeal with the state Supreme Court. But Bivona said homeowners of three properties have since agreed to pay their share.

Nowicki said the association is not trying to avoid payment. With the appeal, it would like the court to set up a system in which everyone would contribute annually, so money could be set aside for repairs. Although some neighbors have contributed, others have not, she said.

"Part of the difficulty is that homeowners don't want to pay to maintain someone else's property," she said. The neighbors would also like to have a say in how the money is being spent, Nowicki said.

The dam, possibly built in 1855 (as stated in a report the DEM has on file), has suffered years of neglect, Chopy said. Prior to the partnership owning the dam in 1998, little or no repair work was done.

"There are no records of anything that anybody did to fix it," Chopy said. "If there were repairs made to the dam, they are not in our files."

According to court documents, an engineering firm, Pare & Associates, prepared a condition survey report on the dam in 1983. The report recommended repairs be done, but the owner at that time neglected to do so.

Chopy said the DEM also inspected the dam in 1983 and again in 1985. The agency sent letters to owners, listing the cracks and erosions on the spillway walls. He could not find records indicating the repairs had been made. Another DEM inspection was conducted in 1990, but again, there were no repair records.

In 2000, at Bivona's request, the DEM inspected the dam, Chopy said. Repair plans were discussed and the spillway was mended in 2002.

Neighbors would like to keep the pond if they can, Nowicki said. It is an important habitat for wildlife and a recreation spot for residents. But if maintaining the dam becomes too expensive, they may have to ask the DEM for permission to breach the dam and drain the pond, she said.

Staff Writer Chelsea Phua can be reached by e-mail at cphua@projo.com

3.3.2.4 Extent

Heavy rainfall and flood events call into question the structural integrity of dams that would affect Exeter and West Greenwich.

Most of Rhode Island's dam failure inundation mapping is publicly available through RIDEM/RIGIS. Of the available mapping, the dam failure inundation areas in Exeter and West Greenwich are shown below (Figure 11).

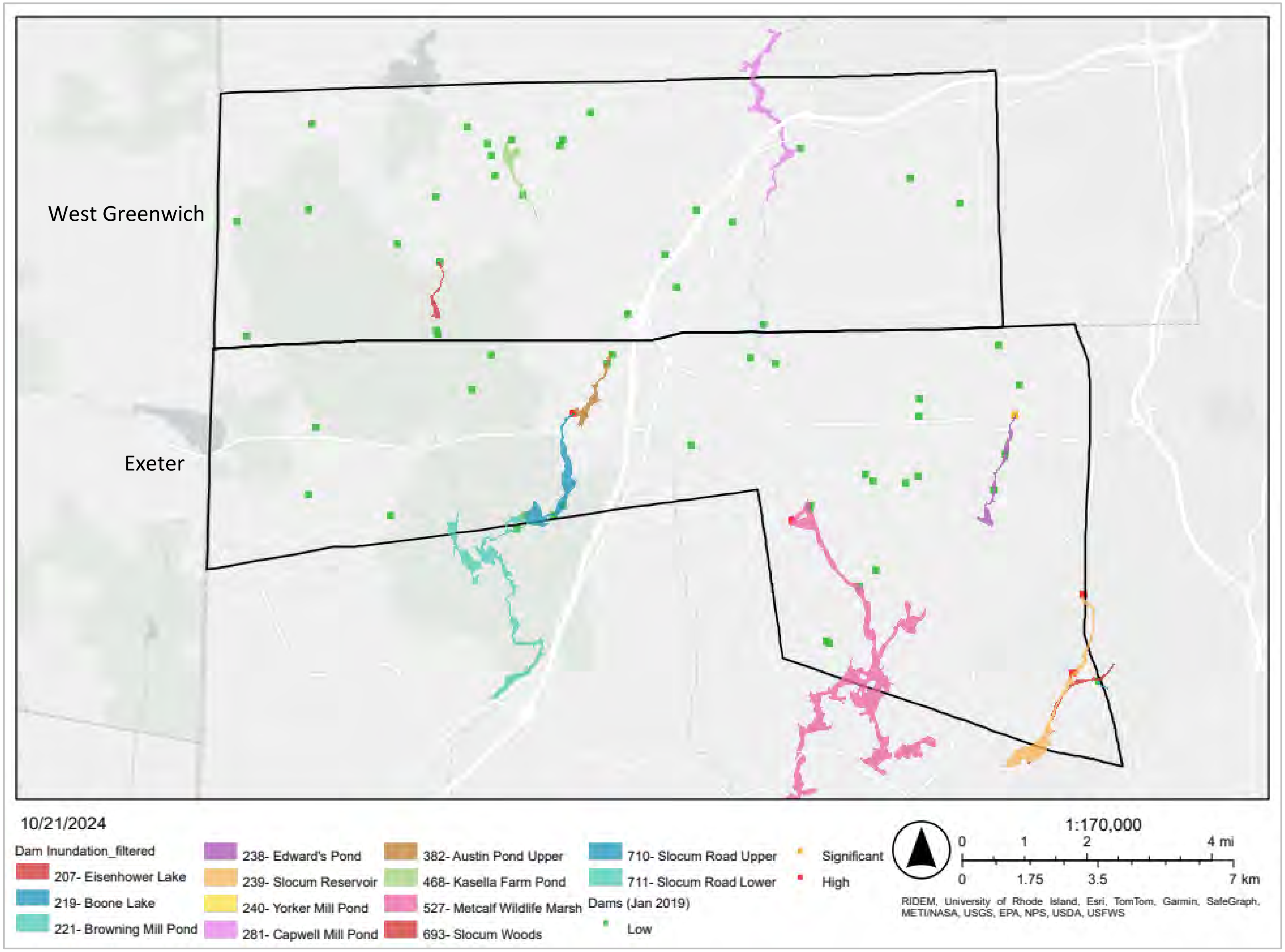


Figure 11- Available Dam Failure Inundation Mapping in Exeter and West Greenwich

Based on available inundation mapping, there are two (2) dams located outside of Exeter's Town boundary that would inundate portions of the Town if it were to fail. These dams include: Solcum Road Upper Dam (High hazard potential, North Kingstown), and Slocum Woods Dam (High hazard potential, North Kingstown). None of these inundation areas are anticipated to impact critical facilities, however two (2) residences would be impacted by a failure of the Slocum Woods Dam. Based on available inundation mapping, there are no dams located outside of West Greenwich's Town boundary that would inundate portions of the Town if it were to fail.

Based on the lack of past dam failures and the criteria identified in Table 7, the extent of dam failure in Exeter and West Greenwich have been Negligible as there has never been a major failure; however, if a High or Significant Hazard Dam in Exeter were to fail, the extent of dam failure could be **Significant** with multiple deaths and severe injuries; medium shutdown of some critical infrastructure and facilities; 20% to 50% of residential and 10-25% of commercial structures are severely damaged; and large impacts to local operations for long amounts of time.

3.3.2.5 Probability of Future Occurrence

According to the 2024 State of Rhode Island HMP:

RIDEM 's Dam Safety Program conducts routine monitoring and inspection of dams within the state on the previously identified schedule, with priority placed on those dams which pose the greatest potential threat. However, to fully determine the probability of a future event, a full engineering inspection would need to be completed on each dam, something beyond the scope of this plan.

Dams undergoing repair and/or reconstruction are required to be designed to pass at least the 1%-annual-chance rainfall event with one foot of freeboard. The most critical and hazardous dams are required to meet a spillway design standard much higher than passing the runoff from a 1%-annual-chance rainfall event. Although not all the dams have been shown to withstand the 1%-annual-chance rainfall event, most of the dams meet this standard due to original design requirements or recent spillway upgrades.

The potential for dam failure reduces when the dam is properly taken care of and receives a "Satisfactory" condition rating.

Based on condition assessments and the criteria identified in Table 8, it is **Possible** that Exeter and West Greenwich will experience a dam failure event in the calendar year; there is a between 1-49.9% annual probability of occurring.

3.3.2.6 Impact

In Exeter and West Greenwich, severe winter storms, flooding, and a hurricane could all bring enough rain and/or snowfall to cause a dam failure. The age and conditions of dams also poses a risk to the structural integrity of dams.

Dam failures result in impacts such as damage or destruction to homes and critical facilities in the inundation area, potential loss of life, overtopping of roads which may lead to erosion and traffic disruption, and funding required to rehabilitate failed dams.

A dam failure will also cause cascading impacts to upstream and downstream flooding potential.

3.3.2.7 Future Conditions

Nature of the hazard	Future climate conditions are unlikely to influence the nature of future dam failures in Exeter and West Greenwich.

Location	Future climate conditions are unlikely to influence the location of future dam failures in Exeter and West Greenwich. However, changing factors that influence the potential of a dam failure (heavy rains, flooding) may result in a dam failure of a dam that has not previously failed.
Extent	A potential outcome of changing climate in Rhode Island is an increase in extreme precipitation events which are likely to lead to more severe floods and a greater risk of dam failure. Additional projected greater periods of drought conditions and high heat may result in ground cracking, a reduction of soil strength, erosion, and subsidence in earthen dams (RIEMA 2024). See Table 18 and Table 19 for projections of future precipitation amounts in Exeter and West Greenwich under different future climate conditions models.
Impact	Increased precipitation is likely to lead to more frequent dam failures of dams with conditions of Poor or Fair, unless dam deficiencies are addressed. The impact of these dam failures may include damage to homes and critical facilities in the inundation area, potential loss of life, overtopping of roads which may lead to erosion and traffic disruptions, and funding required to rehabilitate failed dams.
Probability of Future Events	The NOAA NCEI State Climate Summary 2022 for Rhode Island suggests that the number of extreme precipitation events are projected to increase for Rhode Island. These extreme events will likely place increased stress on dams within the State (RIEMA 2024). The 2024 State of Rhode Island HMP states: *The 2018 National Climate Assessment report indicates that much of the water infrastructure in the northeast portion of the United States, including dams, is nearing the end of its planned life expectancy. As indicated in the report:* • *"Aging and deteriorating dams and levees also represent an increasing hazard when exposed to extreme or, in some cases, even moderate rainfall. Several recent heavy rainfall events have led to dam, levee, or critical infrastructure failures, including the Oroville emergency spillway in California in 2017, Missouri River levees in 2017, 50 dams in South Carolina in October 2015 and 25 more dams in the state in October 2016, and New Orleans levees in 2005 and 2015. The national exposure to this risk has not yet been fully assessed."* At present, there is no comprehensive assessment of the climate-related vulnerability and risks to existing dams. Additionally, there are no common design standards concerning the repair or modification of existing dams nor for the design and construction of new dams operated in the face of changing climate risk (RIEMA 2024).
Changes in Population Patterns	It is possible that future dam failures will cause changes in population patterns in Exeter and West Greenwich as residents may relocate out of inundation areas.
Changes in Land Use Development	It is likely that future dam failures will cause changes in land use development in Exeter and West Greenwich as inundated areas may become unsuitable for future development to reduce future losses, or development will be restricted in inundation areas.

The table below summarizes the influence of future climate conditions on the hazards that may impact the potential for a dam failure in Exeter and West Greenwich.

Hazard	Future climate conditions influence		Influence on dam failure probability	
	Extent	Probability of Future Events	Extent	Probability of Future events
Nor'easter	Increase	Increase	Increase	Increase
Hurricane	Increase	Decrease	Increase	Increase
Snow storm	Increase	Increase rainfall	Increase	Increase
Thunderstorm	Increase	Increase	Increase	Increase
Tornado	Unknown	Unknown	Unknown	Unknown
Earthquake	No change	No change	No change	No change
Flood	Increase	Increase	Increase	Increase

As future climate conditions are influencing the extent and recurrence probability of several hazards that influence the potential of a dam failure, the likelihood of cascading impacts of upstream and downstream flooding potential increases. See the individual hazard profiles for information on how future climate conditions may influence/impact future land use development and population patterns in Exeter and West Greenwich.

3.3.3 Flooding

This section focuses on flooding in terms of riverine, urban, and flash flooding. Further discussion on storm surge is **not included** in this plan, due to Exeter and West Greenwich's inland location in central western Rhode Island.

3.3.3.1 Description

Flooding is the overflow or accumulation of water on normally dry land, often caused by heavy rainfall, snowmelt, storm surges, or the failure of natural or artificial barriers. Flooding can lead to the inundation of homes, roads, farmland, and other areas, causing damage to property, disruption of daily life, and potential threats to human safety and the environment (RIEMA 2024).

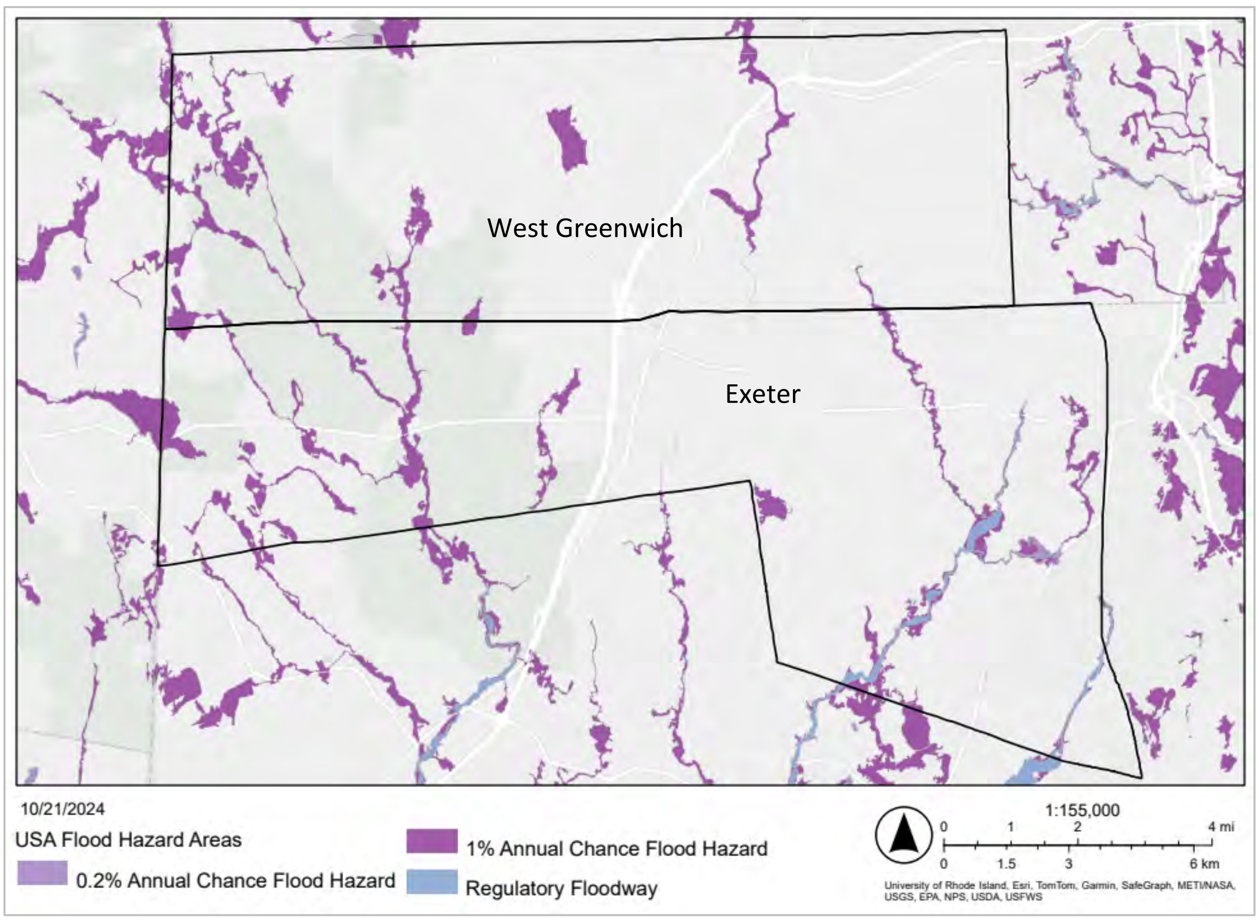
Riverine Flooding: Riverine flooding refers to the overflow of water from a river or a stream onto adjacent land areas. This type of flooding occurs when the water level in a river or stream rises significantly and exceeds its banks, inundating the surrounding areas. The severity of riverine flooding can be influenced by the amount and intensity of rainfall in the watershed, the size, shape, and slope of the river or stream channel, and the presence of dams on the river system.

Urban Flooding: FEMA defines urban flooding as 'the inundation of property in a built environment, particularly in more densely populated areas, caused by rain falling on increased amounts of impervious surfaces and overwhelming the capacity of drainage systems." In Rhode Island, urban flooding has consistently increased due to a number of factors, including the filling for development of natural wetlands and waterways, the reduction of permeable surfaces, and the aging and insufficient capacity of stormwater systems.

Flash Flooding: Flash flooding occurs during heavy or extended periods of rain, generally when the ground is unable to rapidly absorb the water. Most flash flooding in Rhode Island is caused by hurricanes or extra-tropical storms, Nor'easters, or stationary thunderstorms. Heavy sustained rain can create rapid flooding very quickly, and flooding can occur miles away from where the rain fell. Factors that can contribute to the severity of flash flooding include rainfall intensity, duration, drainage condition, and ground conditions (paved or unpaved). Flash floods are particularly dangerous to people and property, as six inches of moving water can knock a person down and two feet can lift a vehicle. As there is often little warning of a flash flood event, they are the cause of most flood fatalities.

3.3.3.2 Location

Figure 12 shows the Special Flood Hazard Areas (SFHAs) in Exeter and West Greenwich. More detailed information on these SFHAs is available in the current FEMA Flood Insurance Rate Maps (FIRMs) that can be found on FEMA's Flood Map Service Center website: https://msc.fema.gov/ and in Appendix L- FEMA Flood Insurance Rate Maps (FIRMs).

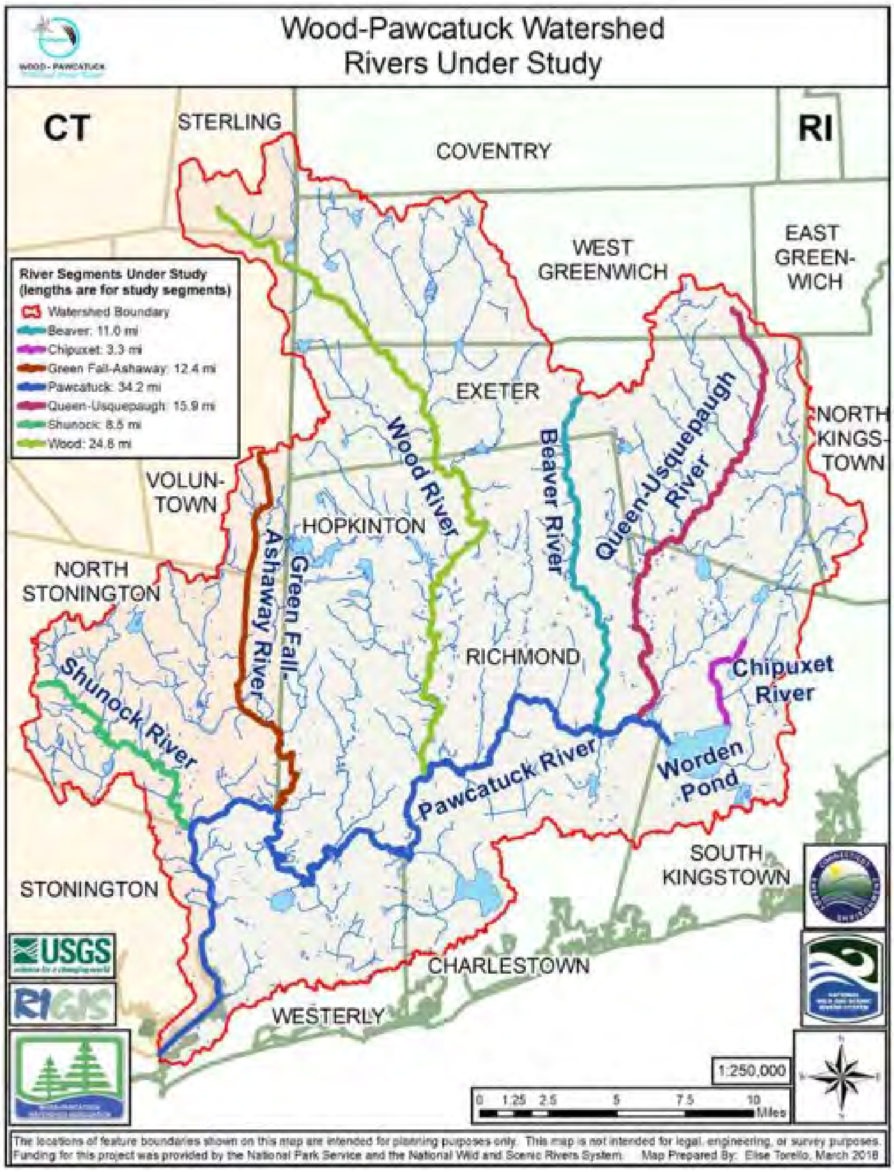


Source: FEMA FIRMs Mapping Data (2024)

Figure 12- Special Flood Hazard Areas in Exeter and West Greenwich

The Wood-Pawcatuck Watershed is located in portions of Exeter and West Greenwich (Figure 13). The Wood-Pawcatuck Watershed encompasses a 300 square mile area of land in southwestern RI and southeastern CT. Its seven major drainage basins include the Queen, Wood, Chickasheen, Chipuxet, Shunock, Green Falls, and Pawcatuck Rivers, and their tributaries. It is one of the few remaining relatively pristine natural areas along the northeast corridor between New York and Boston.

The Wood-Pawcatuck Watershed is vulnerable to flood-related damages, as evidenced by the devastating flooding that occurred in 2010. The Wood-Pawcatuck Watershed Association, working with the watershed municipalities and partner agencies, has developed a watershed-based management plan to enhance the resilience of the watershed communities to future flooding and protect river and stream ecosystems, including water quality and habitat (WPWA 2017). The following is a summary of key findings and of the watershed plan for the Towns of Exeter and West Greenwich (WPWA 2017). Recommended actions in the watershed-based management plan will be integrated into the mitigation strategy.



Source: WPWA (2018)

Figure 13- Wood-Pawcatuck Watershed Boundary

Wood-Pawcatuck Watershed Flood Resiliency Management Plan August 2017

Recommended Actions Summary
Town of Exeter, RI

The Wood-Pawcatuck watershed is vulnerable to flood-related damages, as evidenced by the devastating flooding that occurred in 2010. The Wood-Pawcatuck Watershed Association, working with the watershed municipalities and partner agencies, has developed a watershed-based management plan to enhance the resiliency of the watershed communities to future flooding and protect river and stream ecosystems, including water quality and habitat. The following is a summary of key findings and recommendations of the watershed plan for the Town of Exeter.

Quick Facts - Exeter

- 91% of town within watershed
- Includes portions of the Chipuxet, Chickasheen, Beaver, Usquepaug, Wood, and Queen Rivers and their watersheds
- 63 stream crossings assessed
- 11 dams assessed

Road Stream Crossings

- 25 crossings are hydraulically undersized
- 30 crossings have high geomorphic vulnerability
- 6 crossings have high flood impact potential
- 9 crossings limit or restrict aquatic passage

Recommendations:

- Replace and upgrade priority crossings (see table below) to meet flood resilience and aquatic organism passage (AOP) goals
- Consider other upstream and downstream crossings and dams on the same river system
- In general, replace downstream crossings first
- Perform site-specific data collection, geotechnical evaluation, hydrologic and hydraulic evaluation, and structure type evaluation to support design

Highest-Ranked High Priority Stream Crossings (Listed by Priority Ranking)

Road	Stream	Crossing Type
Deer Brook Lane	Unnamed	36" Concrete Circular Conduit
Tarbox Drive	Queens Fort Brook	48" and 24"" Concrete Circular Conduit (Total 2)
Mail Road	Unnamed	12" Concrete Circular Conduit
Purgatory Road	Unnamed	24" Concrete Circular Conduit
Wolf Rocks Road	Chipuxet River	5.3' x 5.9' Concrete Box Culvert
Yawgoo Valley Road	Chipuxet River	Triple 48" Concrete Circular Conduit
William Reynolds Road	Unnamed	12" HDPE Circular Conduit
Liberty Road	Unnamed	Triple 18" HDPE Circular Conduit
Punchbowl Road	Unnamed	18" CMP Circular Conduit

Dams

- Several dams provide recreational or other uses and are undergoing or were recently repaired
- Several dams are recommended for repair or removal due to poor condition and lack of maintenance

Recommendations:

Breakheart Pond Dam (Breakheart Brook)
- Located within Arcadia Management Area
- Downstream watercourse has obstructions to fish passage
- Dam is in poor condition and repairs are therefore recommended

Browning Mill Pond Dam (Roaring Brook)
- RIDEM owns the dam and operates a hatchery downstream
- Browning Mill Pond has significant public recreational value
- Repairs are recommended for this deteriorating dam

Edward's Pond Dam (Queen River)
- Owned by Exeter Country Club
- No apparent active uses of impoundment
- Consider dam removal

Breakheart Pond Dam

For the complete project plan please visit http://wpwa.org/flood_resiliency.html

Project funding was provided by the National Fish and Wildlife Foundation Hurricane Sandy Coastal Resiliency Competitive Grant Program

FUSS & O'NEILL

Wood-Pawcatuck Watershed Flood Resiliency Management Plan August 2017

Green Infrastructure

A screening-level assessment of potential green infrastructure (GI) retrofit sites was performed within the Wood-Pawcatuck watershed. When applied throughout the watershed, GI can help mitigate flood risk resulting from outdated and undersized storm drainage systems and increase flood resiliency, as well as improve water quality.

Sites Identified for GI Retrofits:

- Exeter Town Animal Shelter
  - Install bioretention along the northern roadside of South Country Trail to treat approximately one quarter mile of roadway
  - Cost: $107,000
- Exeter Town Hall
  - Bioretention and rain garden at parking lot
  - Cost: $103,000
- Browning Mill Pond Parking Access
  - Bioretention and forested buffer to protect adjacent Browning Mill Pond
  - Regrade and till parking lot to alleviate some erosional issues and improve infiltration
  - Cost: $32,000

Typical rain garden detail.

River Corridor

A detailed geomorphic assessment was performed for approximately 40 miles of rivers and streams in the watershed. Based on the results of the geomorphic assessment, river corridor planning recommendations were developed to identify restoration projects that will reduce flood hazards and downstream sediment loading and improve aquatic habitat.

Recommendations:

Arcadia Management Area south of Ten Rod Road (Upper Wood River)

- Add wood cover structures along river banks (a.k.a. marginal wood cover) and wood to river to encourage meander formation and sediment storage within artificially straightened channel
- Area is popular for fly fishing
- Area is owned and managed by the Wood-Pawcatuck Watershed Association

Straightened river channel and old bridge abutments

Land Use Policy and Regulations

Municipal land use policies and regulations can help communities become more resilient to flooding by:

- Preserving undeveloped land
- Siting development in locations less vulnerable to flooding, and
- Promoting designs that reduce runoff and are less likely to be damaged in a flood

Recommendations:

A review was conducted of the land use policies, plans, and regulations of the watershed municipalities. Key recommendations of this review include:

- The Hazard Mitigation Plan is due to be updated and should address flood-prone areas identified during the 2010 flood and subsequent flood events, including street flooding identified as an issue in 2010
- Consider adopting a No Adverse Impact (NAI) Floodplain Management policy
- Amend zoning ordinance to strengthen flood management standards
- Consider implementing fluvial erosion hazard zoning to address riverine erosion hazards
- Amend street and parking lot design standards to reduce impervious cover and remove barriers to LID
- Update design storm precipitation amounts
- Implement road stream crossing standards for new and replacement culverts and bridges

Project funding was provided by the National Fish and Wildlife Foundation Hurricane Sandy Coastal Resiliency Competitive Grant Program

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Wood-Pawcatuck Watershed Flood Resiliency Management Plan — August 2017

Recommended Actions Summary
Town of West Greenwich, RI

The Wood-Pawcatuck watershed is vulnerable to flood-related damages, as evidenced by the devastating flooding that occurred in 2010. The Wood-Pawcatuck Watershed Association, working with the watershed municipalities and partner agencies, has developed a watershed-based management plan to enhance the resiliency of the watershed communities to future flooding and protect river and stream ecosystems, including water quality and habitat. The following is a summary of key findings and recommendations of the watershed plan for the Town of West Greenwich.

Quick Facts – West Greenwich

- 51% of town within watershed
- Includes portions of the Wood, Usquepaug, and Queen Rivers and their watersheds
- 21 stream crossings assessed
- 2 dams assessed

Road Stream Crossings

- 10 crossings are hydraulically undersized
- 12 crossings have high geomorphic vulnerability
- 14 crossings limit or restrict aquatic passage

Recommendations:

- Replace and upgrade priority crossings (see table below) to meet flood resilience and aquatic organism passage (AOP) goals
- Consider other upstream and downstream crossings and dams on the same river system
- In general, replace downstream crossings first
- Perform site-specific data collection, geotechnical evaluation, hydrologic and hydraulic evaluation, and structure type evaluation to support design

Highest-Ranked High and Intermediate Priority Stream Crossings (Listed by Priority Ranking)

Road	Stream	Crossing Type
Tillinghast Pond Road	Coney Brook	4' W x 2'H Stone Masonry Box Culvert
Hazard Road	Wood River	Triple 36" CMP Circular Conduit
Falls River Road	Wood River	10.5'W x 6.5'H Stone Masonry Bridge
Henry Brown Road	Fisherville Brook	48" CMP Circular Conduit
Plain Meeting House Road	Phillips Brook	36" Concrete Circular Conduit
Henry Brown Road	Unnamed	36" Concrete Circular Conduit
Plain Meeting House Road	Breakheart Brook	Double 30" CMP Circular Conduit
Beaver Hill Road	Breakheart Brook	Double 36" Plastic Corrugated Circular Conduit[1]
Liberty Hill Road	Kelley Brook	11'W x 5'H Arched Concrete Conduit

[1]Crossing was modeled as a concrete conduit.

Dams

Recommendations:

Hazard Pond Dam (Falls River)
- Consider dam removal
- There are no known uses of the impoundment
- Next dam downstream on the Wood River (Barberville Pond Dam) should be considered for removal

Kasella Farm Pond Dam (Breakheart Brook)
- Current use of the impoundment is unknown
- Dam recently reconstructed to build a road across crest, but needs repair (crest is not compacted)
- Removal should be considered and could be achieved by enlarging the culverts beneath the roadway to sufficiently drain the impoundment, thereby maintaining the roadway


Kasella Pond Dam


Liberty Hill Road Stream Crossing over Kelley Brook

For the complete project plan please visit http://wpwa.org/flood_resiliency.html

Project funding was provided by the National Fish and Wildlife Foundation Hurricane Sandy Coastal Resiliency Competitive Grant Program

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Wood-Pawcatuck Watershed Flood Resiliency Management Plan August 2017

Green Infrastructure

A screening-level assessment of potential green infrastructure (GI) retrofit sites was performed within the Wood-Pawcatuck watershed. When applied throughout the watershed, GI can help mitigate flood risk resulting from outdated and undersized storm drainage systems and increase flood resiliency, as well as improve water quality.

No site-specific GI retrofit concepts were developed for West Greenwich due to the limited scope of the GI assessment. The Town should incorporate GI approaches into municipal stormwater infrastructure planning and capital improvement plans to address drainage, flooding, and water quality priorities including MS4 Permit requirements, both within and outside of the Wood-Pawcatuck watershed. GI can be implemented on public sites including municipal parking lots and within the public right-of-way.

RW56

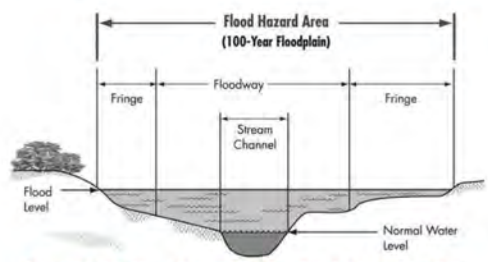
Rendering of a typical bioretention area.

River Corridor

A detailed field geomorphic assessment was performed for approximately 40 miles of rivers and streams in the watershed. Based on the results of the geomorphic assessment, river corridor planning recommendations were developed to identify restoration projects that will reduce flood hazards and downstream sediment loading and improve aquatic habitat. While field geomorphic assessments were not conducted within West Greenwich, these recommendations apply in the town and throughout the watershed.

Recommendations:

- Protect existing wetlands as well as stream connections to wetlands and floodplains
- Remove floodplain constraints, such as levees or berms, where possible
- Protect and enhance riparian buffers.
- Install log jams in select locations along the stream corridor to protect banks, create habitat, and re-form meanders (where human conflicts with meander formation are not present)
- Avoid or limit alterations that will straighten or channelize stream channels
- Consider removing bank armoring where possible once a protected river corridor is established



Conceptual view of a typical floodplain cross section.

Land Use Policy and Regulations

Municipal land use policies and regulations can help communities become more resilient to flooding by:

- Preserving undeveloped land
- Siting development in locations less vulnerable to flooding, and
- Promoting designs that reduce runoff and are less likely to be damaged in a flood

Recommendations:

A review was conducted of the land use policies, plans, and regulations of the watershed municipalities. Key recommendations of this review include:

- Update and integrate the Town hazard mitigation plan and comprehensive plan to address flood-prone areas
- Consider adopting a No Adverse Impact (NAI) Floodplain Management policy
- Amend zoning ordinance to strengthen flood management standards
- Consider implementing fluvial erosion hazard zoning to address riverine erosion hazards
- Consider amendments to the existing conservation/cluster development provisions in the zoning ordinance and subdivision regulations to strengthen flood management provisions
- Amend street and parking lot design standards to reduce impervious cover and remove barriers to LID
- Implement road stream crossing standards for new and replacement culverts and bridges

Project funding was provided by the National Fish and Wildlife Foundation Hurricane Sandy Coastal Resiliency Competitive Grant Program

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During the January 2024 storm, gravel/unpaved roads were washed out in both Exeter and West Greenwich. The loose gravel was washed into adjoining waterways which presents additional environmental concerns (RIIB MRP 2024).

Floods have the potential to wash out and erode bridges in Exeter and West Greenwich. Both Towns have numerous bridges that were built in the early 1900s that offer singular access to remote portions of the Towns (RIIB MRP 2024). If bridges were compromised by flooding and storm events, these areas would be inaccessible, which pose further challenges for emergency services.

Specifically, in Exeter, roadways identified as at risk or currently experiencing impassable conditions during storms include Widow Sweets/Cobblestone Hill, Kingston Road, Liberty Church Road, Dolly Pond Road, Stony Lane, New London Turnpike, Raymond Potter Lane, Summit Road, Pardon Joslin Road, Skunk Hill Road, Queens Fort Road, Bates Schoolhouse Road, Sheffield Hill Road, Wolf Rock Road, and Austin Farm Road (RIIB MRP 2024). Additionally, flooding along the Queens River causes damage and makes the adjoining transportation corridor untraversable at times (RIIB MRP 2024).

An Exeter resident expressed concern about frequent flooding (since 2006) on E. Shore Drive, adjacent to Boone Lake.

In West Greenwich, washouts at Hazard Mill Pond along Hazard Road have occurred in recent years (RIIB MRP 2023). Rapid increase in flood stage on the Falls River during heavy rains (i.e., “flashy system”) with a dramatic washout after the 2010 floods along this river corridor which resulted in the collapse of the Falls River Road bridge and impacts to many culverts that further isolated residents during that storm event and afterward during reconstruction of the bridge and roadway (RIIB MRP 2023). The culvert on Plain Meeting House Road is vulnerable to runoff from heavy precipitation events (RIIB MRP 2023).

3.3.3.3 History

While they might not be categorized as a flash flood or riverine flood, Exeter and West Greenwich experience annual overflow on roads after heavy rains causing impacts to infrastructure in both jurisdictions. Clogged culverts have led to overtopping of roads and damage to the culverts on an annual basis.

Table 15 and Table 16 provide details of historic major floods that have resulted in significant impacts in Exeter and West Greenwich. Since the 2005 HMPs, there have been two (2) flooding events that impacted Exeter and three (3) flooding events that impacted West Greenwich that resulted in major impacts, with some resulting in disaster declarations.

Table 15- Historical Major Flooding Events in Exeter

Date	Event Type	Event Details
10/3/2004	Flood-Heavy Rain	According to the NWS, between 4.5 and 8.3 inches of rail fell between 10/1 to 10/2/2004. In total, the State has seen 12.27 inches of rain in October, which eclipses the old record of 11.89 inches in 1962 (The Standard Times Newspaper, October 20, 2004). Town officials in Exeter had to declare a state of emergency on 10/2/2004 when heavy rains caused flooding of the Chipuxet River along Dorset Mill and Roaring Brook at Summit Road. Chief Scott Kettelle, of Exeter Volunteer Fire Company No. 1, said the state of emergency was declared after a dam engineer from RIDEM determined the Dorset Mill was unsafe (The Standard Times Newspaper, October 20, 2004). It was suggested to err on the side of caution and enact a voluntary evacuation of properties downstream. The lower side of the mill was flooded. They had 3-4 feet of water in the parking lot and they had water damage in the mill itself (The Standard Times Newspaper, October 20,

Table 15- Historical Major Flooding Events in Exeter

Date	Event Type	Event Details
		2004). Nine days of rain forces some Exeter residents to evacuate. Crews of firefighters went door to door to 20 homes, 48 apartments, and 7 businesses, urging them to evacuate. All of the businesses closed and evacuated, 20% of residents sought shelter with family and friends elsewhere, and the rest decided to stay in the homes. A shelter was opened at the Exeter Job Corps Academy auditorium on 10/2/2004 with the help of four volunteers. No one used the facility but noted that more volunteers are needed to staff shelters in the future (The Standard Times Newspaper, October 20, 2004). By the afternoon of 10/3/2004, the floodwaters had receded about 12 inches. A total of 13 families on Yawgoo Valley and Wolf Rocks Roads were trapped in their homes because water was rushing over the roads (The Standard Times Newspaper, October 20, 2004). Additionally, water from Roaring Brook backed up over two culverts and flooded Summit Road. The waters washed out a portion of a property and mobile home on Summit Road (The Standard Times Newspaper, October 20, 2004).
3/29/2010	Flood-Heavy Rain	A low-pressure system sat just south of Long Island for two days, bringing heavy rain to much of Southern New England during that time. A persistent southerly low level jet system brought very moist air into the area, which resulted in high rainfall rates. A coastal front along the I-95 corridor enhanced rainfall in that area. This event followed a heavy rainfall and record flooding event in mid-March as well as a second lesser rain event about a week prior. Rivers across much of Massachusetts and Rhode Island were still high from those events and warm temperatures in northern Vermont and New Hampshire resulted in a period of snowmelt, that resulted in rises on both the mainstem Connecticut and Merrimack Rivers. All of these factors led to a second record rainfall and flooding event. Two-day rainfall totals across Southern New England ranged from an inch to ten inches. Though concentrated in Rhode Island and southeastern Massachusetts, all of Southern New England was affected by the flooding. In hardest hit Rhode Island, two-day rainfall totals ranged from five to ten inches. Providence, Boston, and Blue Hill Observatory in Milton, MA set record monthly precipitation totals during the month of March. Providence also set the record for the wettest month ever in the period of record. Both the Pawtuxet River in Rhode Island and the Sudbury River in Massachusetts set floods of record. River and areal flooding resulted in millions of dollars of damage across Rhode Island, with numerous homes, businesses, and people affected. A portion of Interstate 95, the main highway through Rhode Island, was closed for two days after the Pawtuxet River inundated the highway with up to three feet of water. Amtrak service through the state was suspended for several days because portions of the tracks were under up to two feet of water in several locations across the state. Passengers were rerouted through Springfield, Massachusetts. Though all 39 cities and towns in Rhode Island were affected, the most damage was seen in Warwick, West Warwick, Coventry, and Cranston, where the Pawtuxet and Pocasset Rivers flow through. Four dams in Rhode Island were breached and many others were overtopped and close to breaching, which resulted in the inspection of 42 dams throughout the state. Officials estimated that more than 500 people were evacuated from their homes because of rising water or the threat of rising water. More than 500 Rhode Island National Guardsmen were activated during the flooding, filling sandbags, directing traffic, and aiding in evacuations. Six National Grid substations were flooded and four were close to flooded, disrupting electrical service in Westerly and Warwick. One of the amphibious vehicles generally used on the Boston Duck Tours was lent to the state of Rhode Island to transport utility workers to and from these substations and switching terminals. Shell fishing grounds in the southern part of the state were closed temporarily over concerns about sewage and other contaminants in the water. They reopened about a week and a half later. Half a dozen sewage treatment plants through the state were overwhelmed or compromised by the flooding, leading to raw sewage being discharged into area rivers and bays. The Governor's office estimated that tens of thousands of properties were impacted by the flooding and about 4,000 workers were affected when the businesses they worked in were closed during and after the flooding. Numerous schools and many businesses, as well as the state government were closed for at least

Table 15- Historical Major Flooding Events in Exeter

Date	Event Type	Event Details
		a day because of the flooding. President Obama issued a federal disaster declaration for the entire state of Rhode Island and residents received an automatic extension for filing their state and federal income taxes. The disaster declaration encompassed both the mid-March storm and this storm. Numerous roads were flooded in Exeter, Charlestown, Hopkinton, Narragansett, South Kingstown, and North Kingstown, including the intersection of Route 2 and Mail Road and washing away a portion of Route 102 in Exeter. Sixteen homes on Summit Road in Exeter were isolated after a portion of the road washed out. Several drivers in Narragansett and Exeter had to be rescued from their cars after they drove into water three to four feet deep.
3/30/2014	Flood-Heavy Rain	A stacked low-pressure system passed south and east of southern New England bringing widespread rainfall to much of the region. This system was anomalously moist with precipitable waters two to three standard deviations above normal for late March. Anywhere from two to five inches of rain fell across southern New England with the highest amounts falling along the south coast of Rhode Island and Massachusetts. This resulted in flash flooding across much of this area. In Exeter, Route 102 north of Route 2 was flooded with over a foot of water.

Source: NOAA Storm Events Database- Storm Prediction Center Product (NWS 2024a)

Table 16- Historical Major Flooding Events in West Greenwich

Date	Event Type	Event Details
3/14/2010	Flood-Heavy Rain	A stacked low-pressure system (surface low and upper level low on top of each other) moved southeast of Nantucket, spreading rain across Southern New England. This resulted in widespread rainfall totals of three to six inches. One fatality was reported indirectly due to the flooding occurred when an off-duty state trooper driving along Route 3 in West Greenwich hydroplaned and struck a utility pole.
9/2/2013	Flash Flood-Heavy Rain	A nearly stationary warm front draped across southern New England, coupled with a very moist atmosphere, resulted in showers and thunderstorms across the area for the third day in a row. Heavy rain fell within these showers and storms and flash flooding occurred, particularly over portions of Rhode Island. Heavy rain over the same part of Rhode Island for the second day in a row resulted in widespread flash flooding across much of Kent County and Cranston. In West Greenwich, Route 102 was closed at the Interstate 95 interchange with several feet of water flooding the road. A couple was rescued from a stranded car on Route 3 near the high school.
1/10/2024	Flood-Heavy Rain	A negatively tilted mid-level trough swung through New England while at the surface a low-pressure center passed directly over southern New England. This inland runner brought warm air so that all precipitation fell as rain, along with strong winds. There was a good deal of tree damage from the winds and widespread river flooding with many rivers going into major flood stage. Much of Rhode Island received 2 to 5 inches of rain, which combined with melting snow, led to significant flooding of rivers, streams, urban areas, and some homes and businesses. Schools in Warwick, West Warwick, Coventry and West Greenwich closed or switched to distance learning for the day, while at least a half dozen other districts delayed start times by two hours.

Source: NOAA Storm Events Database- Storm Prediction Center Product (NWS 2024a)

From 1950-2023, Washington County, where Exeter is located, experienced 9 coastal flood events, 6 flash flood events, and 18 other flood events (RIEMA 2024).

From 1950-2023, Kent County, where West Greenwich is located, experienced 5 coastal flood events, 16 flash flood events, and 24 other flood events (RIEMA 2024). At least one fatality (3/14/2010) occurred as an indirect result of the flooding events. Annual flooding after heavy rainfall occurs in both jurisdictions.

Since the 2005 HMPs, there have been six (6) Rhode Island Presidential Disaster Declarations (Table 17) relating to flooding. Exeter and West Greenwich were impacted by the 2010 and 2024 events. Specific impacts can be found in Section 3.3.3.5.

Table 17- State of Rhode Island Presidentially Declared Disasters Relating to Flooding

Designation	Incident Period	Declaration Date	Incident Type
DR-39-RI	08/20/1955	08/20/1955	Hurricane and Flood
DR-1704-RI	04/15 – 04/16/2007	05/25/2007	Severe Storms and Inland/Coastal Flooding
DR-1894-RI	03/12 – 04/12/2010	03/29/2010	Severe Storms and Flooding
EM-3311-RI	03/12 – 04/12/2010	03/30/2010	Severe Storm, Flooding
DR-4753-RI	09/10 – 09/13/2023	01/07/2024	Severe Storm, Flooding, Tornado
DR-4765-RI	12/17 – 12/19/2023	03/20/2024	Severe Storm, Flooding
DR-4766-RI	01/09 – 01/13/2024	03/20/2024	Severe Storm, Flooding

Source: FEMA 2024

3.3.3.4 Extent

Localized flooding can be expected to occur on an annual basis. Structures abutting the floodplain are the most threatened by flooding.

A floodplain is a flat or gently sloping area adjacent to a river, stream, or other water body. These areas act as a buffer during periods of heavy rainfall or snowmelt, absorbing excess water and preventing it from rushing downstream too quickly. In its common usage, a floodplain refers to areas inundated by the 100-year flood, the flood that has a 1% chance of being equaled or exceeded in any given year, and the 500-year flood, the flood that has a 0.2% chance of being equaled or exceeded in any given year. The 100-year flood is the national minimum standard to which communities regulate their floodplains through the NFIP (RIEMA 2024).

The Towns of Exeter and West Greenwich each participate in the National Flood Insurance Program (NFIP). In Exeter, there are A, AE, and X SFHA zones and in West Greenwich, there are A and X zones. Figure 6 shows the extent of SHFA zones. As of October 2024, there are 8 NFIP policies in Exeter and 9 NFIP policies in West Greenwich. More information for the NFIP can be found in Section 4.3.

FEMA maintains regulatory flood maps called Flood Insurance Rate Maps (FIRMs). Insurance companies refer to these when providing coverage to homeowners. These maps are available for viewing at the FEMA Map Service Center. Please note that there is a process for the public to request a change in the flood zone designation for their property.

The FIRMs for Exeter were updated on 4/3/2020 and 7/19/2023 and the FIRMs for West Greenwich were updated on 12/3/2010, 4/3/2020, and 7/19/2023. The full FIRMs are available on FEMA's Flood Map Service Center website: https://msc.fema.gov/.

FEMA's National Risk Index states that Exeter and West Greenwich have the following planning significance related to flooding:

Jurisdiction	Coastal Flood NRI	Coastal Flood EAL	Riverine Flood NRI	Riverine Flood EAL
Exeter	No Rating	No Rating	Relatively Low	Relatively Low
West Greenwich	No Rating	No Rating	Relatively Low	Relatively Low

Source: FEMA National Risk Index (www.hazards.fema.gov/nri/map)

EAL: Expected Annual Loss

NRI: National Risk Index= (Expected Annual Loss x Social Vulnerability) ÷ Community Resilience

The NOAA storm events database indicates that flood depths of up to 4' have occurred in Exeter, and several feet in West Greenwich.

During the historic March 2010 flood in Exeter, the Town's historical FEMA worksheets reported a range of 8 inches to 2-3 feet of water in several residences' basements which led to many of the homeowners shutting off electricity and boilers to prevent fires and further damage. Additional notes indicate that several vehicles were stranded due to high flood waters, and one resulted in a boat rescue by the fire department. Road washouts included several miles and ranged from 2-25 feet wide.

Based on the extent of past events and the criteria identified in Table 7, the extent of flooding in Exeter and West Greenwich are considered **Significant**, with potential for some injuries; short shutdown of some critical infrastructure and facilities; fewer than 10% of residential and commercial structures damaged; and a small number of local operations impacted for short amounts of time.

3.3.3.5 Probability of Future Occurrence

Based on previous occurrences and the criteria identified in Table 8, it is **Likely** that Exeter and West Greenwich will experience a flood event in the calendar year; there is a between 50-89.9% annual probability of occurring.

3.3.3.6 Impact

Due to shallow bedrock and high-water tables in Exeter and West Greenwich, during periods of extensive rain, there is an increased risk of basement flooding in both residential structures and critical facilities. This may lead to public health impacts if mold were to develop after a flood. Additionally, high water tables affect the ability of drainage systems to remove surface water from heavy rain. Other health impacts could include hazardous materials and septic system release to floodwaters.

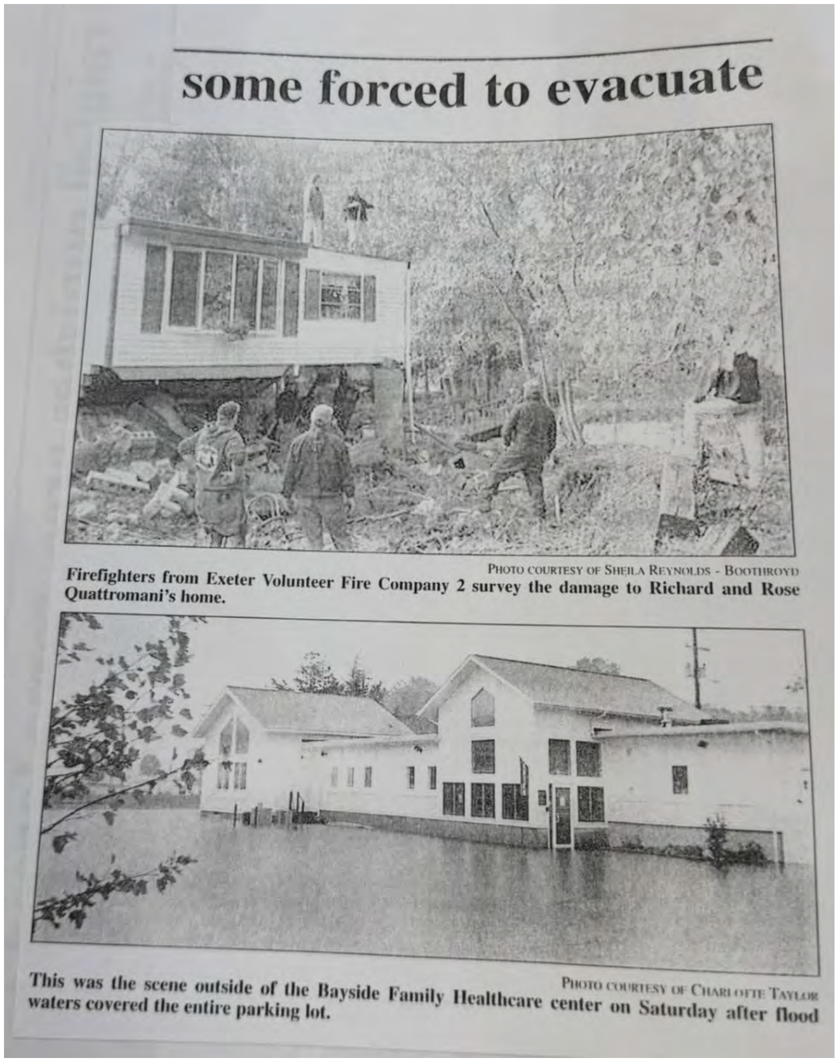
Floods may impact the structural integrity of homes, critical facilities, and critical infrastructure, leading to life, health and safety concerns of residents during an event and impacting warning and evacuation of residents. Loss of power may occur during flood events and outages may influence access to potable water from private wells. Culverts in many locations across Exeter are undersized and inadequate to manage the increased runoff volumes from precipitation events (RIIB MRP 2024). Additionally, a severe weather event or flood would affect the Towns' economy and tax base as resources and funding would need to be reallocated to respond to damages.

Heavy rains, quick thaws and precipitation, and hurricanes accompanied by heavy winds and rain make the Towns vulnerable to personal, property and environmental damage occasioned by flooding.

Structures most vulnerable to flood impacts in both Exeter and West Greenwich include dams, residential homes, mobile home parks, water supply substations, facilities storing hazardous materials, historic buildings, sewer pump stations and electric substations.

October 2004 Flood- Exeter

Figure 14 shows the impact of the October 2004 heavy rain/flood in Exeter, which caused evacuations and damage to a resident's house.



some forced to evacuate

PHOTO COURTESY OF SHEILA REYNOLDS - BOOTHROYD

Firefighters from Exeter Volunteer Fire Company 2 survey the damage to Richard and Rose Quattromani's home.

PHOTO COURTESY OF CHARLOTTE TAYLOR

This was the scene outside of the Bayside Family Healthcare center on Saturday after flood waters covered the entire parking lot.

Source: The Standard Times Newspaper, October 20, 2004

Figure 14- Impact of 2004 Heavy Rain/Flood in Exeter

March 2010 Flood- Exeter

Exeter escaped much of the major damage seen elsewhere in the State, mostly because of the Town's rural landscape and minimal development. Hardest hit were the roads that washed out because of overflowing streams or excessive erosion along shoulders and drainage gullies (Exeter Historical Association 2015).

During the historic 2010 flood, Browning Mill Pond overflowed the dam feeding Roaring Brook which washed out the bridge on Summit Road, isolating sixteen homes (Figure 15). As noted in the Town's FEMA project worksheets, several gravel roads were washed out and led to scouring. The FEMA project worksheets indicate that each event ranged in repair pricing, but an average was ~$7k per washout event.

Source: WPRI 2020

Figure 15- Summit Road Washout in Exeter (2010)

Figure 16 shows the damage to Route 165 in Exeter due to undercutting by fast-moving flood waters.

Photo Credit: Sheila Reynolds Boothroyd; Source: Exeter Historical Association (2015)

Figure 16- Damage to Route 165 in Exeter (2010)

Figure 17 shows members of the Exeter fire department standing watch over a washed-out section of Rhode Island State Route 102 in Exeter.

Photo Credit: Joe Giblin; Source: CBS News (2010)

Figure 17- Damage to Route 102 in Exeter (2010)

Old Voluntown Road in Exeter was also overtopped by Parris Brook (Figure 18).

Photo Credit: Sheila Reynolds Boothroyd; Source: Exeter Historical Association (2015)

Figure 18- Parris Brook Overruns Old Voluntown Rd in Exeter (2010)

Repairs were made over the summer that returned traffic to normal in Exeter. Figure 19 shows a culvert replacement on Ten Rod Road where it crosses the Queen River at the Exeter Country Club.

Source: Exeter Historical Association (2015)

Figure 19- Culvert Replacement on Ten Rod Road at the Exeter Country Club (2010)

March 2010 Flood- West Greenwich

In West Greenwich, bridges and culverts were washed out, specifically on Hazard Road, Falls River Road, and Congdon Mill Road bridges, and power was down for 10-12 days. Figure 20 shows the damage to the bridge on Falls River Road, and the swift repair by the West Greenwich DPW. This image portrays the "get it done" mentality of the Town.

Figure 20- Damage to Falls River Bridge in West Greenwich from Flooding (March 2010)

3.3.3.7 Future Conditions

<table>
<tr><td>Nature of the hazard</td><td>Future climate conditions are unlikely to influence the nature of future flooding events in Exeter and West Greenwich.</td></tr>
<tr><td>Location</td><td>Future climate conditions are possible to influence the location of future flood hazard areas in Exeter and West Greenwich as smaller streams that were not historically flooded may become inundated with water due to increased precipitation in the future.</td></tr>
<tr><td>Extent</td><td>
Table 18 shows Exeter’s historical and future projections for days without precipitation and annual precipitation in inches by season under different future climate conditions models.
Table 18- ClimRR Climate Projection Report- Precipitation (Exeter)
<table>
<tr><th></th><th></th><th>Mid-Century</th><th></th><th>End-Of-Century</th><th></th></tr>
<tr><th>Precipitation</th><th>Hist.</th><th>RCP 4.5</th><th>RCP 8.5</th><th>RCP 4.5</th><th>RCP 8.5</th></tr>
<tr><td colspan="6">ANNUAL</td></tr>
<tr><td>Days Without Precipitation (Days)</td><td>18.18</td><td>16.26</td><td>16.13</td><td>16.36</td><td>14.59</td></tr>
<tr><td>Annual Precipitation (Inches)</td><td>46.44</td><td>50.91</td><td>52.25</td><td>53.18</td><td>54.42</td></tr>
<tr><td colspan="6">AUTUMN</td></tr>
<tr><td>Daily Precipitation (Inches)</td><td>0.11</td><td>-</td><td>0.1</td><td>-</td><td>0.12</td></tr>
<tr><td>Maximum Daily Precipitation (Inches)</td><td>2.31</td><td>-</td><td>1.87</td><td>-</td><td>2.52</td></tr>
<tr><td colspan="6">WINTER</td></tr>
<tr><td>Daily Precipitation (Inches)</td><td>0.15</td><td>-</td><td>0.15</td><td>-</td><td>0.16</td></tr>
<tr><td>Maximum Daily Precipitation (Inches)</td><td>1.9</td><td>-</td><td>2.02</td><td>-</td><td>2.24</td></tr>
<tr><td colspan="6">SPRING</td></tr>
<tr><td>Daily Precipitation (Inches)</td><td>0.1</td><td>-</td><td>0.13</td><td>-</td><td>0.14</td></tr>
<tr><td>Maximum Daily Precipitation (Inches)</td><td>1.75</td><td>-</td><td>2.08</td><td>-</td><td>2.06</td></tr>
<tr><td colspan="6">SUMMER</td></tr>
<tr><td>Daily Precipitation (Inches)</td><td>0.2</td><td>-</td><td>0.24</td><td>-</td><td>0.24</td></tr>
<tr><td>Maximum Daily Precipitation (Inches)</td><td>2.48</td><td>-</td><td>3.13</td><td>-</td><td>2.92</td></tr>
</table>
Source: Climate Risk and Resilience Portal (ClimRR) 2024
<u>Mid-Century Precipitation Analysis</u>: The historical annual total precipitation is 46.44 inches. Under RCP 8.5 the annual minimum precipitation at mid-century is 52.25 inches which represents a +5.81-inch change from the baseline.
<u>Mid-Century Precipitation Analysis, Days Without Measurable Precipitation</u>: The historical longest consecutive number of days without precipitation 18.18 days. Under RCP 8.5 the longest stretch of days without precipitation at mid-century is 16.13 days which represents a -2.05-day change from the baseline.
</td></tr>
</table>

End-Century Precipitation Analysis: The historical annual total precipitation is 46.44 inches. Under RCP 8.5 the annual minimum precipitation at end-century is 54.42 inches which represents a +7.98-inch change from the baseline.

End-Century Precipitation Analysis, Days Without Measurable Precipitation: The historical longest consecutive number of days without precipitation 18.18 days. Under RCP 8.5 the longest stretch of days without precipitation at end-century is 14.59 days which represents a -3.60-day change from the baseline.

As this tools predicts an increase in overall precipitation, it is likely that future climate conditions will influence the extent of future flooding in Exeter.

Table 18 shows West Greenwich's historical and future projections for days without precipitation and annual precipitation in inches by season under different future climate conditions models.

Table 19- ClimRR Climate Projection Report- Precipitation (W. Greenwich)

Precipitation	Hist.	Mid-Century RCP 4.5	Mid-Century RCP 8.5	End-Of-Century RCP 4.5	End-Of-Century RCP 8.5
ANNUAL					
Days Without Precipitation (Days)	18.18	15.93	17.38	15.69	14.52
Annual Precipitation (Inches)	45.14	49.01	50.43	51.32	52.7
AUTUMN					
Daily Precipitation (Inches)	0.11	-	0.09	-	0.11
Maximum Daily Precipitation (Inches)	2.22	-	1.83	-	2.26
WINTER					
Daily Precipitation (Inches)	0.15	-	0.15	-	0.16
Maximum Daily Precipitation (Inches)	1.92	-	2.03	-	2.27
SPRING					
Daily Precipitation (Inches)	0.1	-	0.13	-	0.13
Maximum Daily Precipitation (Inches)	1.72	-	2.1	-	1.96
SUMMER					
Daily Precipitation (Inches)	0.18	-	0.21	-	0.22
Maximum Daily Precipitation (Inches)	2.18	-	2.8	-	2.68

Source: Climate Risk and Resilience Portal (ClimRR) 2024

Mid-Century Precipitation Analysis: The historical annual total precipitation is 45.14 inches. Under RCP 8.5 the annual minimum precipitation at mid-century is 50.43 inches which represents a +5.29-inch change from the baseline.

Mid-Century Precipitation Analysis, Days Without Measurable Precipitation: The historical longest consecutive number of days without precipitation 18.18 days. Under RCP 8.5, the longest stretch of days without precipitation at mid-century is 17.38 days

	which represents a -0.80 day change from the baseline. End-Century Precipitation Analysis: The historical annual total precipitation is 45.14 inches. Under RCP 8.5 the annual minimum precipitation at end-century is 52.70 inches which represents a 7.56-inch change from the baseline. End-Century Precipitation Analysis, Days Without Measurable Precipitation: The historical longest consecutive number of days without precipitation 18.18 days. Under RCP 8.5 the longest stretch of days without precipitation at end-century is 14.52 days which represents a -3.65-day change from the baseline. As this tool predicts an increase in overall precipitation, it is likely that future climate conditions will influence the extent of future flooding in West Greenwich.
Impact	As the probability of annual precipitation increases in Exeter and West Greenwich, so does the potential of flooding, which increases the potential impacts to the Towns. These increased impacts are likely to include inundation and damage to homes and critical facilities, and road flooding and resultant erosion. Increased storm frequency, intensity, and duration can result in greater flooding impacts such as flooding of drinking water well pumps, basement flooding, and dam failures in Exeter and West Greenwich (RIIB MRP 2024).
Probability of Future Events	As the annual precipitation in Exeter and West Greenwich is likely to increase due to future climate conditions (Table 18 and Table 19), the probability of flooding events also increases.
Changes in Population Patterns	It is possible that future flood events will cause changes in population patterns in Exeter and West Greenwich as future floods may impact more homes, residents, and critical facilities resulting in current residents relocating out of flood prone areas. Additionally, an increase in population would likely have similar impacts as land use development increases, unless new construction is prohibited in SFHAs, which is currently enforced in Exeter and West Greenwich.
Changes in Land Use Development	It is likely that future flood events will cause changes in land use development in Exeter and West Greenwich as areas around the existing floodplains may be undevelopable to prevent future losses from flooding. Increased flood events may influence future land use development through zoning regulations as areas prone to flooding may require stricter zoning laws that limit development in flood zones. This could include establishing buffer zones and buying out properties and designating the areas as Open Space to prohibit future development. Transportation infrastructure, such as roads, bridges, and culverts, may need to be designed to withstand increased flooding, influencing how and where they are built. This might involve elevating roadways, installing new culverts, or increasing the capacity of existing culverts. There may be a greater emphasis on preserving and restoring natural ecosystems, such as wetlands and floodplains, which can absorb excess water and mitigate flooding risks. This could influence land use policies to prioritize conservation areas.

According to the 2024 State of Rhode Island HMP:

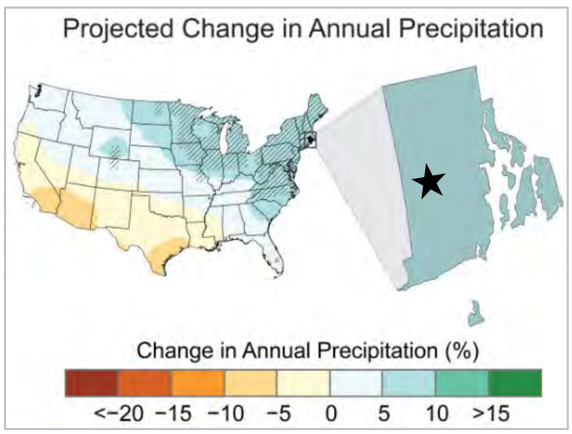
As per the State of Rhode Island Climate Change portal, the impacts of future climate conditions upon Rhode Island's built and natural environments are wide-ranging, discernible, and documented, and, in many cases growing in severity. Related to flooding, Rhode Island will experience more extreme and intense precipitation events. Rhode Island's precipitation rates are climbing an inch almost every 10 years, and 2018 was the third wettest year on record. In 2018, Rhode Island saw a record number of days with over an inch of rain. Under a higher emissions pathway, it is expected that Rhode Island will see a continued increase in frequency and intensity of extreme precipitation events (RIEMA 2024).

The 2018 Resilient Rhody report states:

"Climate change is expected to contribute to more intense and wetter precipitation events, now and into the future. Over the past 80 years, Rhode Island and southern New England have experienced a significant increase in both flood frequency and flood severity, including a doubling of the frequency of flooding and an increase in the magnitude of flood events. Intense rainfall events (heaviest 1% of all daily events from 1901 to 2012 in New England) have increased 71% since 1958. Rhode Island's average annual precipitation has increased more than 10 inches since 1930 (Resilient Rhody 2018).

While multiple climate change models suggest that greenhouse gas increases will result in increased precipitation in Rhode Island, observed increases in precipitation across the northeastern United States are greater than predicted models" (Resilient Rhody 2018).

Figure 21 shows the nationwide projected change in annual precipitation. Rhode Island is in the +5-10% category.



Source: NCEI 2022

Figure 21- Rhode Island Projected Change in Annual Precipitation

The increased potential of more extreme and intense precipitation events leading to increased potential of floods will increase the potential of cascading impacts such as dam failure. See Section 3.3.2.5 for the impacts of a dam failure in Exeter and West Greenwich.

3.3.4 Tropical and Extratropical Storms (Hurricane and Nor'easter)

3.3.4.1 Description

Hurricane	Tropical cyclones, a general term for tropical storms and hurricanes, are low pressure systems that usually form over the tropics. These storms are referred to as "cyclones" due to their rotation. Tropical cyclones are among the most powerful and destructive meteorological systems on earth. Their destructive phenomena include very high winds, heavy rain, lightning, tornadoes, and storm surge. As tropical storms move inland, they can cause severe flooding, downed trees and power lines, and structural damage. There are three categories of tropical cyclones: • Tropical Depression: maximum sustained surface wind speed is less than 39 mph

	• Tropical Storm: maximum sustained surface wind speed from 39-73 mph • Hurricane: maximum sustained surface wind speed exceeds 73 mph Once a tropical cyclone no longer has tropical characteristics, it is classified as an extratropical system. Most Atlantic tropical cyclones begin as atmospheric "easterly waves" that propagate off the coast of Africa and cross the tropical North Atlantic and Caribbean Sea. When a storm starts to move toward the north, it begins to leave the area where the easterly trade winds prevail and enters the temperate latitudes where the westerly winds dominate. This situation produces the eastward curving pattern of most tropical storms that pass through the Mid-Atlantic region. When the westerly steering winds are strong, it is easier to predict where a hurricane will go. When the steering winds become weak, the storm follows an erratic path that makes forecasting very difficult. Storm surge is the abnormal rise in water level caused by the wind and pressure forces of a hurricane or Nor'easter. Nationally, storm surge flooding has caused billions of dollars in damage and hundreds of deaths. Given today's ever-increasing population densities in coastal states, the need for information about the potential for flooding from storm surge has become even more important. Further discussion on storm surge is not included in this plan, due to Exeter and West Greenwich's inland location in central western Rhode Island.
Nor'easter	A Nor'easter is a strong area of low pressure along the East Coast of the United States that typically features winds from the northeast off the Atlantic Ocean. Nor'easters are most often associated with strong winter storms moving up the Northeast coast, but snow isn't a requirement for such a storm. These storms are most frequent and strongest between September and April but can occur any time of the year. The storm radius is often as large as 1,000 miles, and the horizontal storm speed is about 25 mph, traveling up the eastern United States coast. Sustained wind speeds of 10-40 mph are common during a nor'easter, with short-term wind speeds gusting up to 70 mph. Typically a winter weather event, Nor'easters are known to produce heavy snow, rain, and heavy waves along the coast. Unlike hurricanes and tropical storms, Nor'easters can sit offshore, causing damage for days. Also called East Coast Winter Storms, Nor'easters are characterized by: • A closed circulation. • Located within the quadrilateral bounded at 45°N by 65°W and 70°W, and at 30°N by 85°W and 75°W. • Show a general movement from the south-southwest to the north-northeast. • Contain winds greater than 23 mph. • The above conditions must persist for at least a 12-hour period.

The Saffir-Simpson scale below is based primarily on wind speeds and is used to give an estimate of the potential property damage and flooding expected along the coast from a hurricane landfall.

Table 20- Saffir/Simpson Hurricane Wind Scale

Category	Sustained Winds (mph)	Damages
1	74-95	<u>Very dangerous winds will produce some damage:</u> Well-constructed frame homes could have damage to roof, shingles, vinyl siding and gutters. Large branches of trees will snap, and shallowly rooted trees may be toppled. Extensive damage to power lines and poles likely will result in power outages that could last a few to several days.

Category	Sustained Winds (mph)	Damages
2	96-110	Extremely dangerous winds will cause extensive damage: Well-constructed frame homes could sustain major roof and siding damage. Many shallowly rooted trees will be snapped or uprooted and block numerous roads. Near-total power loss is expected with outages that could last from several days to weeks.
3 (major)	111-129	Devastating damage will occur: Well-built framed homes may incur major damage or removal of roof decking and gable ends. Many trees will be snapped or uprooted, blocking numerous roads. Electricity and water will be unavailable for several days to weeks after the storm passes.
4 (major)	130-156	Catastrophic damage will occur: Well-built framed homes can sustain severe damage with loss of most of the roof structure and/or some exterior walls. Most trees will be snapped or uprooted, and power poles downed. Fallen trees and power poles will isolate residential areas. Power outages will last weeks to possibly months. Most of the area will be uninhabitable for weeks or months.
5 (major)	157+	Catastrophic damage will occur: A high percentage of framed homes will be destroyed, with total roof failure and wall collapse. Fallen trees and power poles will isolate residential areas. Power outages will last for weeks to possibly months. Most of the area will be uninhabitable for weeks or months.

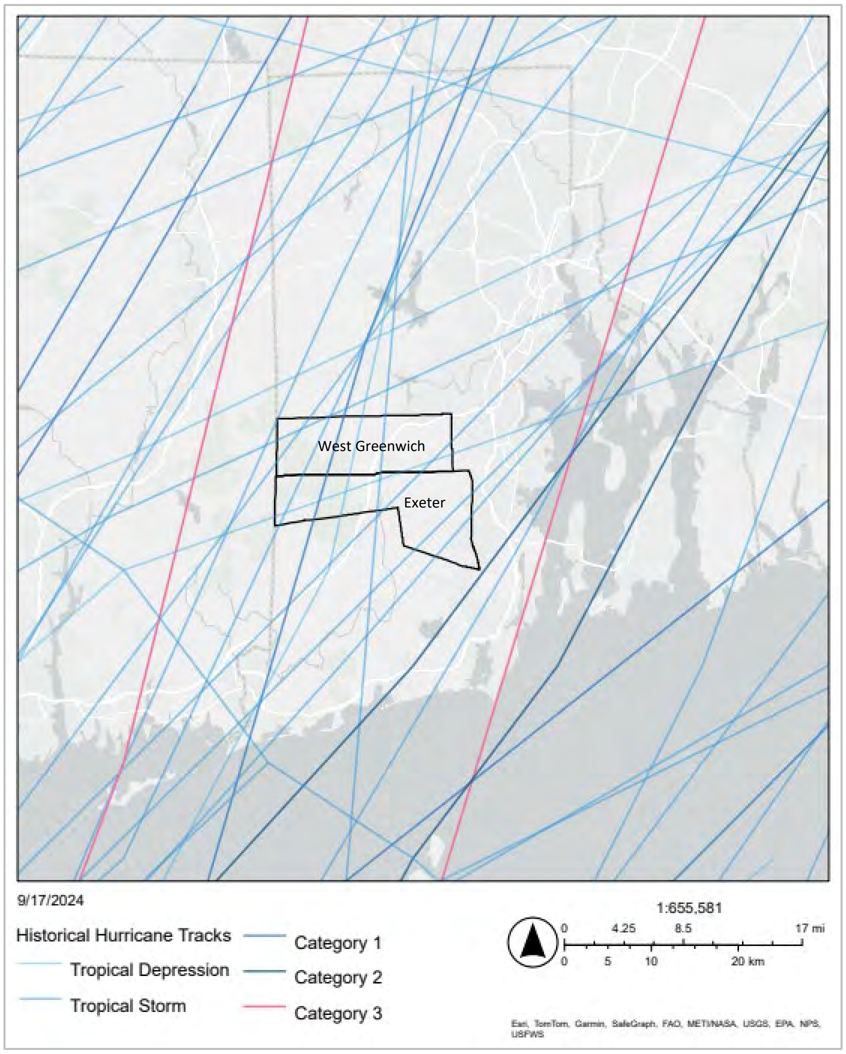
3.3.4.2 Location

Although Exeter and West Greenwich are not coastal communities, the Towns' relative proximity to the Atlantic Ocean renders them susceptible to hurricanes and Nor'easters, which may result in the loss of human life and property. All of Exeter and West Greenwich are susceptible to the impacts of a hurricane or Nor'easter.

Figure 22 shows historical hurricane tracks within Rhode Island.

3.3.4.3 History

Hurricane	Figure 22 shows historical hurricane tracks in Rhode Island. Table 21 provides details of the historical hurricanes that have come within 20 miles of Exeter and West Greenwich. Since records began in 1842, 20 hurricanes or tropical storms have come within 20 miles of Exeter and West Greenwich, with eight (8) tracks traveling through Exeter and West Greenwich. Since the 2005 HMPs, there have been 5 hurricanes that came within 20 miles of Exeter and West Greenwich.
Nor'easter	On average, Exeter and West Greenwich experiences or are threatened by a Nor'easter every few years. Table 23 describes historical notable Nor'easters that have impacted New England. Like hurricanes, Nor'easters are large, regional events. Localized impacts to Exeter and West Greenwich are commonly discussed in terms of "winter storms" which associated impacts can be found in the Severe Weather Section 3.3.5.5. Since the 2005 HMPs have been thirty-two (32) notable Nor'easters that have impacted New England. These events did not cause significant impacts to Exeter or West Greenwich.



Source: NOAA 2024

Figure 22- Historical Hurricane Tracks in Rhode Island

Table 21- Historical Hurricanes within 20 miles of Exeter and West Greenwich

Storm Name	Max Category	Max Wind Speed (kt)	Impacts
Unnamed 1851	Tropical Storm	60	No record of damages in Exeter or West Greenwich.
Unnamed 1858	Category 2	90	No record of damages in Exeter or West Greenwich.
Unnamed 1861	Category 1	70	No record of damages in Exeter or West Greenwich.
Unnamed 1869	Category 3	100	No record of damages in Exeter or West Greenwich.
Unnamed 1872	Category 1	70	No record of damages in Exeter or West Greenwich.
Unnamed 1888	Category 3	110	No record of damages in Exeter or West Greenwich.
Unnamed 1897	Tropical Storm	60	No record of damages in Exeter or West Greenwich.
Unnamed 1902	Tropical Storm	50	No record of damages in Exeter or West Greenwich.
Unnamed 1908	Category 1	65	No record of damages in Exeter or West Greenwich.

Storm Name	Max Category	Max Wind Speed (kt)	Impacts
Unnamed 1916	Tropical Storm	40	No record of damages in Exeter or West Greenwich.
Great New England Hurricane of 1938	Category 3	120	The unforeseen Great New England Hurricane of 1938 is the most catastrophic weather event in Rhode Island and history. The event occurred slightly before high tide and brought with it winds upward of 120 mph. A tidal surge inundated the City of Providence with over 10' of water. Many weathermen had instrument readings that led them to believe something unusual was going to happen, but none sounded alarms. It is believed little could have been done to lessen the damage even if warnings were issued. Thousands of acres of Pine and Oak were destroyed, and all sawmills were operating at full capacity to salvage as much lumber as possible before boring insects and rot ruined economic value of the destroyed trees. Lumber prices sank immediately. The Federal Government paid $8 per thousand board feet. During the post WWII building boom, the same lumber was selling for over $100 per thousand board feet (*In the Shadow of the Trees* (2003)).
Unnamed 1944	Category 2	85	No record of damages in Exeter or West Greenwich.
Carol 1954	Category 3	100	No record of damages in Exeter or West Greenwich.
Bob 1991	Category 2	115	No record of damages in Exeter or West Greenwich.
Gordon 2000	Category 1	70	No record of damages in Exeter or West Greenwich.
Barry 2007	Tropical Storm	50	No record of damages in Exeter or West Greenwich.
Hanna 2008	Category 1	75	No record of damages in Exeter or West Greenwich.
Andrea 2013	Tropical Storm	55	No record of damages in Exeter or West Greenwich.
Elsa 2021	Category 1	75	No record of damages in Exeter or West Greenwich.
Henri 2021	Category 1	65	Tropical Storm Henri made landfall in southwest Rhode Island around noon on August 22nd, then moved slowly northwestward and westward across northern Connecticut and weakened. Henri brought strong wind gusts and flash flooding. The strongest gusts -- to 70 mph -- occurred along the Rhode Island coast. The worst flash flooding occurred in northeast Connecticut. Exeter had a lot of damage, with the first report coming in at 746 AM EST, with a tree down on wires on Falcon Drive. By 2 PM EST, the Exeter EMA characterized the town as having major damage, with numerous trees and power poles down throughout Exeter. Impacts were not as severe in West Greenwich.

Source: NOAA 2024

Rhode Island has experienced ten (10) Presidential Disaster Declarations related to hurricanes or tropical storms (Table 22). Since the 2005 HMPs, there have been five (5) Rhode Island Presidential Disaster Declarations relating to hurricanes or tropical storms.

Table 22- State of Rhode Island Presidentially Declared Disasters Relating to Hurricanes

Designation	Incident Period	Declaration Date	Incident Type
DR-23-RI	09/02/1954	09/02/1954	Hurricane Carol

Designation	Incident Period	Declaration Date	Incident Type
DR-39-RI	08/20/1955	08/20/1955	Hurricane and Flood
DR-748-RI	09/27/1985	10/15/1985	Hurricane Gloria
DR-913-RI	08/19/1991	08/26/1991	Hurricane Bob
EM-3255-RI	08/29 – 10/01/2005	09/18/2005	Hurricane Evacuation (Katrina)
EM-3334-RI	08/26 – 08/29/2011	08/27/2011	Hurricane Irene
DR-4027-RI	08/27 – 08/29/2011	09/03/2011	Tropical Storm Irene
EM-3355-RI	10/26 – 11/08/2012	10/29/2012	Hurricane Sandy
DR-4089-RI	10/26 – 10/31/2012	11/03/2012	Hurricane Sandy
EM-3563-RI	08/20 – 08/24/2021	08/21/2021	Hurricane Henri

Source: FEMA 2024

Table 23- Notable Nor'easters Impacting New England

Event	Date	Comments
Great Blizzard of 1888	3/11/1888	One of the worst blizzards in U.S. history. Dropped 40–50 inches of snow, killing 400 people, mostly in New York.
Great Appalachian Storm of November 1950	11/24/1950	A very severe storm that dumped more than 30 inches of snow in many major metropolitan areas along the eastern United States, with record-breaking temperatures, and hurricane-force winds. The storm killed 353 people.
Ash Wednesday Storm of 1962	3/5/1962	Caused severe tidal flooding and blizzard conditions from the Mid-Atlantic to New England, killing 40 people.
Eastern Canadian Blizzard of March 1971	3/3/1971	Dropped over 32 inches of snow over areas of eastern Canada, killing at least 30 people.
Groundhog Day gale of 1976	2/1/1976	Caused blizzard conditions for much of New England and eastern Canada, dropping a maximum of 56 inches of snow.
Northeastern United States blizzard of 1978	2/5/1978	A catastrophic storm, which dropped over 27 inches of snow in areas of New England, killing a total of 100 people, mainly people trapped in their cars on metropolitan Boston's inner beltway and in Rhode Island.
1991 Perfect Storm (the "Perfect Storm," combined Nor'easter/hurricane)	10/28/1991	Very unusual storm in which a tropical and extratropical system interacted strangely, with tidal surge that caused severe damage to coastal areas (especially in Massachusetts), killing 13 people.
December 1992 nor'easter	12/10/1992	A powerful storm which caused severe coastal flooding throughout much of the northeastern United States.
1993 Storm of the Century	3/12/1993	A superstorm which formed in the Gulf of Mexico and brought high storm surge to Florida. It then grew so large that it affected the entire eastern U.S., in addition to parts of eastern Canada and Cuba, and was ranked as a Category 5 winter storm on the Regional Snowfall Index. It caused $6.65 billion (2008 USD) in damage and killed 310 people.
Christmas 1994 nor'easter	12/22/1994	An intense storm which affected the east coast of the U.S. and exhibited traits of a tropical cyclone.
North American blizzard of 1996	1/6/1996	Severe snowstorm which brought up to 4 feet of snow to areas of the Mid-Atlantic and Northeastern U.S.

Event	Date	Comments
North American blizzard of 2003	2/14/2003	Dropped over 2 feet of snow in several major cities, including Boston and New York City, affected large areas of the Northeastern and Mid-Atlantic U.S., and killed a total of 27 people.
White Juan of 2004	2/17/2004	A blizzard that affected Atlantic Canada, crippling transportation in Halifax, Nova Scotia, and dropping over 37 inches of snow in areas.
North American blizzard of 2005	1/20/2005	Brought blizzard conditions to southern New England and dropped over 40 inches of snow in areas of Massachusetts.
October 2005 nor’easter	10/25/2005	Several trees, wires, and limbs were reported down in Woonsocket, West Greenwich, Exeter, and Tiverton. No known injuries directly resulted from this nor'easter.
North American blizzard of 2006	2/11/2006	A powerful storm that developed a hurricane-like eye when off the coast of New Jersey. It brought over 30 inches of snow in some areas and killed 3 people.
April 2007 nor'easter	4/13/2007	An unusually late storm that dumped heavy snow in parts of Northern New England and Canada and heavy rains elsewhere. The storm caused a total of 18 fatalities.
November 2009 nor'easter	11/11/2009	Formed from the remnants of Hurricane Ida, produced moderate storm surge, strong winds and very heavy rainfall throughout the Mid-Atlantic region. It caused US$300 million (2009) in damage and killed six people.
December 2009 North American blizzard	12/16/2009	A major blizzard affected large metropolitan areas, including New York City, Philadelphia, Providence, and Boston. In some of these areas, the storm brought up to 2 feet of snow.
March 2010 nor'easter	3/12/2010	A slow-moving nor'easter that devastated the Northeastern United States. Winds of up to 70 miles per hour snapped trees and power lines, resulting in over 1 million homes and businesses left without electricity. The storm produced over 10 inches of rain in New England, causing widespread flooding of urban and low-lying areas. The storm also caused extensive coastal flooding and beach erosion.
December 2010 North American blizzard	12/5/2010	A severe and long-lasting blizzard which dropped up to 36 inches of snow throughout much of the eastern United States.
January 8–13, 2011 North American blizzard and January 25–27, 2011 North American blizzard	1/8/2011 and 1/25/2011	In January 2011, two nor'easters struck the East Coast of the United States just two weeks apart and severely crippled New England and the Mid-Atlantic. During the first of the two storms, a record of 40 inches was recorded in Savoy, Massachusetts. Two people were killed.
2011 Halloween nor'easter	10/28/2011	A rare, historic nor'easter, which produced record-breaking snowfall for October in many areas of the Northeastern U.S., especially New England. The storm produced a maximum of 32 inches of snow in Peru, Massachusetts, and killed 39 people. After the storm, the rest of the winter for New England remained very quiet, with much lower-than-average snowfall and no other significant storms striking the region for the rest of the season.
November 2012 nor'easter	11/7/2012	A moderately strong nor'easter that struck the same regions that were impacted by Hurricane Sandy a week earlier. The storm exacerbated the problems left behind by Sandy, knocking down trees that were weakened by Sandy. It also left several residents in the Northeast without power again after power had been restored following Hurricane Sandy. The highest snowfall total from the storm was 13 inches, recorded in Clintonville, Connecticut.

Event	Date	Comments
Late December 2012 North American storm complex	12/17/2012	A major nor'easter that was known for its tornado outbreak across the Gulf Coast states on Christmas Day and giving areas such as northeastern Texas a white Christmas. The low underwent secondary cyclogenesis near the coast of North Carolina and dumped a swath of heavy snow across northern New England and New York, and caused blizzard conditions across the Ohio Valley, as well as an ice storm in the mountains of Virginia and West Virginia.
Early February 2013 North American blizzard	2/7/2013	An extremely powerful and historic nor'easter that dumped heavy snow and unleashed hurricane-force wind gusts across New England. Many areas received well over 2 feet of snow, especially Connecticut, Rhode Island, and eastern Massachusetts. The highest amount recorded was 40 inches in Hamden, Connecticut, and Gorham, Maine, received a record 35.5 inches. Over 700,000 people were left without power and travel in the region came to a complete standstill. On the afternoon of February 9, when the storm was pulling away from the Northeastern United States, a well-defined eye could be seen in the center. The eye feature was no longer visible the next day and the storm quickly moved out to sea. The nor'easter later moved on to impact the United Kingdom before finally dissipating on February 20. The storm killed 18 people.
March 2013 nor'easter	3/1/2013	A large and powerful nor'easter that ended up stalling along the eastern seaboard due to a blocking ridge of high pressure in Newfoundland and pivoted back heavy snow and strong winds into the Northeast United States for a period of 2 to 3 days. Many officials and residents were caught off guard as local weather stations predicted only a few inches (several centimeters) of snow and a change over to mostly rain. Contrary to local forecasts, many areas received over one foot of snow, with the highest amount being 29 inches in Milton, Massachusetts. Several schools across the region, particularly in the Boston, Massachusetts metropolitan area, remained in session during the height of the storm, not knowing the severity of the situation. Rough surf and rip currents were felt all the way southwards towards Florida's east coast.
January 2015 North American blizzard	1/23/2015	The blizzard began as an Alberta Clipper in the Midwestern states, which was forecast to transfer its energy to a new, secondary low-pressure system off the coast of the Mid-Atlantic and move northeastward and pass to the south and east of New England. After moving into the sea, the storm began to slowly pull away to the northeast, a little quicker than expected. The storm brought over 20 inches of snow to much of the area, with several reports of over 30 inches across the state of Massachusetts, breaking many records. A maximum of 36 inches was recorded in at least four towns across Worcester County in Massachusetts and the city of Worcester itself received 34.5 inches, marking the city's largest storm snowfall accumulation on record. Boston recorded 24.6 inches, making it the largest storm snowfall accumulation during the month of January. On the coast of Massachusetts, hurricane-force gusts up to around 80 mph along with sustained winds between 50 and 55 mph at times, were reported. The storm also caused severe coastal flooding and storm surge.
October 2015 North American storm complex	9/29/2015	In early October, a low-pressure system formed in the Atlantic. Tapping into moisture from Hurricane Joaquin, the storm dumped a significant amount of rain, mostly in South Carolina.
January 2016 United States blizzard (also known as Winter Storm Jonas, Snowzilla, or The Blizzard of 2016)	1/19/2016	This system dumped 2 to 3 feet of snow in the East Coast of the United States. States of emergency were declared in 12 states and the city of Washington, D.C., in advance of the storm. The blizzard also caused significant storm surge in New Jersey and Delaware. Sustained damaging winds over 50 mph were recorded in many coastal communities, with a maximum gust to 85 mph reported on Assateague Island, Virginia. A total of 55 people died due to the storm.
February 9–11, 2017 North American blizzard (also known as Winter	2/6/2017	Forming as an Alberta clipper in the northern United States on February 6, the system initially produced light snowfall from the Midwest to the Ohio Valley as it tracked southeastwards. It eventually reached the East Coast of the United States on February

Event	Date	Comments
Storm Niko)		9 and began to rapidly grow into a powerful nor'easter, dumping 1 to 2 feet across the Northeast megalopolis. The storm also produced prolific thunder and lightning across Southern New England. Prior to the blizzard, unprecedented and record-breaking warmth had enveloped the region, with record highs of above 60 °F recorded in several areas, including Central Park in New York City. Some were caught off guard by the warmth and had little time to prepare for the snowstorm.
February 12–14, 2017 North American blizzard	2/12/2017	The February 12–14, 2017 North American blizzard was a strong and historic nor'easter that affected the Northeastern United States and Eastern Canada from February 12–14. It impacted the Northeastern United States less than a week after the February 9–11, 2017 North American blizzard. This blizzard was more localized and less widespread than the previous storm, but snow totals were higher in some areas, including portions of Maine and Vermont. The system caused 2 fatalities and is estimated to have caused over $3.9 million (2017 USD) in damages.
March 2017 North American blizzard (also known as Winter Storm Stella, Blizzard Eugene, and Blizzard of 2017)	3/12/2017	The March 2017 North American blizzard also known as Winter Storm Stella was a major late-season blizzard that affected the Northeastern United States, New England and Canada, dumping up to 3 feet of snow in the hardest hit areas, mainly New York, Vermont, New Hampshire and southern Quebec. Ahead of the storm, residents prepared in advance for the major nor'easter, with blizzard warnings issued for several states, including New York, Pennsylvania, New Jersey, Connecticut, Rhode Island, and Massachusetts. Several officials had crews with salt trucks ready to deploy to clear roads. The system also disrupted travel across the country, with numerous flight cancellations at most of the major airports in the Northeast. It dropped a swath of moderate snow accumulation as it moved across the northern tier of the country, with as much as 13 inches reported. The storm was also responsible for ending a record streak without snowfall in Chicago, Illinois, where no snow had occurred since December 25, 2016.
October 2017 North American storm complex	10/28/2017	An extratropical storm absorbed the remnants of Tropical Storm Philippe. The combined systems became an extremely powerful nor'easter that wreaked havoc across the Northeastern United States and Eastern Canada. The storm produced sustained tropical storm force winds, along with hurricane-force gusts in many areas. The highest wind gusts recorded were 93 mph in Popponesset, Massachusetts and Matinicus Isle, Maine. The storm caused over 1,400,000 power outages, with the worst occurring in Maine, where most residents were in the dark immediately following the storm. Damage across New England was very extensive. This was due to the combination of the high winds, heavy rainfall, saturated ground, and most trees still being fully leaved. Autumn foliage in parts of northern New England was removed from the landscape in a matter of hours due to high winds. Some residents in Connecticut were also without power for nearly a week following the storm. Heavy rain in Quebec and Eastern Ontario, with up to 98 mm (3.9 in) in the Canadian capital region of Ottawa, greatly interfered with transportation.
January 2018 North American blizzard	1/2/2018	A powerful blizzard that caused severe disruption along the East Coast of the United States and Canada. It dumped snow and ice in places that rarely receive wintry precipitation, even in the winter, such as Florida and Georgia, and produced snowfall accumulations of over 2 feet in the Mid-Atlantic states, New England, and Atlantic Canada. The storm originated on January 3 as an area of low pressure off the coast of the Southeast. Moving swiftly to the northeast, the storm explosively deepened while moving parallel to the Eastern Seaboard, causing significant snowfall accumulations. The storm received various unofficial names, such as Winter Storm Grayson, Blizzard of 2018 and Storm Brody. The storm was also dubbed a "historic bomb cyclone", with a minimum central pressure of 948 mb, similar to that of a Category 3 or 4 hurricane

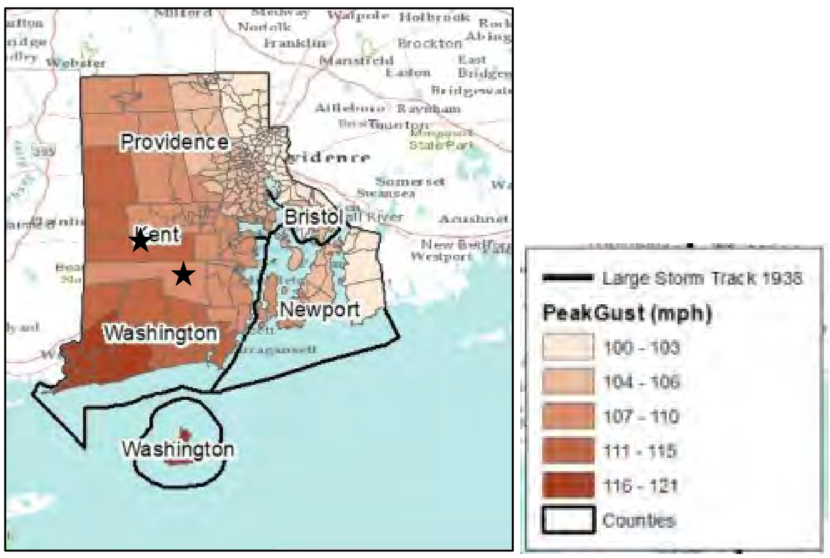
Event	Date	Comments
March 1-3, 2018 nor'easter (also known as Winter Storm Riley)	3/1/2018	A very powerful nor'easter that caused major impacts in the Northeastern, Mid-Atlantic and Southeastern United States. It originated as the northernmost low of a stationary front over the Midwest on March 1, which moved eastward into the Northeast later that night. A new low-pressure system rapidly formed off the coast on March 2 as it slowly meandered near the coastline. It peaked later that day and began to gradually move out to sea by March 3. Producing over 2 feet (24 in) of snow in some areas, it was one of the most significant March snowstorms in many areas, particularly in Upstate New York. In other areas, it challenged storm surge records set by other significant storms, such as Hurricane Sandy. It also produced widespread damaging winds, with gusts well over Hurricane force strength in some areas across Eastern New England as well as on the back side in the Mid-Atlantic via a sting jet. Over 2.2 million customers were left without power.
March 6-8, 2018 nor'easter (also known as Winter Storm Quinn)	3/2/2018	A powerful nor'easter that affected the Northeast United States. It came just days after another nor'easter devastated much of the Northeast. Frequent cloud to ground Thundersnow as well as snowfall rates of up to 3 inches an hour were reported in areas around the Tri-State Area, signaling the rapid intensification of the storm. Late in the afternoon, an eye-like feature was spotted near the center of the storm. It dumped over 2 feet of snow in many areas across the Northeast, including many areas in New England where the predominant precipitation type was rain for the previous storm. Over 1 million power outages were reported at the height of the storm due to the weight of the heavy, wet snow on trees and power lines. Many people who lost power in the previous storm found themselves in the dark again.
March 12–14, 2018 nor'easter (also known as Winter Storm Skylar)	3/11/2018	A powerful nor'easter that affected portions of the Northeast United States. The storm underwent rapid intensification with a central millibaric pressure dropping down from 1001 mb to 974 mb in just 24 hours. This was the third major storm to strike the area within a period of 11 days. The storm dumped over up 2 feet of snow and brought Hurricane-force wind gusts to portions of Eastern New England. Hundreds of public school districts including, Boston, Hartford, and Providence were closed on Tuesday, March 13.
March 20–22, 2018 nor'easter (also known as Winter Storm Toby and Four'Easter)	3/20/2018	A powerful nor'easter that became the fourth major nor'easter to affect the Northeast United States in a period of less than three weeks. It caused a severe weather outbreak over the Southern United States on March 19 before moving off the North Carolina coast on March 20 and spreading freezing rain and snow into the Mid-Atlantic States after shortly dissipating later that night. A new low-pressure center then formed off of Chesapeake Bay on March 21 and then became the primary nor'easter. Dry air prevented most of the precipitation from reaching the ground in areas in New England such as Boston, Hartford, and Providence, all of which received little to no accumulation, in contrast with what local forecasts had originally predicted. In Islip, New York at the height of the storm, snowfall rates of up to 5 inches per hour were reported. 8 inches was reported at Central Park and over 12 inches was reported in many locations on Long Island as well in and around New York City and in parts of New Jersey. Over 100,000 customers lost power at the peak of the storm, mostly due to the weight of the heavy, wet snow on trees and power lines, with a majority of the outages being in New Jersey.
Early December 2020 nor'easter	12/4/2020	It brought up to 18 inches of snow in northern New England.
Mid-December 2020 nor'easter	12/14/2020	The nor'easter brought significant snowfall to metropolitan areas such as New York City, Philadelphia, and Washington, D.C., which eclipsed the entire snowfall total from the previous winter season, as well as Boston and Portland that saw over a foot of snow from the storm. It killed at least 7 people.
January 31 – February 3, 2021 nor'easter	1/31/2021	The Groundhog Day Nor'easter of 2021 was a powerful Nor'easter that impacted the Northeastern United States and Eastern Canada. Large metropolitan areas such as

Event	Date	Comments
		New York City saw as much as 46-61 centimeters of snow accumulation from January 31 to February 2.
April 2021 nor'easter	4/15/2021	The April 2021 nor'easter, also referred to as the 2021 Spring nor'easter, was a significant late-season nor'easter that impacted much of New England with heavy snowfall, gusty winds, thundersnow, and near-whiteout conditions from April 15–17, 2021. The system originated from a weak frontal system late on April 14 over North Carolina, which moved into the ocean the next day and began to strengthen. The low-pressure steadily deepened as it moved up the East Coast and developed an eye-like feature just prior to peak intensity. It prompted a large area of Winter Storm Warnings across interior sections of New England, with Winter Weather Advisories being issued closer to the coast. Over 20,000 customers lost power at the height of the storm on April 16 due to heavy wet snow, and near-whiteout conditions were reported in many areas. Several injuries, some serious, occurred as well, mostly due to traffic incidents on poorly treated roadways during the storm.
Late October 2021 Nor'easter	10/25/2021	A powerful early-season nor'easter that struck the Northeastern United States in late October 2021. The system subsequently moved out to sea and later became Tropical Storm Wanda. Over 607,000 customers lost power during the storm, with the majority of them in Massachusetts. The Nor'easter fell as high as 5 inches of rain in Hunter, New York.
April 2022 Nor'easter	4/18/2022	Beginning early on April 18, a nor'easter began developing off the Southeastern United States, bringing heavy rain, wind, heavy snow, and coastal flooding to much of the Mid-Atlantic states. Further inland in areas like Pennsylvania, Upstate New York and New England, heavy snowfall fell as high as 6–12 inches. Over 300,000 customers in the Northeast lost power, including 200,000 in New York. Virgil, New York saw 18 inches of snow, while Montrose, Pennsylvania saw 14.5 inches of snow.
March 2023 nor'easter	3/13/2023	Beginning on March 13, a nor'easter brought heavy snow to Northern New England and Upstate New York, with up to 40 inches in isolated spots. The nor'easter brought very little snow to the coast.

3.3.4.4 Extent

Hurricane	Hurricanes that typically reach Rhode Island are usually weak (Category 1) or downgraded tropical systems. The wind speeds may be less, but the storms can still bring a lot of rain. Hurricanes are categorized according to the Saffir/Simpson scale (Table 20) with ratings determined by wind speed and central barometric pressure. Hurricane categories range from one (1) through five (5), with Category 5 being the strongest (winds greater than 155 mph). A hurricane watch is issued when hurricane conditions could occur within the next 36 hours. A hurricane warning indicates that sustained winds of at least 74 mph are expected within 24 hours or sooner. Figure 23 shows the statewide peak wind gust of the 1938 Great Hurricane. Exeter experienced a peak wind gust of 107-110 mph and West Greenwich experienced a peak wind gust of 111-115 mph. Based on the extent of past events and the criteria identified in Table 7, the extent of hurricanes/tropical cyclones in Exeter and West Greenwich are considered **Limited**, with potential for some injuries; short shutdown of some critical infrastructure and facilities; fewer than 10% of residential and commercial structures damaged; and a small number of local operations impacted for short amounts of time.
Nor'easter	The magnitude or severity of a severe winter storm or Nor'easter depends on several factors including a region's climatological susceptibility to snowstorms, snowfall amounts, snowfall rates,

	wind speeds, temperatures, visibility, storm duration, topography, and time of occurrence during the day (e.g., weekday versus weekend) and time of season. The extent of a severe winter storm (including Nor'easters that produce snow) can be classified by meteorological measurements and by evaluating its combined impacts. For measuring wind effects, the Beaufort Wind Scale is a system that relates wind speed to observed conditions at sea or on land (See Table 11). The snow impact of a Nor'easter can be measured using NOAA's Regional Snowfall Index (See Table 28). Based on the extent of past events and the criteria identified in Table 7, the extent of Nor'easters in Exeter and West Greenwich are considered **Limited**, with potential for some injuries; short shutdown of some critical infrastructure and facilities; fewer than 10% of residential and commercial structures damaged; and a small number of local operations impacted for short amounts of time.



Source: RIEMA 2024

Figure 23- Peak Wind Gust of the 1938 Great Hurricane

FEMA's National Risk In states that Exeter and West Greenwich have the following planning significance related to tropical and extratropical storms:

Jurisdiction	Tropical and Extratropical NRI	Tropical and Extratropical EAL
Exeter	Relatively Moderate	Relatively Moderate
West Greenwich	Relatively Moderate	Relatively Moderate

Source: FEMA National Risk Index (www.hazards.fema.gov/nri/map)

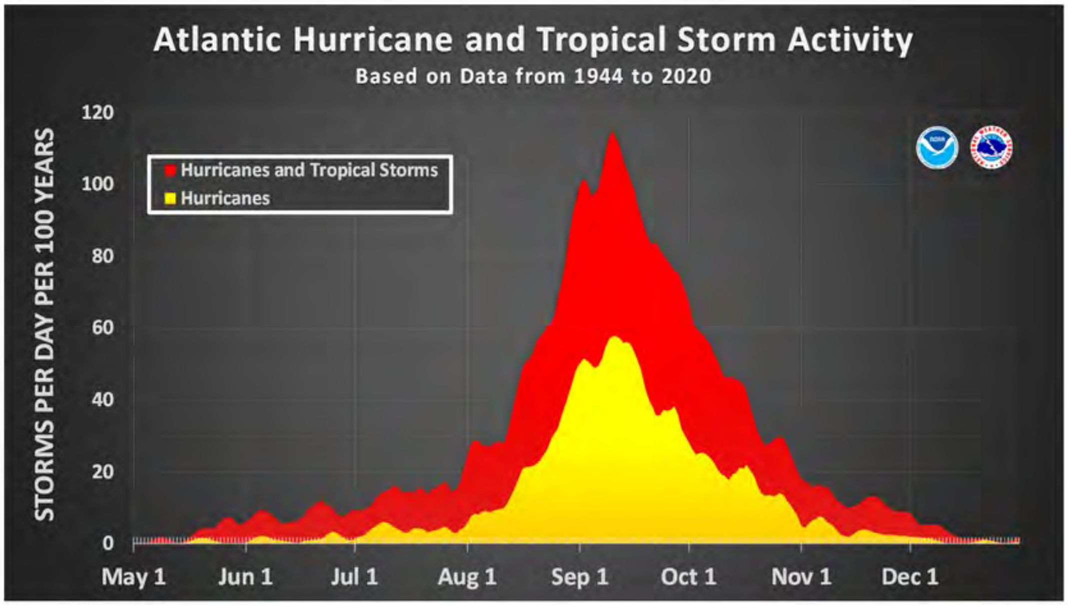
EAL: Expected Annual Loss

NRI: National Risk Index= (Expected Annual Loss x Social Vulnerability) ÷ Community Resilience

3.3.4.5 Probability of Future Occurrence

Hurricane	The official hurricane season for the Atlantic basin is from June 1 to November 30, but tropical cyclone activity sometimes occurs before and after these dates. The peak of the Atlantic hurricane season is September 10, with most activity occurring between mid-August and mid-October. Figure 24 shows the seasonal distribution of Atlantic hurricane and tropical storm activity from

	1944-2020. Hurricanes occur annually in the Atlantic Ocean, but based on previous occurrences and the criteria identified in Table 8, it is **Possible** a hurricane will impact Exeter and West Greenwich in the calendar year; there is a between 1-49.9% annual probability of occurring.
Nor'easter	Based on previous occurrences and the criteria identified in Table 8, it is **Possible** a Nor'easter will impact Exeter and West Greenwich in the calendar year; there is a between 1-49.9% annual probability of occurring.



Source: NOAA NHC 2021

Figure 24- Atlantic Hurricane and Tropical Storm Activity (1944-2020)

3.3.4.6 Impact

Hurricane	The wind and rain that precedes a hurricane can cause severe damage even to those communities that are further inland, such as Exeter and West Greenwich. As Exeter and West Greenwich are inland communities, most damage from a hurricane would be from downed power lines, downed trees, and damage to mobile homes or older structures. Loss of power may prevent access to potable water from private wells. In 2021, high winds from Hurricane Henri caused a large tree to fall on a house in Exeter (Figure 25). The residents were unharmed, but the house was destroyed. Impacts from Irene and Sandy included widespread inland flooding along with tree damage and associated power outages (RIIB MRP 2024).
Nor'easter	Exeter and West Greenwich are inland communities; most damage would be from downed power lines, downed trees, and damage to mobile homes or older structures. The Blizzard of 1978 was the largest Nor'easter on record. Many people were without heat, food, and electricity for over a week. Loss of power may prevent access to potable water from private wells.

Source: NBC News 10 (2021)

Figure 25- Exeter House Damaged by Hurricane Henri (2021)

3.3.4.7 Future Conditions

Hurricane	Nature of the hazard	The physics driving the global climate are complicated thus it is difficult to be certain how future climate conditions will influence the intensity, frequency, and geographical distribution of hurricanes. Some effects of future climate conditions, like rising sea surface temperatures, are likely to favor hurricane development and intensification. Other meteorological effects (such as increasing upper troposphere temperature and vertical wind shear) of future climate conditions are not likely believed to be favorable for hurricane formation (EC4 STAB 2016).
	Location	The warming of mid-latitudes may be changing the pattern of tropical storms, leading to more storms occurring at higher latitudes. A northward shift in the location at which storms reach their peak intensity has been observed in the Pacific, but not in the North Atlantic, where hurricanes that make landfall in the Gulf and East Coast are created. This shift makes it possible to put more lives and property at risk, however more research is required to better understand how hurricane tracks might change (C2ES 2024).
	Extent	Warmer sea surface temperatures intensify tropical storm wind speeds, giving them the potential to deliver more damage if they make landfall. Over the 39-year period from 1979-2017, the number of major hurricanes has increased while the number of smaller hurricanes has decreased. Based on modeling, the National Oceanic and Atmospheric Administration predicts an increase in Category 4 and 5 hurricanes, alongside increased hurricane wind speeds. Warmer sea temperatures also cause wetter hurricanes, with 10-15% more precipitation from storms projected (C2ES 2024).

		Scientists are currently uncertain whether there will be a change in the number of future hurricanes, but report that it is possible that the intensity and severity of hurricanes will continue to increase in the future (C2ES 2024).
	Impact	While the impact of future climate conditions on the frequency of storms in the Atlantic Basin remains uncertain, the predicted changes in storm activity could make it likely to change the frequency and intensity of associated storm surges, high winds, and precipitation events, causing serious implications for both coastal and inland communities and infrastructure systems in Rhode Island (Resilient Rhody 2018).
	Probability of Future Events	In the Atlantic basin, modeling studies predict a substantial reduction in the number of tropical storms and hurricanes, but the frequency of intense storms (Category 4 and 5) is likely to increase and possibly double by the end of the 21st century (EC4 STAB 2016).
	Changes in Population Patterns	As hurricanes are a regional hazard and Exeter and West Greenwich are inland communities, it is possible that future climate conditions will influence future conditions impacting population patterns if residents need to relocate due to flooding associated with hurricanes. It is also possible that residents could relocate to other areas within the Towns.
	Changes in Land Use Development	With increased intensities and heavier rain, it is possible that future hurricanes may impact future land use development by altering floodplains/flood hazard areas, and increased erosion. These impacts may result in infrastructure relocation or prohibiting future development in these areas. However, as Exeter and West Greenwich are inland communities, future changes in sea level rise and storm surges are not likely to alter land use development in the Towns.
Nor'easter	Nature of the hazard	Similar to hurricanes, changes in air and water temperatures are likely to lead to stronger Nor'easters along the Atlantic Ocean. Exeter and West Greenwich should expect stronger Nor'easters in the future, but not necessarily more frequent storms.
	Location	Nor'easters are a predicable annual hazard associated with the Atlantic Ocean. Future climate conditions are not likely to alter the location of future Nor'easter events in Exeter and West Greenwich as a Nor'easter would be a regional event, affecting more areas than just the Towns.
	Extent	The 2024 State of Rhode Island HMP states: *For extratropical storms, particularly Nor'easters, the increase in intensity is caused by changes in atmospheric conditions, including temperature gradients, which can affect the strength and track of these storms.* *Both tropical and extratropical storms are expected to produce heavier rainfall in a warmer climate. This can lead to more significant inland flooding and exacerbate the risk of river and urban flooding* (RIEMA 2024). It is likely that future climate conditions will influence the extent of Nor'easters affecting Exeter and West Greenwich.
	Impact	As the extent/intensity of future Nor'easters is projected to increase, the impacts to the infrastructure and residents of Exeter and West Greenwich will likely increase. Increased impacts are likely to include increased flooding and resultant erosion, increased snow/ice storms are likely to lead to power/utility outages, road closures, and travel disruptions.
	Probability of Future	Similar to hurricanes, changes in air and water temperatures will lead to stronger Nor'easters along the Atlantic Ocean. Exeter and West Greenwich will likely see

	Events	stronger Nor'easters in the future, but not necessarily more frequent storms.
	Changes in Population Patterns	As Nor'easters are a regional hazard and Exeter and West Greenwich are inland communities, it is possible that future conditions would impact future population patterns if flooding occurs, requiring residents to relocate. Additionally, an increase in population would likely have similar impacts as land use development increases.
	Changes in Land Use Development	With increased intensities and heavier rain/snowfall, future Nor'easters are likely to impact future land use development by altering floodplains/flood hazard areas and increase erosion. These impacts are likely to result in infrastructure relocation or prohibiting future development in these areas. Increased land use development such as new housing developments or structures in the community may increase the potential of impacts from hurricane and Nor'easter events due to clearing of trees, which act as natural wind breaks, and new power lines associated with increased housing will increase the potential of utility disruptions if trees are downed due to high winds, heavy rain, and heavy snow associated with hurricanes and/or Nor'easters. This would increase the potential of impacts to Exeter and West Greenwich's residents.

3.3.5 Severe Winter Weather (Snow Storm, Ice Storm)

This hazard profile includes information on snow storms and ice storm events.

3.3.5.1 Description

Snow Storm	A winter storm is a combination of heavy snow, blowing snow, and/or dangerous wind chills. A winter storm can be life-threatening. A snowstorm is an example of a winter storm. A snow storm occurs when a mass of very cold air moves away from the polar region and collides with a warm air mass. The warm air rises quickly and the cold air cuts underneath it, causing huge cloud banks to form. As the ice crystals within the cloud collide, snow is formed. However, snow will only fall from the cloud if the temperature of the air between the bottom of the cloud and the ground is below 40 degrees Fahrenheit. A higher temperature will cause the snowflakes to melt as they fall through the air, turning them into rain or sleet. Similar to ice storms, the effects from a snow storm can disturb a community for a prolonged period of time. Buildings and trees can collapse under the weight of heavy snow. Winter storms vary in size and strength and can be accompanied by strong winds that create blizzard conditions and dangerous wind chills. A blizzard as a specific type of snowstorm that consist of large amounts of snow or blowing snow, winds greater than 35 mph, and visibility of less than ¼ mile for at least three hours.
Ice Storm	Ice storms are characterized by the accumulation of freezing rain or freezing drizzle, which coats surfaces with a layer of ice. These storms can have significant impacts on transportation, infrastructure, and the environment. Ice storms occur when there is a layer of warm air above a layer of cold air near the surface. Precipitation falls as rain in the warm layer and then freezes upon contact with surfaces at or below freezing temperatures in the cold layer. The most common type of precipitation during an ice storm is freezing rain. This is rain that falls as a liquid but freezes upon contact with cold surfaces, forming a layer of ice (RIEMA 2024).

3.3.5.2 Location

Snow Storm	The majority of Rhode Island lies outside the heavy snow and ice regions of the northeast. Due to its maritime climate, Rhode Island generally experiences cooler summers and warmer winters than inland areas. However, snow does occur and can be more than an inconvenience and cause extensive damage. The two major threats from heavy snow are stranded populations and snow loading on rooftops. All of Exeter and West Greenwich are susceptible to snow storms. Roads, trees, and power lines will be the most affected. In Exeter and West Greenwich, the power companies are responsible for trimming trees near powerlines, however, they do not trim above the powerlines. This frequently leads to downed powerlines and power outages when heavy snow or ice is deposited on the trees.
Ice Storm	All of Exeter and West Greenwich are susceptible to ice storms. Roads, trees, and power lines will be the most affected.

3.3.5.3 History

Snow Storm	Table 24 provides details on historical heavy snow and snow storm events in Exeter. Table 25 provides details on historical heavy snow and snow storm events in West Greenwich. Exeter and West Greenwich both are subject to snowfall on an annual basis. Since the 2005 HMPs, there have been two (2) heavy snow or snow storm events in Exeter and five (5) heavy snow or snow storm events West Greenwich.
Ice Storm	Table 24 provides details on historical heavy snow and snow storm events in Exeter. Table 25 provides details on historical heavy snow and snow storm events in West Greenwich. Due to the unique weather in New England, ice storms are usually part of larger snow events. The winter storm event that crippled the state in February 1978 did include a FEMA disaster declaration for snow and ice. Subsequent storms have included ice warnings when there are rapidly warming and cooling temperatures. Since the 2005 HMPs, there has been one (1) ice storm events in Exeter and two (2) ice storm events in West Greenwich.

Table 24- History of Severe Winter Weather Events in Exeter

Date	Event Type	Event Details
12/5/2003	Winter Storm	A major winter storm brought heavy snow and strong winds to southern New England, dumping 1 to 2 feet of snow over a large area as it tracked slowly off the coast. In Rhode Island, snowfall amounts averaged between 10 and 20 inches and had a major disruption on transportation due to the combination of poor visibility and snow-covered roads. Dozens of minor accidents were reported. Two deaths were indirectly attributed to the storm. One man was killed when the inner tube he was riding in, towed behind a truck, hit a utility pole. Another man was killed when he was hit by a train while crossing the tracks on a snowmobile in Exeter. 12 inches of snow fell in in Exeter.
1/22/2005	Winter Storm	A major winter storm brought heavy snow, high winds, and coastal flooding to southern New England. In Rhode Island, snowfall totals of 15 to 25 inches were widely observed. Winds gusting as high as 60 mph at times (mainly around greater Providence) created near blizzard conditions, making travel impossible during the height of the storm. 18 inches of snow fell in in Exeter.
2/24/2005	Heavy	Low pressure over the Mid-Atlantic states strengthened rapidly as it passed southeast of Nantucket and brought heavy snow to much of southeast New England, including Rhode Island.

Table 24- History of Severe Winter Weather Events in Exeter

Date	Event Type	Event Details
	Snow	Snowfall totals averaged 5 to 8 inches throughout the Ocean State, with locally as much as 10 inches near the south coast. 8 inches of snow fell in in Exeter.
2/14/2018	Winter Weather	An area of light freezing rain moved across Rhode Island during the morning rush hour, causing numerous traffic accidents and a few road closures due to icing. At 718 AM EST, a multiple vehicle accident due to icing was reported in Exeter.
2/27/2023	Heavy Snow	A potent mid-level low/shortwave deamplified as it moved east-southeast from the Ohio Valley late on the 27th and early on the 28th. At the surface, while the parent low lifted across the Great Lakes, a secondary low developed over Delmarva Peninsula in response to height falls from approaching trough, then moved east, passing well south of southern New England. 6 inches of snow fell in in Exeter.

Source: NOAA Storm Events Database- Storm Prediction Center Product (NWS 2024a)

Table 25- History of Severe Winter Weather Events in West Greenwich

Date	Event Type	Event Details
2/25/1999	Heavy Snow	A strong low-pressure system, which passed about 200 miles southeast of Cape Cod, brought heavy snow to Rhode Island. The storm closed schools across the state and created hazardous road conditions. This was the heaviest snowfall of the winter to date. 12 inches of snow fell in West Greenwich.
11/26/2000	Winter Weather	Low pressure moving north up the mid-Atlantic coast brought a period of light freezing rain to much of northern Rhode Island. Ice accretion was under one quarter inch, but the freezing rain left black ice on roads, causing dozens of accidents at the end of the Thanksgiving weekend, usually a busy travel day. A series of minor accidents on Interstate 95 in West Greenwich forced the closure of the highway for nearly two hours. Temperatures warmed into the 40s by late morning, ending the danger of icing.
12/30/2000	Heavy Snow	The season's first winter storm dumped 6 to 9 inches of snow in western Kent and northwest Providence Counties. Since the storm occurred on a Saturday, no major problems with travel were noted. The immediate Providence area down to the south coast reported 1 to 4 inches of snow, before a change to rain occurred. 6 inches of snow fell in West Greenwich.
12/5/2002	Heavy Snow	A winter storm passing about 200 miles southeast of Nantucket brought heavy snow to much of Rhode Island. Due to its offshore track, the storm brought the most snow to central and southern sections of the Ocean State, where amounts averaged around 7 inches. Amounts averaged less in northwest Providence County, generally between 2 and 5 inches. No storm damage or injuries were reported. 8 inches of snow fell in West Greenwich.
3/1/2005	Winter Storm	Heavy snow and gusty winds affected Rhode Island and all southern New England, as low pressure reformed off the mid-Atlantic coast and tracked southeast of the region. 6 inches of snow fell in West Greenwich.

Table 25- History of Severe Winter Weather Events in West Greenwich

Date	Event Type	Event Details
12/9/2005	Winter Storm	A low-pressure system centered near the Delaware coast intensified rapidly as it tracked quickly northeast across southern New England, producing near-blizzard conditions across Rhode Island around midafternoon. Damaging winds, whiteout conditions, and approximately one hour of thunder and snow occurred across most of the region. In addition, snowfall amounts ranged from around 2 inches across south coastal locations, to as much as 12 inches across northwest Rhode Island. This winter storm caused icy roadways, which resulting in a chain-reaction automobile pileup on Interstate 95 South in West Greenwich that severely injured two women.
12/23/2017	Winter Weather Ice Storm	A series of weak moved from the Ohio Valley across Southern New England. This drew warm air north over Southern New England even as colder air moved south at the surface. This brought a brief period of snow during the late afternoon of the 22nd, and freezing rain during the overnight and day of the 23rd. All of Southern New England was affected, with icy roads and downed trees and wires. Ice accumulation of around one-tenth of an inch was reported from West Greenwich.
2/14/2018	Winter Weather	An area of light freezing rain moved across Rhode Island during the morning rush hour, causing numerous traffic accidents and a few road closures due to icing. At 702 AM EST in West Greenwich, a multiple vehicle accident occurred on Plain Meeting House Road. As part of the accident, a school bus with two children on board slid into a utility pole.
2/7/2021	Heavy Snow	A storm system underwent rapid intensification near the Benchmark of 40N/70W as it tracked quickly northeastward. A particularly heavy snow band formed from northeast Connecticut to the Metro-West Boston area. During the afternoon, 3 to 4 inch per hour snowfall rates occurred in this band. It was a quick-hitting storm, starting around noon and ending in the early evening. Heavy snow in western Kent County included 10 inches in West Greenwich.
2/27/2023	Heavy Snow	A potent mid-level low/shortwave deamplified as it moved east-southeast from the Ohio Valley late on the 27th and early on the 28th. At the surface, while the parent low lifted across the Great Lakes, a secondary low developed over Delmarva Peninsula in response to height falls from approaching trough, then moved east, passing well south of southern New England. 8.3 inches of snow fell in West Greenwich.
1/6/2024	Heavy Snow	A strong storm moved up the east coast passing near the 70/40 benchmark brought heavy snow to southern New England beginning late Monday night and continuing on Sunday. The first round of heavy snow fell overnight followed by a lull in the snow and mixing with rain Sunday morning. Some accumulations included 5.6 inches of snow in West Greenwich.

Source: NOAA Storm Events Database- Storm Prediction Center Product (NWS 2024a)

Additionally, Rhode Island has experienced nine (9) Presidential Disaster Declarations related to severe winter storms (Table 26). Exeter and West Greenwich were not severely impacted by any of these disasters. Since the 2005 HMPs, there have been three (3) Rhode Island Presidential Disaster Declarations relating to winter storms.

Table 26- State of Rhode Island Presidentially Declared Disasters Relating to Winter Storms

Designation	Incident Period	Declaration Date	Incident Type
EM-3058-RI	02/07/1978	02/07/1978	Blizzards and Snowstorms
DR-548-RI	02/16/1978	02/16/1978	Snow and Ice
EM-3102-RI	03/13 – 03/16/1993	03/16/1993	Blizzards, High Winds, Record Snowfall

Designation	Incident Period	Declaration Date	Incident Type
DR-1091-RI	01/07 – 01/13/1996	01/24/1996	Blizzard
EM-3182-RI	02/17 – 02/18/2003	03/27/2003	Snowstorm
EM-3203-RI	01/22 – 01/23/2005	02/17/2005	Heavy Snow
DR-4107-RI	02/08 – 02/09/2013	03/22/2013	Severe Winter Storm and Snowstorm
DR-4212-RI	01/26 – 01/28/2015	04/03/2015	Severe Winter Storm and Snowstorm
DR-4653-RI	01/28 – 01/29/2022	05/12/2022	Severe Winter Storm and Snowstorm

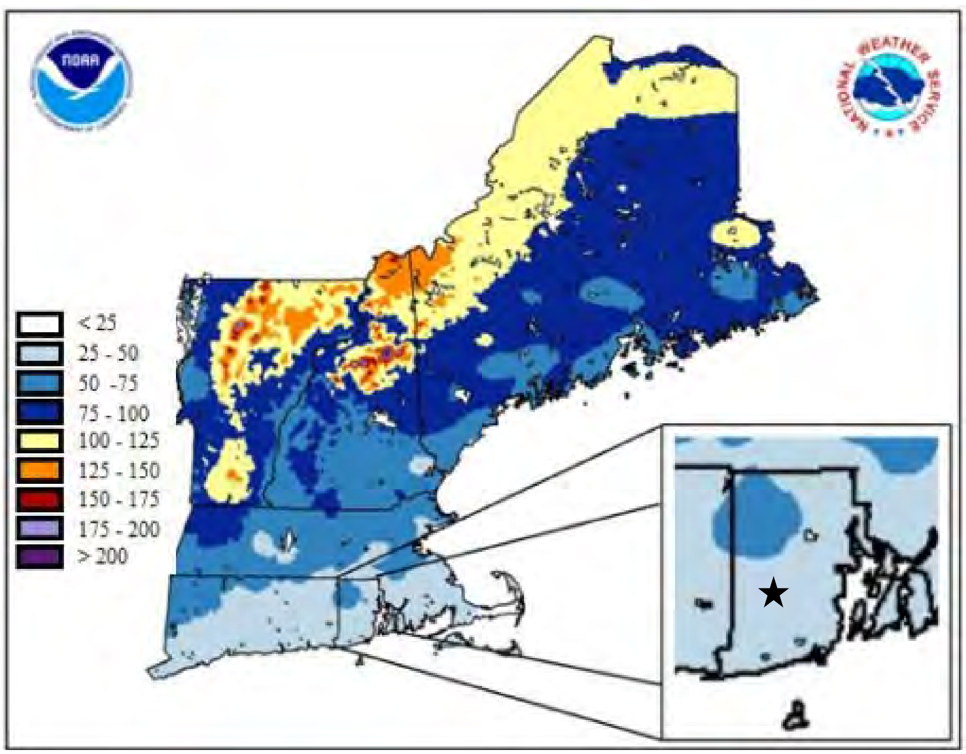
Source: FEMA 2024

3.3.5.4 Extent

Snow Storm	Figure 26 shows average snowfall amounts in inches for the state. Exeter and West Greenwich both fall in the 25–50-inch category. On average, Exeter and West Greenwich receives 25-40 inches of snow per year. The winter storms Nemo and Juno dropped 2-3 feet of snow with 2-3 inches per hour of accumulation at their peak (RIIB MRP 2024). Based on the extent of past events and the criteria identified in Table 7, the extent of snow storms in Exeter and West Greenwich are considered **Limited**, with potential for some injuries; short shutdown of some critical infrastructure and facilities; fewer than 10% of residential and commercial structures damaged; and a small number of local operations impacted for short amounts of time.
Ice Storm	Ice storms can be the most devastating winter weather phenomena and are often the cause of automobile accidents, power and communication system outages, personal injury, and death. Moreover, they can hinder the delivery of emergency services needed in response to these catastrophes and endanger the responders. Ice storms accompanied by wind gusts cause the most damage. Significant ice accumulations are usually accumulations of ¼" or greater. The Sperry–Piltz Ice Accumulation (SPIA) Index is a scale for rating ice storm intensity, based on the expected storm size, ice accumulation, and damages on structures, especially exposed overhead utility systems (Table 27). The SPIA Index uses forecast information to rate an upcoming ice storm's impact from 0 (little impact) to 5 (catastrophic damage to exposed utility systems). Exeter and West Greenwich expect at least a level 1 (isolated or localized utility interruptions) every year due to ice. Based on the extent of past events and the criteria identified in Table 7, the extent of ice storms in Exeter and West Greenwich are considered **Limited**, with potential for some injuries; short shutdown of some critical infrastructure and facilities; fewer than 10% of residential and commercial structures damaged; and a small number of local operations impacted for short amounts of time.

Table 27- The Sperry-Piltz Ice Accumulation Index

Ice damage index	Radial ice	Wind	Damage and impact descriptions
0	0–0.25 in	0-15 mph	Minimal risk of damage to exposed utility systems; no alerts or advisories needed for crews, few outages.
1	0.10–0.25 in	15–25 mph	Some isolated or localized utility interruptions are possible, typically lasting only a few hours. Roads and bridges may become slick and hazardous.
	0.25–0.50 in	0–15 mph	
2	0.10–0.25 in	25–35 mph	Scattered utility interruptions expected, typically lasting 12 to 24 hours. Roads and travel conditions may be extremely hazardous due to ice accumulation.
	0.25–0.50 in	15–25 mph	
	0.50–0.75 in	0–15 mph	
3	0.10–0.25 in	Over 35 mph	Numerous utility interruptions with some damage to main feeder lines and equipment expected. Tree limb damage is excessive. Outages lasting 1 to 5 days.
	0.25–0.50 in	25–35 mph	
	0.50–0.75 in	15–25 mph	
	0.75–1.00 in	0–15 mph	
4	0.25–0.50 in	Over 35 mph	Prolonged and widespread utility interruptions with extensive damage to main distribution feeder lines and some high voltage transmission lines/structures. Outages lasting 5 to 10 days.
	0.50–0.75 in	25–35 mph	
	0.75–1.00 in	15–25 mph	
	1.00–1.50 in	0–15 mph	
5	0.50–0.75 in	Over 35 mph	Catastrophic damage to entire exposed utility systems, including both distribution and transmission networks. Outages could last several weeks in some areas. Shelters needed.
	0.75–1.00 in	Over 25 mph	
	1.00–1.50 in	Over 15 mph	
	Over 1.50 in	Any	



Source: NOAA per RIEMA 2024

Figure 26- Rhode Island Average Annual Snowfall (1991-2020)

FEMA's National Risk Index states that Exeter and West Greenwich have the following planning significance related to severe winter weather:

Jurisdiction	Ice Storm NRI	Ice Storm EAL	Winter Weather NRI	Winter Weather EAL
Exeter	Relatively Low	Relatively Low	Relatively Low	Relatively Low
West Greenwich	Relatively Low	Relatively Low	Relatively Low	Relatively Low

Source: FEMA National Risk Index (www.hazards.fema.gov/nri/map)

EAL: Expected Annual Loss

NRI: National Risk Index= (Expected Annual Loss x Social Vulnerability) ÷ Community Resilience

3.3.5.5 Probability of Future Occurrence

Snow Storm	Based on previous occurrences and the criteria identified in Table 8, it is **Highly Likely** that Exeter and West Greenwich will experience a heavy snow/snow storm event within the calendar year; there is a greater than 90% annual probability of occurring.
Ice Storm	Based on previous occurrences and the criteria identified in Table 8, it is **Highly Likely** that Exeter and West Greenwich will experience an ice storm event within the calendar year; there is a greater than 90% annual probability of occurring.

3.3.5.6 Impact

Snow Storm	The Northeast Snowfall Impact Scale is a scale used to assess and rank the impact of snowfall events in the northeastern United States. It was developed by NOAA to provide a standardized way of measuring the societal and economic impacts of snowstorms (RIEMA 2024). The scale considers factors such as snowfall amount, population density, and the area affected by the storm to determine its impact. The scale has five categories, each with its own associated impacts (see Table 28, below). As described in the 2024 State of Rhode Island HMP, impacts on people and the community from winter storms may include: • **Injuries and Fatalities**: Slippery sidewalks, roads, and driveways can lead to slip and fall accidents, vehicle crashes, and pedestrian injuries. Exposure to extreme cold temperatures can cause frostbite, hypothermia, and cold-related illnesses, which can be life-threatening. • **Power Outages**: Heavy snow, ice, and freezing rain can bring down power lines and disrupt electricity supply. Power outages can lead to heating and lighting challenges, particularly in extreme cold conditions. Loss of power may prevent access to potable water from private wells. • **Transportation Disruptions**: Winter storms can make roads and highways treacherous, leading to travel delays, accidents, and stranded motorists. Public transportation services may be disrupted, affecting commuters and essential travel. • **Stranded or Isolated Communities**: Severe winter weather can leave communities isolated and cut off from emergency services and supplies. Residents may need to shelter in place or rely on local resources until conditions improve. • **Health Risks**: Exposure to extreme cold can lead to a range of health risks, including frostbite, hypothermia, and cold-related illnesses. Individuals with pre-existing health conditions may face exacerbated risks. • **Increased Heating Costs**: Cold weather can result in higher heating costs, which can be a financial burden for many households. Low-income individuals and families may struggle to afford adequate heating.

<table>
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- **Disruption of Essential Services**: Severe winter weather can disrupt essential services such as healthcare, emergency response, and utilities. Hospitals may face increased patient volumes due to weather-related injuries and illnesses.

Additionally, the 2024 State of Rhode Island HMP describes impacts on critical facilities and infrastructure:

- **Power Outages**: Severe winter storms can cause power outages by bringing down power lines, causing ice accumulation on electrical infrastructure, or overloading the electrical grid due to increased demand for heating. Critical facilities such as hospitals, emergency response centers, and data centers may rely on backup generators to maintain essential operations during outages.
- **Communication Disruptions**: Ice and freezing rain can damage communication infrastructure, including cell towers, telephone lines, and data centers, leading to disruptions in phone and internet services. This can hinder emergency communication and coordination, affecting critical response efforts.
- **Transportation Disruptions**: Snow and ice accumulation on roads, runways, and railways can disrupt transportation networks, leading to travel delays, accidents, and closures. Critical facilities may face challenges in receiving essential supplies and personnel during and after the storm.
- **Healthcare System Strain**: Hospitals and healthcare facilities may experience increased demand for medical services due to storm-related injuries and illnesses, including those related to slips and falls, traffic accidents, and cold exposure.
- **Water Supply Interruptions**: Freezing temperatures can cause water pipes to burst, leading to water supply interruptions and damage to water infrastructure. Critical facilities such as hospitals and emergency response centers rely on a continuous supply of clean water for various purposes, including patient care and firefighting.
- **Wastewater Systems**: Cold temperatures can affect wastewater treatment plants, leading to potential operational disruptions and contamination risks.
- **Fuel Supply Disruptions**: Snow and ice can disrupt fuel supply chains, leading to shortages of gasoline, diesel, and heating oil. Critical facilities may rely on fuel for backup power generators and heating systems.
- **Property Damage**: Severe winter storms can result in property damage, including roof collapses due to heavy snow accumulation, ice damming, and frozen pipes.

Past snow storms in Exeter and West Greenwich have caused vehicular accidents, power outages, and caused schools and businesses to shut down for multiple days.
</td></tr>
<tr><td>Ice Storm</td><td>In Exeter and West Greenwich, ice accumulation on trees leads to downed powerlines and loss of utilities and access to potable water from private wells. Icy roads can also cause dangerous driving conditions.</td></tr>
</table>

Table 28- Northeast Snowfall Impact Scale

Category	Description	Impacts
1	Notable	• Light to moderate snowfall. • Limited impacts on transportation and daily life. • Typically localized to small areas.
2	Significant	• Moderate to heavy snowfall. • Widespread impacts on transportation, including delays and disruptions.

Category	Description	Impacts
		• Some school and business closures. • Widespread power outages are rare.
3	Major	• Heavy snowfall, often exceeding one foot or more. • Significant transportation disruptions, including major highway closures. • Widespread school and business closures. • Power outages may occur, especially in areas with wet, heavy snow.
4	Crippling	• Extreme snowfall, often exceeding two feet or more. • Severe and prolonged transportation disruptions, including highway closures. • Widespread school and business closures for an extended period. • Widespread and prolonged power outages, especially in areas with ice accumulation.
5	Extreme	• Exceptional snowfall, often exceeding three feet or more. • Complete paralysis of transportation systems, including major highways and airports. • Extended school and business closures. • Widespread and prolonged power outages with significant damage to the electrical infrastructure.

Source: RIEMA 2024

3.3.5.7 Future Conditions

Snow Storm and Ice Storm	Nature of the hazard	The 2024 State of Rhode Island HMP states: *Climate change can lead to greater variability in precipitation patterns. In Rhode Island, this may result in more erratic and intense winter storms with periods of heavy snowfall followed by rain or freezing rain. These mixed precipitation events can make winter storms more challenging to predict and can lead to a greater risk of ice accumulation.* It is possible that the nature of Snow and Ice Storms could change in the future due to future climate conditions.
	Location	The 2024 State of Rhode Island HMP states: *Changes in atmospheric circulation patterns associated with climate change can influence the tracks of winter storms. This could lead to a shift in the amounts of heavy snowfall, ice, and other winter weather hazards in Rhode Island (RIEMA 2024).* It is possible that the location of Snow and Ice Storms could change in the future due to future climate conditions.

	Extent	The 2024 State of Rhode Island HMP states: *Rhode Island may experience milder winters as average temperatures rise due to climate change. While this could lead to a decrease in the frequency of traditional snowstorms, it may also increase the likelihood of winter storms that produce mixed precipitation, including freezing rain and sleet. Warmer temperatures can lead to a higher snowfall threshold, meaning that storms that would have produced snow in the past may now bring more rain or a mix of precipitation types. This can affect the accumulation of snow in the state.* *Changes in atmospheric circulation patterns associated with climate change can influence the tracks of winter storms. This could lead to a shift in the amounts of heavy snowfall, ice, and other winter weather hazards in Rhode Island* (RIEMA 2024). It is possible that the extent of Snow and Ice Storms could change in the future due to future climate conditions.
	Impact	Future climate conditions will likely increase impacts to the Towns of Exeter and West Greenwich from snow storm events. Higher temperatures allow the atmosphere to hold more water, which creates more precipitation and makes it more likely to fall quickly. This influence will likely cause more snow to fall in shorter periods of time, leading to road and travel hazards, increased snow loads, and the potential for snow-related injuries from shoveling more amounts of snow.
	Probability of Future Events	The 2024 State of Rhode Island HMP states: *Rhode Island may experience milder winters as average temperatures rise due to climate change. While this could lead to a decrease in the frequency of traditional snowstorms, it may also increase the likelihood of winter storms that produce mixed precipitation, including freezing rain and sleet. Warmer temperatures can lead to a higher snowfall threshold, meaning that storms that would have produced snow in the past may now bring more rain or a mix of precipitation types. This can affect the accumulation of snow in the state.* *Changes in atmospheric circulation patterns associated with climate change can influence the tracks of winter storms. This could lead to a shift in the amounts of heavy snowfall, ice, and other winter weather hazards in Rhode Island* (RIEMA 2024). The frequency of extreme snowstorms in the eastern two-thirds of the contiguous United States has increased over the past century (NCEI 2016). It is possible that the frequency of Snow and Ice Storms could change in the future due to future climate conditions.
	Changes in Population Patterns	It is possible that future snow storms or ice storms will influence changes in population patterns in Exeter and West Greenwich. Increased severe weather events could impact the reliability of power systems resulting in residents relocating to areas with more reliable power systems. Additionally, an increase in population would likely have similar impacts as land use development increases.
	Changes in Land Use Development	It is possible that future snow storms or ice storms will cause changes in land use development in Exeter and West Greenwich. As the extent and probability of future events is projected increase, new areas of the Town are likely to need to be reserved for snow plow storage areas. Increased snow and ice storm events will influence future land use development

		through transportation planning with an increased focus on maintaining and improving roadways and transportation systems to withstand snow and ice storms may shape land use decisions, utility planning as an increased frequency of snow and ice storms may prompt utilities to upgrade their infrastructure, such as burying power lines or using more robust materials, influencing land use decisions and potentially increasing costs for new developments, and overall infrastructure resilience as areas prone to ice storms may require infrastructure designed to withstand snow/ice accumulation. This could lead to stricter building codes and standards for roofs, power lines, and other structures, encouraging designs that reduce vulnerability.

3.3.6 Brushfire/Wildfire

The HMPCs are particularly concerned about Wildland-Urban Interface (WUI) and potential impacts to Town residents. The WUI is the zone of transition between unoccupied land and human development. It is the line, area or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels (USFA FEMA 2024).

3.3.6.1 Description

Brushfires/wildfires are fueled by natural cover (fuels), including native and non-native species of trees, brush and grasses, and crops along with weather conditions and topography. While available fuel, topography, and weather provide the conditions that allow fires to spread, most fires are caused by people through intentional or accidental misuse of fire.

Brushfires/wildfires pose serious threats to human safety and property in rural and suburban areas. They can destroy crops, timber resources, recreation areas, and habitat for wildlife. Brushfires/wildfires are commonly perceived as hazards in the western part of the country; however, brushfires/wildfires are a growing problem in the wildland/urban interface of the eastern United States, including Rhode Island.

Brushfires/wildfires are dependent upon the quantity and quality of available fuels. Fuel quantity is the mass per unit area. Fuel quality is determined by a number of factors, including fuel density, chemistry, and arrangement. Arrangement influences the availability of oxygen. Another important aspect of fuel quality is the total surface exposed to heat and air. Fuels with large area-to-volume ratios, such as grasses, leaves, bark, and twigs are easily ignited when dry.

Climatic and meteorological conditions that influence brushfires/wildfires include solar insulation, atmospheric humidity, and precipitation, all of which determine the moisture content of wood and leaf litter. Dry spells, heat, low humidity, and wind increase the susceptibility of vegetation to fire. In Rhode Island, common factors leading to large fires include short-term drought, humidity below 20%, and fuel type.

Various natural and human agents can be responsible for igniting brushfires/wildfires. Natural agents include lightning, sparks generated by rocks rolling down a slope, friction produced by branches rubbing together in the wind, and spontaneous combustion.

Human-caused brushfires/wildfires are typically worse than those caused by natural agents. Arson and accidental fires usually start along roads, trails, streams, or at dwellings that are generally on lower slopes or bottoms of hills and valleys. Nurtured by updrafts, these fires can spread quickly uphill. Arson fires are often set deliberately at times when factors such as wind, temperature, and dryness contribute to the fire's spread.

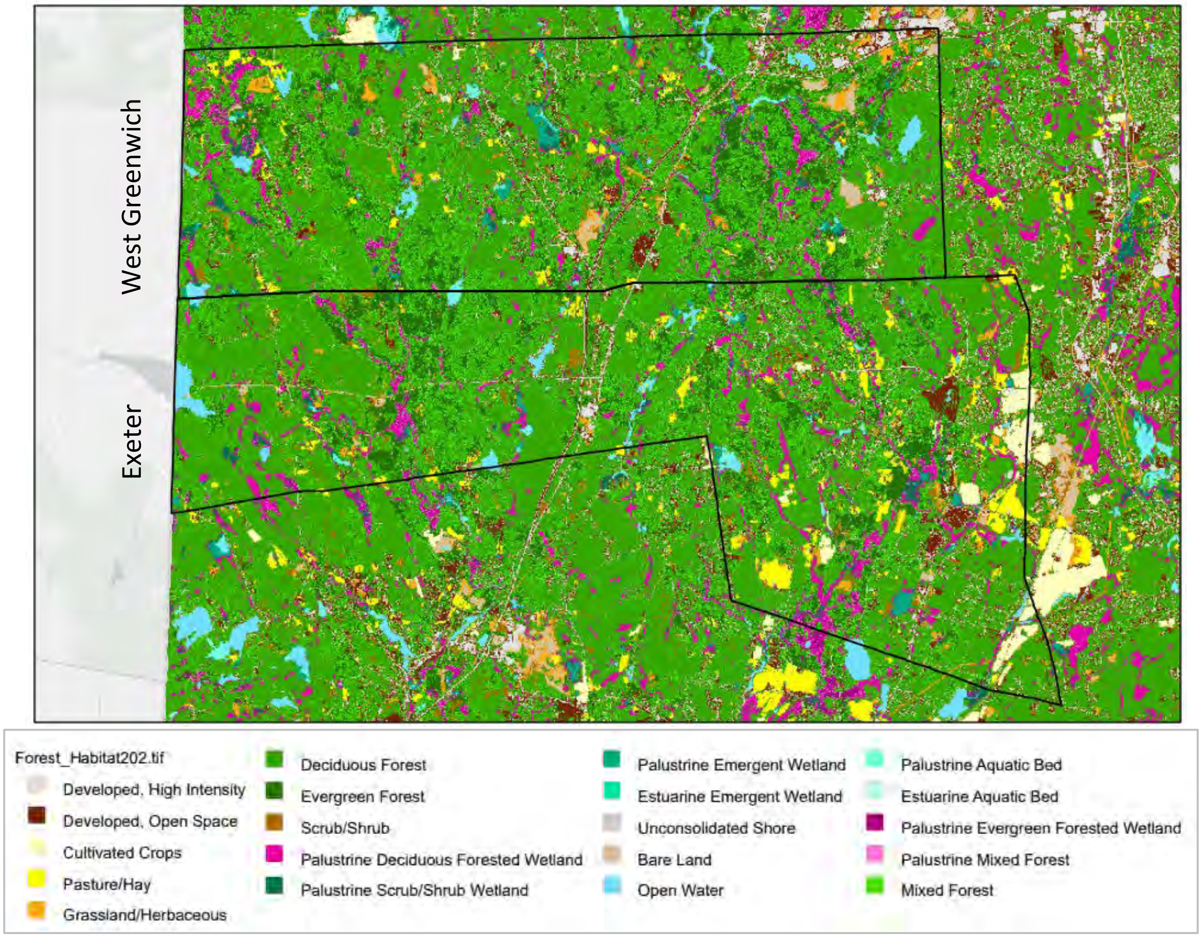
3.3.6.2 Location

The forested areas of Exeter and West Greenwich are at the highest risk of fire (Figure 28).

Figure 27- Red Flag Warning for Rhode Island

Areas with downed and dead trees are more susceptible to catching fire. Invasive species, such as the spongy (gypsy) moth caterpillar, are present in Exeter and West Greenwich, which have damaged forests in much of New England. They hatch in May and pupate in late June. In that short time span, the caterpillar feeds on the leaves of deciduous trees. Beginning in 2016, they caused noticeable change in the Northeastern United States.

A Red Flag Warning is issued when warm temperatures, very low humidities, and stronger winds are expected to combine to produce an increased risk of fire danger. Red flag warnings are common in Rhode Island.



Source: RIGIS 2024- Forest Habitat (2020)

Figure 28- Forested Areas in Exeter and West Greenwich

3.3.6.3 History

Figure 29 shows historical fires in and surrounding Exeter and West Greenwich.

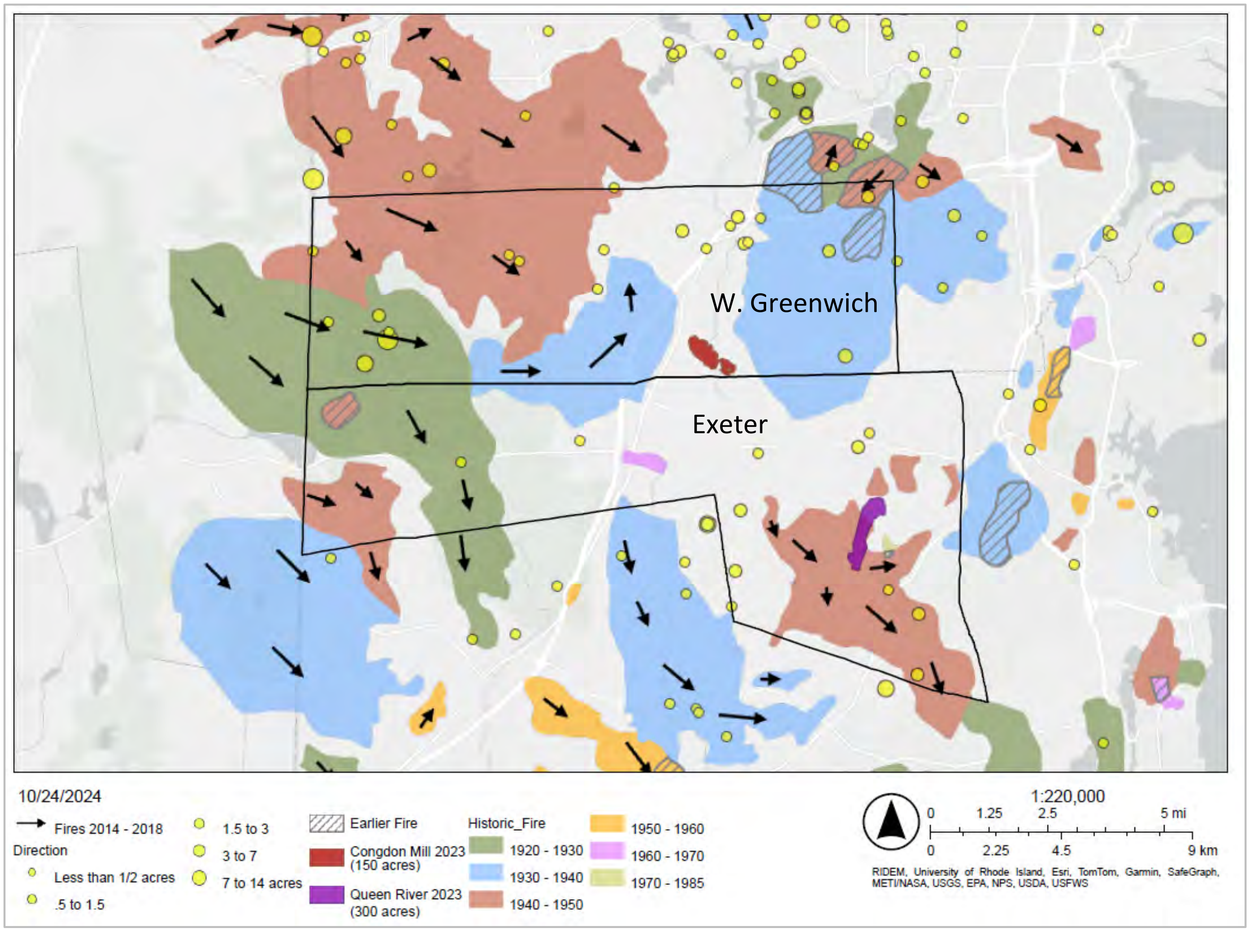


Figure 29- Locations of Historic Brushfires/Wildfires in Exeter and West Greenwich

Historically, one to two acres of land per year, on average, have been subject to fires per year. Below is a list of notable historic fires in Rhode Island.

- The great fire of 1907 swept down from the northwest and burned the Acid Creek Factory Buildings to the ground.
- The Coventry fire of 1941 consumed 18,000 acres of forest.
- A wildfire in Exeter in 1951 consumed 5,000 acres.
- In 1974, 300 acres along the Exeter-North Kingstown line burned.
- In 1975, 500 acres along Slocum Road burned.
- In 1985, 200 acres along Sunderland Road burned and 75 acres at the Ladd Center burned.

While not a brushfire/wildfire, the following urban fires are notable in Rhode Island history.

- The most devastating urban fire, in terms of loss of life, took place in West Warwick in 2003, when the Station Nightclub caught fire during a performance involving pyrotechnics. 100 people were killed and 230 were injured.
- A fire in an empty mill complex in Pawtucket, fed by gale force winds, spread to 17 homes in the nearby area.

Forest fires have long been a constant threat to the area based on the lumber industry (Images of America-West Greenwich 2011). Historical fires have been described as "*coming on a line through the woods and if a house happened to be along the road or in a field, and it caught fire, there was no way to stop it. Several houses just burned to the ground. Over the years, there were instances where fires burned from Coventry and West Greenwich all the way to Narragansett in the 1900s and turned around and came all the way back again. The wind would change the course of the fires."* – A Stitch in Time: A Historical Sampler of Exeter and West Greenwich by the Talented and Gifted Program of Metcalf School (1989).

In 1933, a fire tower was built on Rattlesnake Ledge in the Wickaboxet Management Area in West Greenwich (Images of America- West Greenwich 2011). Figure 30 shows Frank Sprague climbing the tower in 1936.

Source: Images of America- West Greenwich (2011), Photo Credit: Burton Andrews III

Figure 30- Fire Tower in the Wickaboxet Management Area in West Greenwich (1936)

The original fire tower was dismantled by a group of volunteers and re-erected at the West Greenwich Volunteer Fire Company No. 1 station (Images of America- West Greenwich 2011). The fire company was created in 1945 and Figure 31 shows the original two-bay station.

Source: Images of America- West Greenwich (2011), Photo Credit: West Greenwich Historical Preservation Society

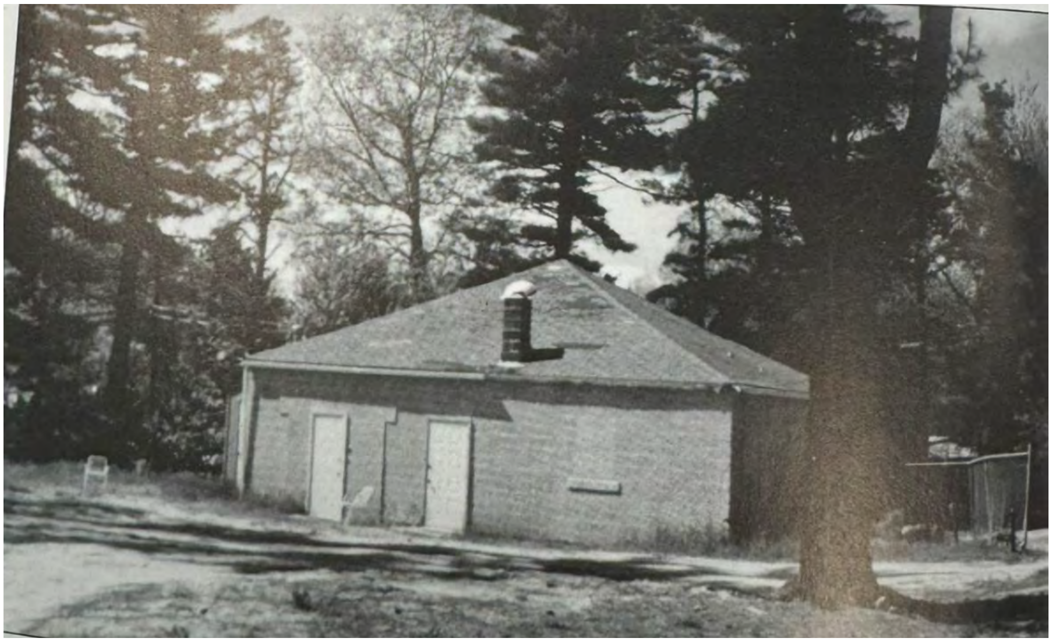
Figure 31- Fire Tower in the Wickaboxet Management Area in West Greenwich (1936)

The Hianloland Fire Company, the first fire company in West Greenwich, was started by the Louttit family to serve Hianloland Farms and the Town (Images of America- West Greenwich 2011). It incorporated in 1940 and built a station in 1953. Robert Bonner, engineer of the Hianloland Farms Fire Engine Company, also has his own one-man unit, shown in Figure 32.

Source: Images of America- West Greenwich (2011), Photo Credit: West Greenwich Historical Preservation Society

Figure 32- Hianloland Farms Fire Engine Company in West Greenwich (1940s)

Figure 33 shows the old fire station of the Lake Mishnock Volunteer Fire Company which was founded in 1951.



Source: Images of America- West Greenwich (2011), Photo Credit: West Greenwich Historical Preservation Society

Figure 33- Old Mishnock Fire Station (1950s)

A book titled *In the Shadow of the Trees* was published in 2003 by the Pawtuxet Valley Preservation and Historical Society. This book documents historical information on the Town of West Greenwich, including historical hazard events and impacts. Historical fires and impacts are described below:

- **1896**: Recorded in the Providence Journal- the fire took place in Mishnock area, burning 7 square miles of woodland.
- **1907**: A fire destroyed several sawmills and an acid factory.
- **July 1908**: A fire started in same general area of the 1896 fire, in the woods east of Mishnock Pond. Winds swept the fire northwest towards the villages of Crompton and Washington. The fire was 2.5 miles long and 1 mile wide. It destroyed timber, hay and other crops, and a sawmill owned by Will Rathburn that contained 150,000-175,000 board feet of lumber. Over 100 firefighters attempted to contain the fire to the Mishnock- Burton's Corner section of the Town. Due to the 1896 fire, fuel was less abundant and flammable than areas containing large stands of mature timber and forest litter. Damages were assessed at $5,000 (valued at ~175k in 2025), but woodland could be purchased for $5/acre at this time.
- **April 1942**: A fire labeled as the "biggest fire in the history of Southern NE" spread from West Greenwich into Coventry and parts of Foster. Conditions were perfect for a major fire- extremely dry forests, no rain for several days, trees and brush had not leafed out. High winds out of the NW, caused firefighters and equipment to become worn out due to fighting smaller, sporadic fires in the previous weeks. The fire began as seven smaller fires started along Route 117. The West Greenwich Fire Chief called for state aid. The wind never died down, and switched from NW to SW on May 2nd, causing a new series of fires to break out. Rain began to fall May 4th, but 14,300 acres of merchantable timber had been destroyed and another 5,000 acres of non-merchantable (under 4-inch diameter) timber had been destroyed. Damages were assessed at $72,410 in woodland and $500,000 in lumber and buildings. 24,510 acres were burned. A resident was tried and found guilty of causing the fire.
- **Spring 1951**: A fire known as the "Wood River Fire", started by high winds picking up embers of a

local resident burning trash outdoors (Similar conditions as 1942 fire). Ignited trash was blown to Liberty or Wilcox Road, where it burned S/SE towards the Town of Exeter. This was the first major fire fought by West Greenwich's recently formed Fire Company #1. It burned across Route 165 at a rate of 60mph, hot enough to level guardrails and highway signage. The fire burned along the natural trough of the Wood River before being contained at the shores of Locustville Pond in Hope Valley. The fire burned thousands of acres in West Greenwich, Exeter, and Richmond in a few hours.

2023 West Greenwich Fire aka Congdon Mill Road Fire

The West Greenwich Brushfire aka Congdon Mill Road Fire occurred from April 12-14, 2023, and marked a significant and unprecedented event in the state's history. After more than five decades without a major wildfire, Rhode Island faced an immense challenge due to the brushfire's size, complexity, and the multiple contributing factors.

On Wednesday, April 12th, at 12:51 pm, the Exeter Fire Department received a dispatch for a reported brush fire on Falcon Ridge Rd in Exeter.

The day began with heightened fire danger warnings due to a combination of factors, including drought conditions, unseasonably high temperatures for the time of year, and strong winds. These conditions had already led to a series of brush fires across southern Rhode Island.

At the time of the dispatch, West Greenwich firefighters were already engaged in battling another fire on Division Road, further highlighting the severity of the situation. Upon arrival at Falcon Ridge Rd, Exeter firefighters quickly realized that the reported fire was not located on Falcon Ridge Road itself but was instead across the street in the Big River Reservoir area in West Greenwich (RIEMA 2023a).

West Greenwich fire companies, upon clearing the Division Road fire, swiftly redirected their efforts and responded to Congdon Mill Road, where they joined forces with Exeter to confront and control the rapidly spreading brushfire. It took an intensive collaborative effort spanning three days to contain the brushfire and until April 27th to declare the fire under control, demonstrating the resilience and determination of the firefighting teams involved in managing this challenging event (RIEMA 2023a).

The recipe for disaster was brewing as Rhode Island experienced drought conditions, unseasonably warm temperatures, and strong winds. The National Weather Service issued "Red Flag Warnings" for that day and the days leading up to the event, forewarning of dangerous fire conditions. The forests in the region had also been impacted by tree die-offs due to insect infestations, including Spongy Moth which significantly increased the available fuel for the fire.

The brushfire marked the first time in Rhode Island's history that the Rhode Island National Guard deployed helicopters equipped with "Bambi buckets" to support firefighting efforts through aerial attacks. This proved to be effective in helping contain the fire and limiting its spread. This brushfire was of an extraordinary scale and complexity for Rhode Island. It quickly became a complex event, requiring the coordinated efforts of over 45 fire departments and resources from four states: Rhode Island, Connecticut, Massachusetts, and Maine.

Table 29- 2023 West Greenwich Fire Incident Participants

Local		
Ashaway Fire Department	Lake Mishnock Fire Department	South Kingstown (Union) Fire Department
Barnstable County Forest Fire Division	Lincoln Fire Department	Sterling Fire Department
Charlestown Fire Department	Middletown Fire Department	Uxbridge Fire Department
Chepachet Fire Department	Millville Fire Department	Voluntown Fire Department
Chopmist Hill Fire Department	Misquamicut Fire Department	Watch Hill Fire Department
Dunns Corners Fire Department	North Kingstown Fire Department	West Glocester Department
Exeter 1 Fire Department	North Smithfield Fire Department	Westerly Fire Department
Exeter 2 Fire Department	North Stonington Fire Department	Western Coventry Fire Department
Harmony Fire Department	Oakland Mapleville Fire Department	West Greenwich Emergency Management Agency
Harrisville Fire Department	Pascoag Fire Department	West Greenwich Emergency Medica Services
Hianloland Fire Department	Plainfield Fire Department	West Greenwich Police Department
Hope Jackson Fire Department	Plainville Fire Department	West Greenwich Public Works Department
Hope Valley Wyoming Fire Department	Potterville Fire Department	Wrentham Fire Department
Jamestown Fire Department	Richmond Carolina Fire Department	
Kingston Fire Department	Smithfield Fire Department	

State		
Connecticut Environmental Protection and Natural Resources (Forestry Firefighting Division)	Rhode Island Department of Environmental Management (Forestry Firefighting Division)	Rhode Island National Guard
Maine Agriculture, Conservation & Forestry (Forestry Firefighting Division)	Rhode Island Department of Environmental Management Law Enforcement	Rhode Island State Police
Rhode Island Department of Environmental Management Agriculture	Rhode Island Emergency Management Agency	Rhode Island National Guard

Dispatch			
Metro-Control	Northern-Control	Southern-Control	West Greenwich Police Dispatch

Source: RIEMA 2023a- West Greenwich Brushfire aka Congdon Mill Road Fire After-Action Report/Improvement Plan

This event did not result in a disaster declaration. The images below show the extent and response of this fire.

Source: NBC News 10 (2023)

Figure 34- Aerial Image of West Greenwich Fire (2023)

Source: RIEMA 2023a

Figure 35- West Greenwich Fire (2023)

Source: Rhode Island Current (2023)

Figure 36- RI National Guard Utilizing Bambi Buckets- West Greenwich Fire (2023)

Source: RIEMA 2023a

Figure 37- Interagency Response Efforts- West Greenwich Fire (2023)

<u>2023 Exeter Brushfire aka Queen River Preserve Fire</u>

The 2023 Exeter Brushfire aka Queen River Preserve Fire occurred from April 14-16, 2023. The fire occurred just two days after the West Greenwich brushfire, which was the first major brushfire in the state since the 1950s. This created both benefits and challenges as that fire brought resources into the state and provided a more rapid response to this incident, but it also created shortfalls in needed resources such as wildland forestry hose. "Red Flag" warnings were already ordered by the National Weather Service that morning. This brushfire was driven by strong winds, leading to rapid expansion to the north, south, and west, threatening homes and property, and involving multiple emergency response agencies and personnel.

On Friday, April 14th, at 12:31 pm, Exeter Fire Department received a dispatch for a reported brush fire on the property of the Queen's River Preserve. The Exeter 1 Fire Chief was first on scene and was met with a rapidly developing fire that was driven by gusty winds and dry conditions. The fire proceeded to move at significant speed and started to turn into a fire storm. A decision was made to create a fire break (RIEMA 2023b).

Exeter Fire Chief 2 arrived and was given command and he quickly divided the fire into divisions for better manageability. This fire would quickly spread and required a Herculean effort before it would be controlled and extinguished.

This brushfire was of an extraordinary scale and complexity as it consumed approximately 300 acres of Rhode Island Forest (Figure 41) in an area covering over 576 acres. It quickly became a major event, requiring the coordinated efforts of over 54 fire departments and 19 other agencies from four states: Rhode Island, Connecticut, Massachusetts, and Maine. Over 425 personnel responded with 24 fire engines, 45 Tankers, 18 Brush Trucks, 12 UTVs, 3 Bulldozers, 2 Helicopters, 2 Drones, 10 Chief's vehicles, and a mobile command. Many other resources were utilized to support the operation (RIEMA 2023b).

Due to the direct efforts and defensive actions of the firefighters, no homes were lost. They protected 30 homes that were threatened by the fire. Only a small hunting cabin was lost. This fire was notable as it was the first brushfire that required both human and livestock evacuation in modern Rhode Island history. Additionally, 200 homes were evacuated, including about 30 farms (RIEMA 2023b).

Authorities believe that the fire started at a campsite inside the Queen's River Preserve.

Table 30- 2023 Exeter Fire Incident Participants

Rhode Island Local		
Ashaway Fire Department	Hianloland Fire Department	Potterville Fire Department
Charlestown Fire Department	Hope Jackson Fire Department	Quonset Airport Fire Department
Chepachet Fire Department	Hope Valley Wyoming Fire Department	Richmond Carolina Fire Department
Chopmist Hill Fire Department	Hopkins Hill Fire Department	Scituate Fire Department
Coventry Fire Department	Jamestown Fire Department	South Kingstown (Union) Fire Department
Dunns Corners Fire Department	Kingston Fire Department	Warwick Fire Department
East Greenwich Fire Department	Lake Mishnock Fire Department	Watch Hill Fire Department
Exeter EMA	Little Compton Fire Department	West Greenwich Fire Department 1
Exeter 1 Fire Department	Narragansett Fire Department	West Kingston Fire Department
Exeter 2 Fire Department	North Kingstown Fire Department	Western Coventry Fire Department
Exeter Rescue	Pascoag Fire Department	Westerly Fire Department
Foster Center Fire Department	Portsmouth Fire Department	

Connecticut Local		
Avon Fire Department	Lyme Fire Department	Quimbaug Fire Department
Burlington Fire Department	Mystic Fire Department	Simsbury Fire Department
Canton Fire Department	North Stonington Fire Department	Tunxis Hose Co. 1
Clinton Fire Department	Old Lyme Fire Department	Voluntown Fire Department
Franklin Fire Department	Pawcatuck Fire Department	Wequetock Fire Department
Gales Ferry Fire Department	Plainfield Fire Department	Westbrook Fire Department
Griswold Fire Department	Preston City Fire Department	

State		
Connecticut Environmental Protection and Natural Resources (Forestry Firefighting Division)	Rhode Island Department of Environmental Management (Forestry Firefighting Division)	Rhode Island National Guard
Maine Agriculture, Conservation & Forestry (Forestry Firefighting Division)	Rhode Island Department of Environmental Management Law Enforcement	Rhode Island State Police
Massachusetts Forestry Department	Rhode Island Emergency Management Agency	Rhode Island State Marshall
Rhode Island Department of Environmental Management Agriculture	Rhode Island Fire Academy	Rhode Island National Guard

Dispatch			
Metro-Control	Northern-Control	Southern-Control	Exeter Dispatch

Private and Non-Profit Organizations			
Benn Water Transport	RI Medical Reserve Corp	Rhode Island Red Cross	Special Signal Association

Source: RIEMA 2023b- Exeter Brushfire a.k.a. Queens River Preserve Fire After-Action Report/Improvement Plan

Source: RIEMA 2023b

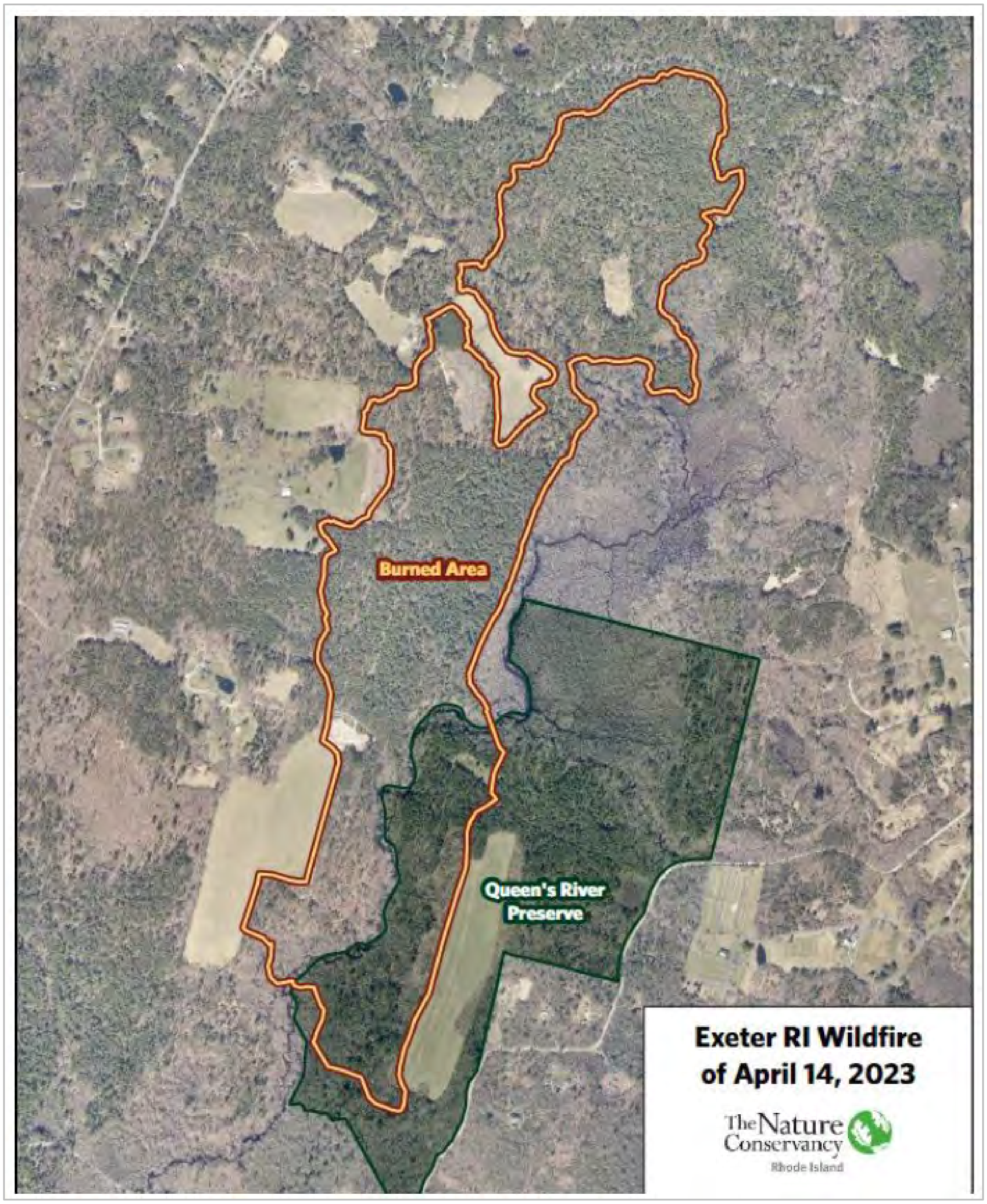
Figure 38- Aerial Image of Exeter Fire (2023)

Source: ABC 15 News (2023)

Figure 39**- RI National Guard Utilizing Bambi Buckets- Exeter Fire (2023)**

Source: Providence Journal (2023)

Figure 40- Charred Undergrowth at Queen's River Preserve- Exeter Fire (2023)



Source: RIEMA 2023b

Figure 41- Overview Map of Exeter Fire (2023)

THE STANDARD TIMES

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THE STANDARD TIMES THURSDAY • APRIL 20, 2023

Wildfire engulfs Exeter

Clockwise from top: National Guard Black Hawk helicopter drops buckets of water onto the fire; Fire apparatus from as far away as Connecticut, line Purgatory road and William Reynolds road on Friday to assist with fire fighting efforts; Smoke seen from South Country Trail in Exeter around 3pm on Friday; Police go door to door to notify residents of the evacuation orders.

PHOTOS BY LAURA PATON

Brush fire burns hundreds of acres in Exeter forest

By LINDSAY OLIVER AND KATRINA THORNLEY
Contributing Writers

EXETER – Last Friday the town of Exeter experienced one of the biggest brush fires to date, ultimately burning hundreds of acres.

The call came in by one of Exeter Volunteer Fire Department's own, Chief Scott Gavitt. His wife alerted him to the smell of smoke outside their School Landwoods Road home. Upon stepping outside he too could smell it and contacted dispatch at 12:30 p.m. letting them know there was a brush fire in the area and he would be investigating. Gavitt observed smoke coming from the Queen's River Conservatory. He was able to gain access to the area and observed the fire about the size of four to five acres.

"When I came upon it was small in size but was growing fast and we needed to get apparatuses out there quick," said Gavitt.

The only fire hydrants in town are located at the former Ladd Center and with the help of other department's tankers, including Exeter's own, they were able to fill up using the hydrants. Black Hawk helicopters were called in to help and they utilized the pond at the Exeter Country Club to fill up the buckets.

As of Tuesday, data is still being collected by the Rhode Island State Fire Marshal's office but it seems that over 50 departments and hundreds of fire personnel from around the state and bordering states helped in the fight. The fire was deemed "under control" 24 hours later. However, crews were still putting out hotspots throughout the weekend.

An evacuation order was put into place for residents on William Reynolds and Purgatory Roads with an emergency shelter being opened at the Exeter Public Library. Eleven residents utilized the shelter. Gavitt was notified that his home was being threatened by the fire which sent a wave of concern over him.

"My backyard abuts the field where the main fire was and it was starting to threaten my property and that's when I got scared because at this time the fire was out of control and the wind was taking it in many directions. But the crews held

See FIRE, page A2

Earth Day events planned in North Kingstown

By ROBERT FORD
Contributing Writer

According to Rhode Island's DEM, every day should be Earth Day. Officials said, "Since its inception in 1970, Earth Day has served as a yearly catalyst for ongoing environmental education, action, and change. Each year, Earth Day serves as a reminder of the value of our state's precious natural resources. It helps mark the progress made by Rhode Island in protecting them – from beautiful Narragansett Bay to our local waters and green spaces to the air we breathe. While we have cleaned up many large sources of pollution, today many small amounts of pollution come from things like failing septic systems, runoff from large parking lots, and exhaust from thousands of tailpipes. Taken together, these seemingly small sources of pollution scattered across the state

See EVENTS, page A2

Source: The Standard Times Newspaper, April 20, 2023

Figure 42- Local Newspaper Article on the 2023 Exeter Fire

Since the 2005 HMPs, there have been two (2) severe brushfires/wildfires in Exeter and West Greenwich, described above. The Exeter fire resulted in a disaster declaration, which is the only brushfire disaster declaration in Rhode Island's history.

Table 31- State of Rhode Island Presidentially Declared Disasters Relating to Brushfires/wildfires

Designation	Incident Period	Declaration Date	Incident Type
FM-5464-RI	04/14 – 04/16/2023	FMAG- 04/14/2023	Rhode Island Exeter Fire

Source: FEMA 2024

3.3.6.4 Extent

Prior to the 2023 fires in Exeter and West Greenwich, described below, Rhode Island had not had a significant brushfire in over 50 years. During those events, 150 acres in West Greenwich was burned and

300 acres in Exeter was burned. On average, roughly 5 acres are burned in Exeter and West Greenwich due to brushfires/wildfires in a year.

FEMA's National Risk Index states that Exeter and West Greenwich have the following planning significance related to brushfire:

Jurisdiction	Brushfire NRI	Brushfire EAL
Exeter	Relatively Low	Relatively Low
West Greenwich	Relatively Low	Relatively Low

Source: FEMA National Risk Index (www.hazards.fema.gov/nri/map)

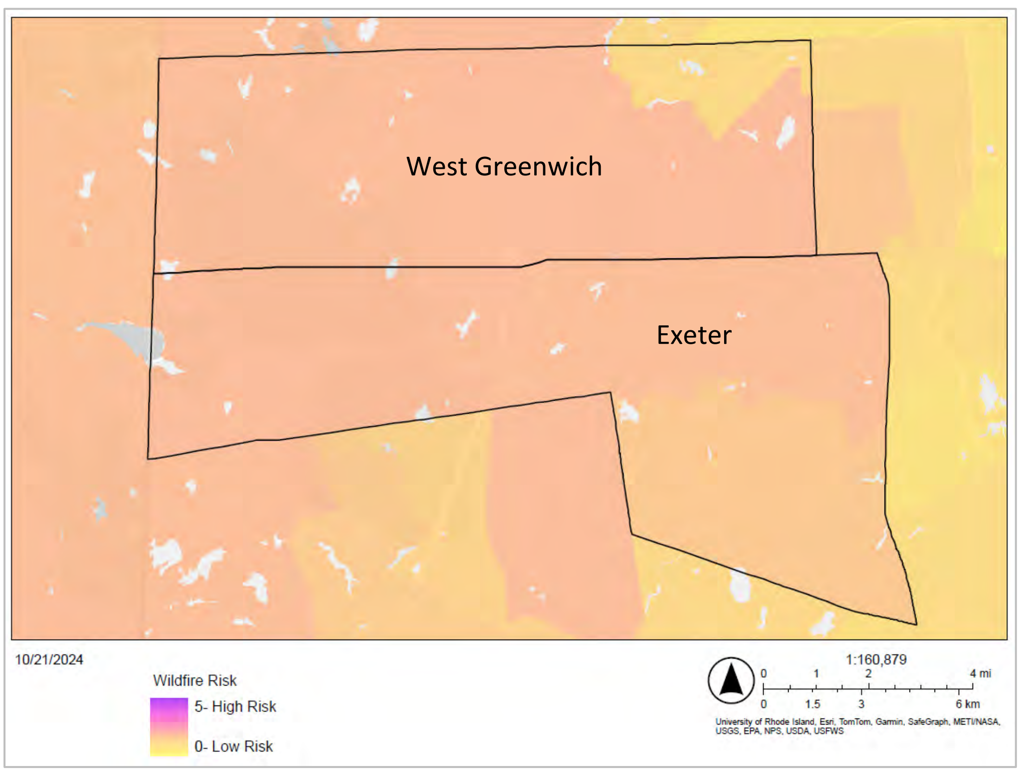
EAL: Expected Annual Loss

NRI: National Risk Index= (Expected Annual Loss x Social Vulnerability) ÷ Community Resilience

Based on the extent of past events and the criteria identified in Table 7, the extent of brushfires/wildfires in Exeter and West Greenwich are considered **Limited**, with potential for some injuries; short shutdown of some critical infrastructure and facilities; fewer than 10% of residential and commercial structures damaged; and a small number of local operations impacted for short amounts of time.

3.3.6.5 Probability of Future Occurrence

Figure 43 shows Exeter and West Greenwich's relative fire risk. Exeter's risk level varies from 0.40 (light orange- low risk) to 1.67 (peach- low risk). West Greenwich's risk level varies from 0.99 (gold- very low risk) to 1.66 (peach- low risk).



ArcGIS Layer: USA Brushfire Hazard Potential with Demographics

Figure 43- Exeter and West Greenwich Brushfire Risk

Based on previous occurrences and the criteria identified in Table 8, it is **Possible** that Exeter and West Greenwich will experience a brushfire event in the next year; there is between 1-49.9% annual probability of occurring.

3.3.6.6 Impact

Individual buildings and infrastructure may be more or less vulnerable to damage from brushfire based on factors such as the clear distance around the structure and the structure's construction materials. Loss of power due to damaged power lines and infrastructure may prevent access to potable water from private wells. Brushfire primarily impacts timber and forest ecosystems, although the threat to nearby buildings is always present. Farmland and animals may also be affected.

Additionally, fires require essential resources, like a fire department, to put out, which can be costly for a community.

In the 2023 West Greenwich fire, no residents, homes, or structures were damaged, but over 150 acres were burned.

In the 2023 Exeter fire, due to the direct efforts and defensive actions of the firefighters, no homes were lost and there were no fatalities. Two hundred (200) homes and 30 farms were evacuated, and only a small hunting cabin was lost (RIEMA 2023b). This fire required assistance and coordination from numerous local, out-of-state, and federal agencies. FEMA reports that total public assistance funding obligated was over $300,000.

Additionally, residents in Exeter and West Greenwich without technology were unaware of the severity of the situation and therefore often refused to leave their homes despite the threat level (RIIB MRP 2024).

3.3.6.7 Future Conditions

<table>
<tr><td>Nature of the hazard</td><td>Future climate conditions are not likely to influence the nature of future brushfires/wildfires in Exeter and West Greenwich.</td></tr>
<tr><td>Location</td><td>Future climate conditions are not likely to influence the location of future brushfires/wildfires in Exeter and West Greenwich. The entire Planning Area is susceptible to impacts from brushfires/wildfires.</td></tr>
<tr><td>Extent</td><td>Table 32 and Table 33 shows Exeter and West Greenwich's historical and future projections for brushfires/wildfires by estimating the Town's Fire Weather Index (FWI). The FWI estimates weather-related brushfire danger using daily readings of weather conditions that influence the spread of brushfires/wildfires, including the dryness of fuel sources and high winds. Higher FWI values represent greater danger of brushfires/wildfires due to weather conditions; the index does not account for land cover or potential ignition sources. FWI values signal different levels of relative fire danger across regions. Values above 25 typically represent a high level of danger in the northern regions.

Table 32- ClimRR Climate Projection Report- Brushfire (Exeter)
<table>
<tr><th>Wildfire</th><th>Historical</th><th>Mid-Century</th><th>End-of-Century</th></tr>
<tr><td>ANNUAL</td><td></td><td></td><td></td></tr>
<tr><td>Fire Weather Index</td><td>8.61</td><td>8.31</td><td>8.28</td></tr>
<tr><td>Fire Weather Index Class</td><td>Low</td><td>Low</td><td>Medium</td></tr>
</table>
</td></tr>
</table>

AUTUMN			
Fire Weather Index	7.95	8.93	8.19
Fire Weather Index Class	Low	Medium	Low
WINTER			
Fire Weather Index	0.91	0.82	1.43
Fire Weather Index Class	Low	Low	Low
SPRING			
Fire Weather Index	7.53	7.08	7.57
Fire Weather Index Class	Low	Low	Low
SUMMER			
Fire Weather Index	8.31	7.75	8.13
Fire Weather Index Class	Medium	Low	Medium

Source: Climate Risk and Resilience Portal (ClimRR) 2024

Relative Fire Danger: FWI classes show fire weather-related danger relative to nationwide patterns and are based on 95th percentile FWI values. Exeter's historical FWI class is Low and its mid-century RCP8.5 class is Low. By end-of-century, the FWI class will be **Medium**.

It is possible that future climate conditions will influence the extent of future brushfires/wildfires in Exeter.

Table 33- ClimRR Climate Projection Report- Brushfire (W. Greenwich)

Wildfire	Historical	Mid-Century	End-of-Century
ANNUAL			
Fire Weather Index	8.6	8.53	8.71
Fire Weather Index Class	Low	Low	Medium
AUTUMN			
Fire Weather Index	7.99	9.02	8.72
Fire Weather Index Class	Low	Medium	Low
WINTER			
Fire Weather Index	0.81	0.74	1.33
Fire Weather Index Class	Low	Low	Low

SPRING			
Fire Weather Index	7.63	7.38	7.79
Fire Weather Index Class	Low	Low	Low
SUMMER			
Fire Weather Index	8.88	8.32	8.81
Fire Weather Index Class	Medium	Low	Medium

Source: Climate Risk and Resilience Portal (ClimRR) 2024

Relative Fire Danger: FWI classes show fire weather-related danger relative to nationwide patterns and are based on 95th percentile FWI values. West Greenwich's historical FWI class is Low and its mid-century RCP8.5 class is Low. By end-of-century, the FWI class will be **Medium**.

It is possible that future climate conditions will influence the extent of future brushfires/wildfires in West Greenwich.

Impact	As Exeter and West Greenwich's overall fire danger is projected to increase, potential impacts to the community will increase. These impacts are likely to include damage to critical facilities/ infrastructure, historical facilities, homes, and the overall safety of Town residents.
Probability of Future Events	Future climate conditions are likely to increase the probability of future brushfires/wildfires in Exeter and West Greenwich as changes in climate create warmer, drier conditions, leading to longer and more active fire seasons. Changes in precipitation patterns may shorten the dry periods that produce ideal conditions for brushfires/wildfires. However, periods of drought may be more intense, increasing the fire hazard during the summer. As snow melt is occurring earlier than it has historically, coupled with hotter Spring and Summer seasons, once the sun hits the understory of a forest, leaves and debris dry out earlier. This creates more fuel for a fire and increases potential of a fire igniting.
Changes in Population Patterns	It is possible that future brushfires/wildfires are likely to cause changes in population patterns if portions of the Towns that historically were not affected by brushfires/wildfires become affected, causing relocation of homes and residents.
Changes in Land Use Development	It is possible that future brushfires/wildfires are likely to cause changes in land use development if portions of the Towns are burned due to a fire.

Increased brushfire events will influence future land use development through zoning regulations as areas prone to brushfires/wildfires may see stricter zoning laws that limit development in high-risk zones. This could include creating buffer zones and restricting certain types of construction, particularly in the wildland-urban interface. Future developments may need to adhere to enhanced building codes that require fire-resistant materials and designs. This can influence the types of materials used in construction and the overall architecture of buildings. Transportation and access routes may need to be designed with evacuation in mind, influencing road layouts and connectivity in fire-prone areas. This may also impact emergency response planning and accessibility for fire services. Older developments in fire-prone areas may require retrofitting to meet new standards, influencing both costs and the approach to land use in those areas. Additionally, an increase in population would likely have similar impacts as land use development increases.

3.3.7 Drought

3.3.7.1 Description

Drought is characterized as a continuous period of time in which rainfall is significantly below normal for a particular area over a multi-year period. The American Meteorology Society defines drought as a period of abnormally dry weather sufficiently long enough to cause a serious hydrological imbalance.

There are cases when drought develops relatively quickly and lasts a very short period of time, exacerbated by extreme heat and/or wind, and there are other cases when drought spans multiple years, or even decades (RIEMA 2024). While droughts typically cause very little structural damage, they can have profound economic, environmental, and social impacts.

There are four different ways that a drought can be categorized:

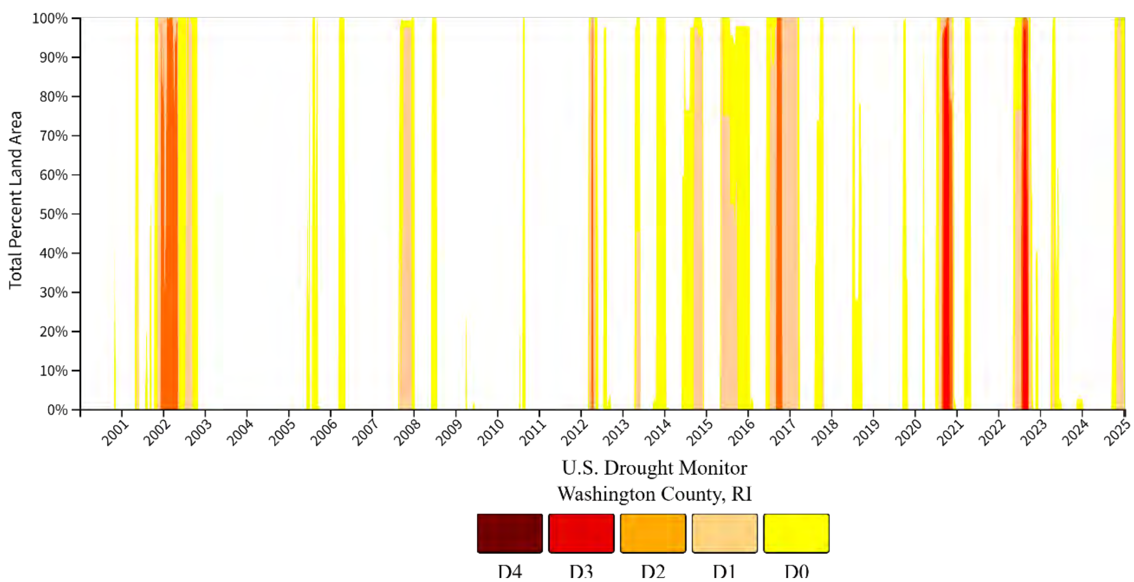
- Agricultural: When the amount of moisture in the soil no longer meets the needs of previously grown crops.
- Hydrological: When surface and subsurface water levels are significantly below their normal levels.
- Meteorological: When there is a significant departure from the normal levels of precipitation.
- Socio-Economic: When the water deficiency begins to significantly affect the population.

3.3.7.2 Location

All of Exeter and West Greenwich are susceptible to droughts.

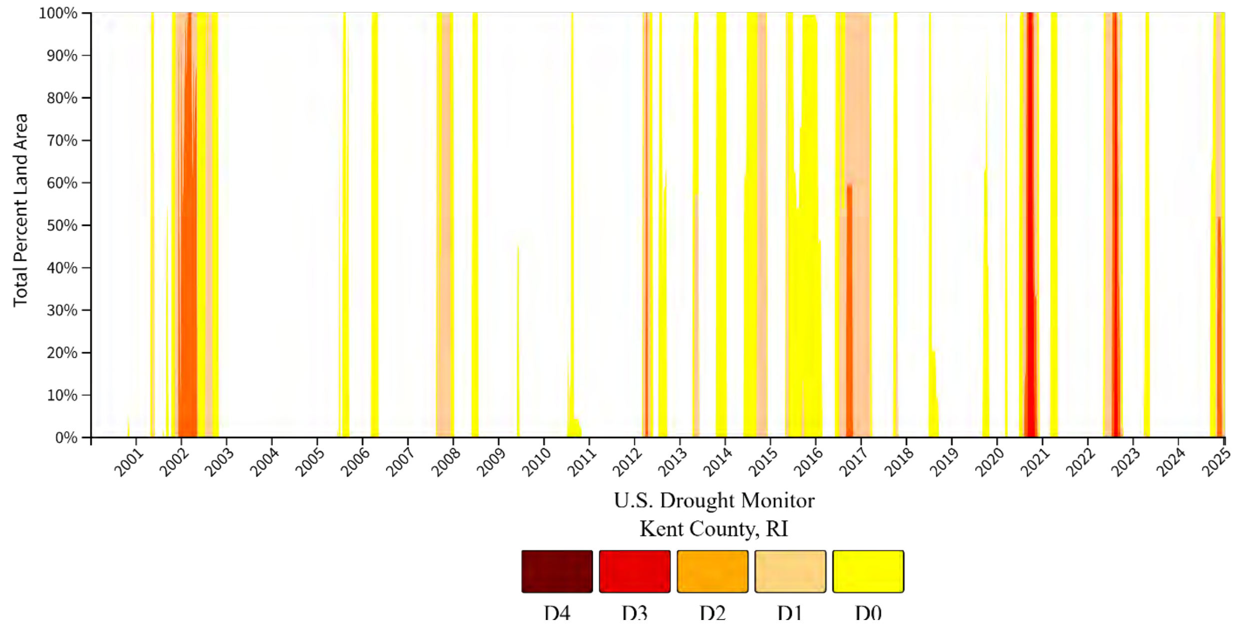
3.3.7.3 History

Figure 44 and Figure 45 show historical drought conditions for Washington County and Kent County, respectively, from 2000 through January 2025. Since the 2005 HMPs, Washington County and Kent County have been through periods of drought ranging from D0 (Abnormally Dry) to D3 (Extreme Drought).



Source: NOAA NIDIS 2024a

Figure 44- Historical Drought Conditions for Washington County (Exeter) (2000 – January 2025)



Source: NOAA NIDIS 2024b

Figure 45- Historical Drought Conditions for Kent County (W. Greenwich) (2000 – January 2025)

Table 34 further breaks down the weekly percentage that Washington and Kent Counties were in one of the USDM categories from 2000-2023.

Table 34- Weekly Percentage of Washington and Kent Counties in USDM Categories (2000-2023)

County	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Washington	73.4%	26.6%	12.2%	3.9%	0.9%	0.0%
Kent	74.7%	25.2%	11.7%	3.1%	0.8%	0.0%

Source: RIEMA 2024

Additionally, The Secretary of Agriculture is authorized to designate counties as disaster areas to make emergency loans available to producers suffering losses in those counties and in counties that are contiguous to a designated county. United States Department of Agriculture Secretarial disaster designations must be requested of the Secretary of Agriculture by a governor or the governor's authorized representative, and there is an expedited process for drought (RIEMA 2024).

Since 2012, there have been 3 Secretarial Drought Disaster Declarations issued for Washington and Kent Counties (2016, 2020, and 2022) (RIEMA 2024).

3.3.7.4 Extent

The United States Drought Monitor (USDM) tracks drought conditions in Rhode Island and in the rest of the nation. They create maps based on climate data, hydrologic and soil conditions, as well as reported impacts and observations from over 350 contributors nationwide. Table 35 describes the USDM's drought classification system as well as possible impacts from each category.

Table 35- USDM Classifications of Drought Conditions

Category	Description	Possible Impacts
D0	Abnormally Dry	Going into drought: • short-term dryness slowing planting, growth of crops or pastures Coming out of drought: • some lingering water deficits • pastures or crops not fully recovered
D1	Moderate Drought	• Some damage to crops, pastures • Streams, reservoirs, or wells low, some water shortages developing or imminent • Voluntary water-use restrictions requested
D2	Severe Drought	• Crop or pasture losses likely • Water shortages common • Water restrictions imposed
D3	Extreme Drought	• Major crop/pasture losses • Widespread water shortages or restrictions
D4	Exceptional Drought	• Exceptional and widespread crop/pasture losses • Shortages of water in reservoirs, streams, and wells creating water emergencies

FEMA's National Risk Index states that Exeter and West Greenwich have the following planning significance related to drought:

Jurisdiction	Drought NRI	Drought EAL
Exeter	Relatively Moderate	Relatively Moderate
West Greenwich	Relatively Low	Relatively Low

Source: FEMA National Risk Index (www.hazards.fema.gov/nri/map)

EAL: Expected Annual Loss

NRI: National Risk Index= (Expected Annual Loss x Social Vulnerability) ÷ Community Resilience

Based on the extent of past events and the criteria identified in Table 7, the extent of droughts in Exeter and West Greenwich are considered **Limited**, with potential for some injuries; short shutdown of some critical infrastructure and facilities; fewer than 10% of residential and commercial structures damaged; and a small number of local operations impacted for short amounts of time.

3.3.7.5 Probability of Future Occurrence

For the 2024 State of Rhode Island HMP, RIEMA reviewed historical data from the U.S. Drought Monitor weekly reports for each Rhode Island County from 2000 through 2023 (1,233 weeks) and created a weekly average that indicates the percentage time in each Drought Monitor category for the State. RIEMA used this average to extrapolate the potential likelihood of future drought conditions (Table 36).

Table 36- Estimated Weekly Probability of Rhode Island Being in U.S. Drought Monitor Category

None	D0-D4	D1-D4	D2-D4	D3-D4	D4
74.2%	25.8%	11.8%	3.4%	0.8%	0.0%

Source: RIEMA 2024

Based on previous occurrences and the criteria identified in Table 8, it is **Possible** that Washington and Kent Counties, including Exeter and West Greenwich, will experience a drought event, of any magnitude, in the calendar year; there is a between 1-49.9% annual probability of occurring.

3.3.7.6 Impact

In Exeter and West Greenwich, periods of drought can have significant environmental, agricultural, health, economic, and social consequences. The effects vary depending upon vulnerability and regional characteristics. Droughts can also reduce water quality through a decreased ability for natural rivers and streams to dilute pollutants and increase contamination. The most common effects are diminished crop yield, increased erosion, dust storms, ecosystem damage, reduced electricity production due to reduced flow through hydroelectric dams, shortage of water for industrial production, and increased risk of wildland fires (RIEMA 2024).

The main impact of meteorological drought is periods of very high fire danger. In addition, small pond levels are reduced, thereby impacting private wells. Loss of power due to fire-damaged power lines and infrastructure may prevent access to potable water from private wells. There are ongoing and growing concerns amongst Exeter and West Greenwich residents with private drinking water wells regarding the impacts of drought on water availability. During the MRP Workshop a resident stated that “wells are drying up with one month of drought” (RIIB MRP 2024).

Drought conditions have been known to trigger the rapid increase of the spongy (gypsy) moth populations in the region. The extended period of dry weather (specifically in May and June) slows the fungus that usually keeps the spongy (gypsy) moth caterpillars at bay. Denuded trees can have cascading effects on the local ecosystem.

3.3.7.7 Future Conditions

Nature of the hazard	Future climate conditions interact with droughts in many ways. Some regions are experiencing warmer, drier conditions than they have in the past, leading to less rainfall (meteorological drought) or snowpack (snow drought). Over time, this can cause water sources like lakes, streams, and underground aquifers to dry up (hydrological drought). This, in turn, can lead to water shortages in human communities (socioeconomic drought) and agricultural systems (agricultural drought). It can also damage plant and animal communities in the region (ecological drought) (USGS 2022a).
Location	Future climate conditions are not likely to influence the location of future droughts in Exeter and West Greenwich.
Extent	Future climate conditions are likely to increase the intensity and length of droughts. Future climate conditions exacerbate droughts by making them more frequent, longer, and more severe.
Impact	As droughts are projected to become more frequent, longer, and more severe, impacts on Exeter and West Greenwich will increase. Future impacts are likely to include water shortages, impacts to agriculture, plants, and animals, and overall human health.
Probability of Future Events	Future climate conditions are highly likely to exacerbate droughts by making them more frequent, longer, and more severe.
Changes in Population Patterns	It is possible that future droughts will cause changes in population patterns in Exeter and West Greenwich due to changes in drinking water availability in new developments. Additionally, an increase in population would likely have similar impacts as land use development increases.
Changes in Land Use Development	It is possible that future droughts will cause changes in land use development in Exeter and West Greenwich. Areas historically not suitable for development may change in the future opening up developable areas.

	Increased drought events will influence future land use development through water resource management as areas facing frequent droughts will need to prioritize efficient water use and management strategies. This could lead to the implementation of stricter regulations on water consumption and the development of infrastructure for water recycling and conservation. Drought conditions may prompt a shift in agricultural practices, encouraging the use of drought-resistant crops and sustainable farming methods. Land use planning may need to be adapted by designating areas for more resilient agricultural practices. In water-scarce areas, the demand for housing might shift away from regions most impacted by drought, leading to increased development in areas with more reliable water resources.

NOAA's State Climate Summary 2022 for Rhode Island suggests that annual average precipitation, as well as extreme precipitation events, are projected to increase for Rhode Island. Although increased precipitation is projected, naturally occurring droughts are projected to be more intense because higher temperatures will increase evaporation rates (RIEMA 2024).

Additionally, higher temperatures associated with future climate conditions can increase the rate of evaporation from soil, water bodies, and vegetation. This can contribute to soil moisture depletion and more rapid drying of surface water sources during dry periods (RIEMA 2024).

3.3.8 Extreme Temperatures

3.3.8.1 Description

Extreme temperature events occur when climate conditions produce temperatures well outside of the predicted norm. These extremes can have severe impacts on human health and mortality, natural ecosystems, agriculture, and other economic sectors (RIEMA 2024).

Extreme heat is defined as temperatures that hover 10 degrees or more above the average high temperature for the region and last for several weeks. Ambient air temperature is one component of heat conditions, with relative humidity being the other. Humid or muggy conditions, which add to the discomfort of high temperatures, occur when an area of high atmospheric pressure traps moisture laden air near the ground (RIEMA 2024).

Although no specific definition exists for extreme cold, an extreme cold event can generally be defined as temperatures at or below freezing for an extended period of time. Extreme cold events are usually part of winter storm events but can occur during any time of the year and can have devastating effects on agricultural production (RIEMA 2024).

3.3.8.2 Location

An extreme heat or cold event would be a regional issue affecting both Exeter and West Greenwich and significant portions of Southern New England. Extreme temperatures could have a serious impact on private and public structures, as well as the general population throughout Exeter and West Greenwich. Those most at risk to extreme temperatures are the elderly, homeless populations, and those who work outside. Exeter and West Greenwich have a relatively large elderly population.

3.3.8.3 History

Official temperatures are recorded by NOAA at the T.F. Green International Airport in Warwick, RI (12 miles northeast of Exeter). This data is the most accurate for recording weather in and around Exeter and West Greenwich. Table 37 and Table 38 summarizes extreme temperature events in Washington County (Exeter) and Kent County (West Greenwich).

Since the 2005 HMPs, there has been one (1) extreme temperature event recorded in Washington County and four (4) extreme temperature events recorded in Kent County.

Table 37- History of Extreme Temperatures in Washington County (Exeter)

Date	Event Type	Event Details
7/6/2010	Heat	A strong ridge built into Southern New England resulting in temperatures nearing 100 with high humidity. Heat index values ranged from 100 to 106 for most of Southern New England on the 6th and again on the 7th in a more limited area, generally the Connecticut River Valley. Heat index values at the Westerly State Airport (KWST) Automated Surface Observing System were 105 to 106 degrees.

Source: NOAA Storm Events Database- Storm Prediction Center Product (NWS 2024a)

Table 38- History of Extreme Temperatures in Kent County (W. Greenwich)

Date	Event Type	Event Details
1/3/1998	Heat	The maximum temperature at T.F. Green Airport in Warwick reached a balmy, record-setting 62 degrees. The previous record was 58 degrees set on this date in 1913.
3/27/1998	Heat	No details provided.
3/28/1998	Heat	No details provided.
3/31/1998	Heat	On March 27th, the high temperature at T.F. Green Airport in Warwick reached 81 degrees, breaking the old record for the date of 77 degrees set in 1945. On March 28th, the temperature rocketed to 81 degrees at 11:40 AM, breaking the old record for the date set in 1989. The high temperature for the day was 83 degrees, thereby establishing the new record high temperature for March 28th. On March 31st, the temperature at T.F. Green Airport in Warwick reached 85 degrees at 1:50 PM, breaking the previous record for the date of 75 degrees set in 1981. The warmest temperature ever recorded in the month of March is 90 degrees on March 29, 1945, however.
9/27/1998	Heat	The mercury soared to 86 degrees at the T.F. Green State Airport. This broke the record high for the date of 85 degrees set in 1972.
12/4/1998	Heat	A new record high temperature for the month of December of 71 degrees was established for Providence at T.F. Green Airport in West Warwick. The previous record was 67 degrees which was set in 1982. This followed a couple of days after the high temperature of 63 degrees on December 2 broke the record high of 62 degrees which was set in 1985.
12/7/1998	Heat	Unseasonably warm temperatures occurred throughout much of the state. High pressure over the western Atlantic generated an unusually warm westerly wind flow. A new record high temperature for the month of December of 77 degrees was established for Providence at T.F. Green Airport in West Warwick. The previous record was 71 degrees which was set just 3 days earlier on December 4. The high of 77 degrees also shattered the previous record high for the date, which was 63 degrees set in 1932.
3/18/1999	Heat	The high temperature of 71 degrees at T.F. Green State Airport in West Warwick broke the previous record high for the date of 69 degrees, which was set in 1945.
6/7/1999	Heat	High pressure near Bermuda brought a southwest flow of hot and humid air to Rhode Island. The high temperature of 96 degrees at T.F. Green State Airport in Warwick tied the record high temperature for the date, which was set in 1925.
7/5/1999	Heat	Bermuda high pressure brought a southwest flow of hot and humid air to Rhode Island during the holiday weekend. The high temperature of 98 degrees at T.F. Green State Airport in West Warwick tied the record high for July 5th, which was first set in 1919. Also, the temperature

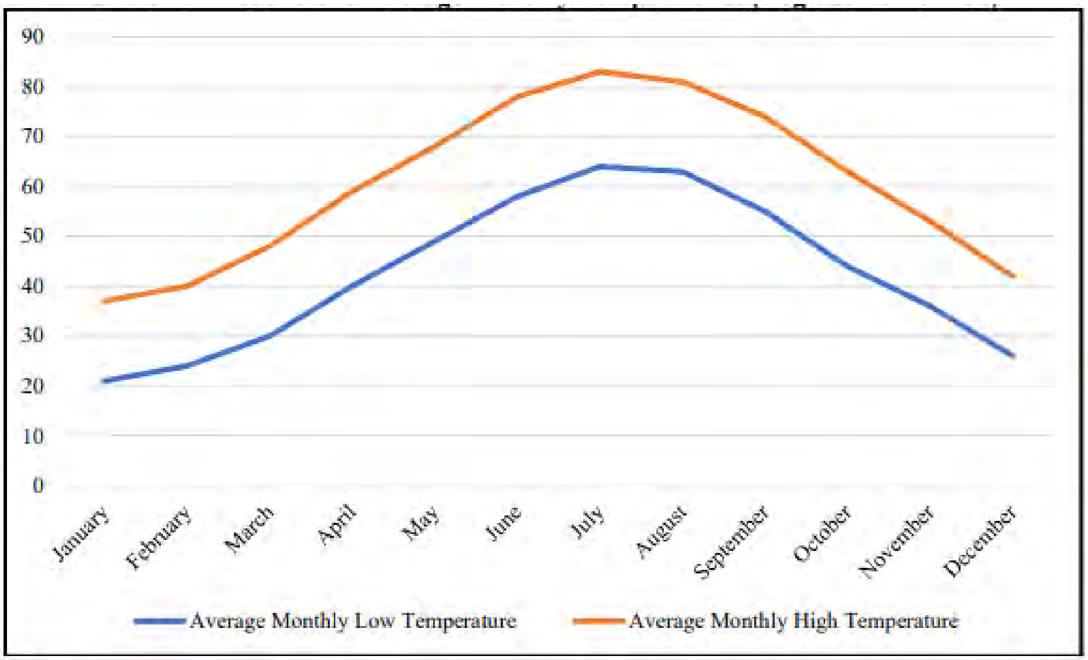
Date	Event Type	Event Details
		only fell to a low of 78 degrees on the 5th, which set a record high minimum temperature for the date. The previous record was 77 degrees which was also set in 1919.
7/6/1999	Heat	For the second day in a row, temperatures at T.F. Green State Airport in West Warwick tied the record high for the date. The high of 97 degrees equaled the record high for July 6th, which was set in 1911.
7/14/1999	Cold/ Wind Chill	The low temperature at T.F. Green State Airport dropped to 53 degrees, which tied the record low for the date which was set in 1937.
7/17/1999	Heat	The high temperature at T.F. Green State Airport of 97 degrees tied the record high for the date, which was set in 1977.
7/18/1999	Heat	The high temperature at T.F. Green State Airport of 98 degrees tied the record high for the date, which was set in 1982.
9/7/1999	Heat	Record warm minimum temperatures were set at T.F. Green State Airport in Warwick. The low temperature of 73 degrees on the 7th broke the previous record of 71 degrees set in 1983. The low temperatures of 72 degrees on both the 8th and 9th broke the records of 70 degrees in 1936, and 70 degrees in 1992, respectively.
5/9/2000	Excessive Heat	The high temperature at T.F. Green State Airport in Warwick reached 91 degrees, which broke the previous record high for the date set in 1963. It was also the third day in a row of high temperatures exceeding 90 degrees, making May 7th through the 9th the earliest heat wave on record in greater Providence. The previous record was in 1992, from May 21st through the 23rd. Records date back to 1904.
10/9/2000	Cold/ Wind Chill	The high temperature of 44 degrees at T.F. Green State Airport broke the previous record low maximum temperature for the date, which was 48 degrees in 1917.
10/29/2000	Cold/ Wind Chill	The high temperature at T.F. Green State Airport in Warwick only reached 41 degrees at 10:00 am. This broke the record for the lowest maximum temperature for the date, which was 42 degrees set in 1952 and previous years.
5/3/2001	Excessive Heat	The high temperature of 91 degrees at T.F. Green State Airport in Providence broke the previous record high for the date, which was 89 degrees set in 1944.
5/4/2001	Excessive Heat	The high temperature reached 92 degrees at T.F. Green State Airport in Warwick, breaking the record high for the date, which was 89 degrees set in 1944. It was also the third day of temperatures reaching 90 degrees or higher, making it the earliest heat wave on record in greater Providence. The previous record for the earliest heat wave was set just last year, from May 7th to 9th of 2000.
5/12/2001	Excessive Heat	The high temperature of 90 degrees at T.F. Green State Airport in Warwick broke the record high for the date, which was 87 degrees set in 1959.
7/6/2010	Excessive Heat	Heat index values at the T.F. Green Providence Airport (KPVD) Automated Surface Observing System in Warwick were 105 to 106 degrees.
7/22/2011	Excessive Heat	The Automated Surface Observing System at T.F. Green State Airport (KPVD) recorded heat indexes of 105 to 106 over an eight-hour period.
2/16/2015	Extreme Cold/ Wind Chill	The Automated Surface Observation Station at T.F. Green Airport in Warwick, RI (KPVD) recorded wind chills as low as 26 below zero.
2/14/2016	Extreme Cold/ Wind Chill	Wind chills as low as 32 below zero were reported at TF Green Airport in Warwick.

Source: NOAA Storm Events Database- Storm Prediction Center Product (NWS 2024a)

3.3.8.4 Extent

In Rhode Island, extreme cold usually involves temperatures below 0^{o}F. The National Weather Service (NWS) issues extreme (or excessive) heat warnings when the maximum expected heat index is expected to be 105^{o} F or higher for at least 2 consecutive days and night time air temperatures are not expected to fall below 75^{o}. In the northeast, these criteria are generally modified to a heat index of 92^{o} or higher for 2 consecutive days.

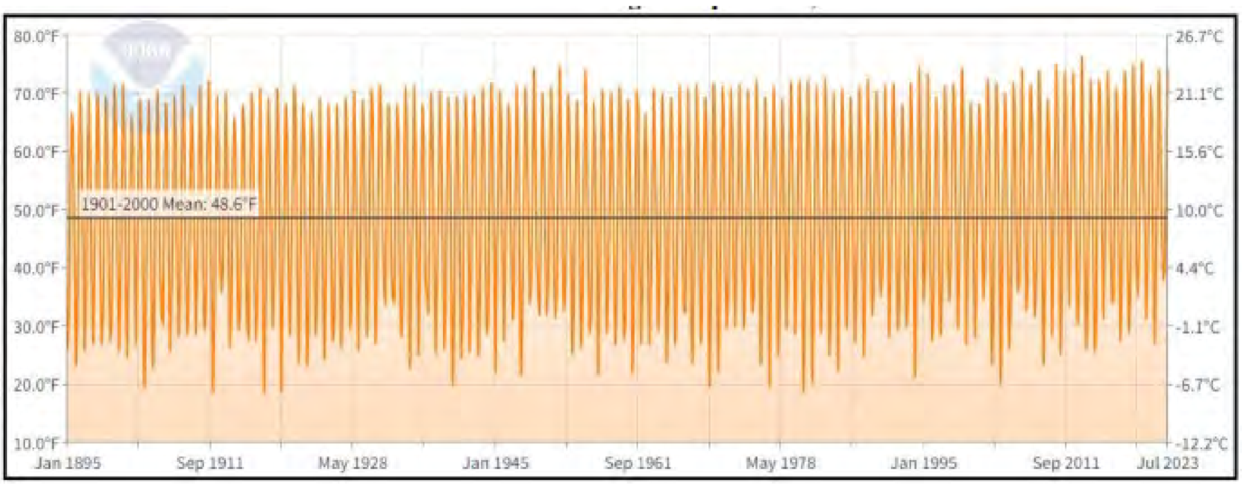
Figure 46 details monthly temperature averages for Rhode Island:



Source: NOAA per RIEMA 2024

Figure 46- Rhode Island Average Monthly Temperatures (^{o}F)

Figure 47 details the average temperature for Rhode Island from 1895 to 2023.



Source: NCEI 2023

Figure 47- Rhode Island Average Temperature (1895-2023)

FEMA's National Risk Index states that Exeter and West Greenwich have the following planning significance related to extreme temperatures:

Jurisdiction	Heatwave NRI	Heatwave EAL	Cold Wave NRI	Cold Wave EAL
Exeter	Relatively Low	Relatively Low	Relatively Low	Relatively Low
West Greenwich	Relatively Low	Relatively Low	Relatively Low	Relatively Low

Source: FEMA National Risk Index (www.hazards.fema.gov/nri/map)

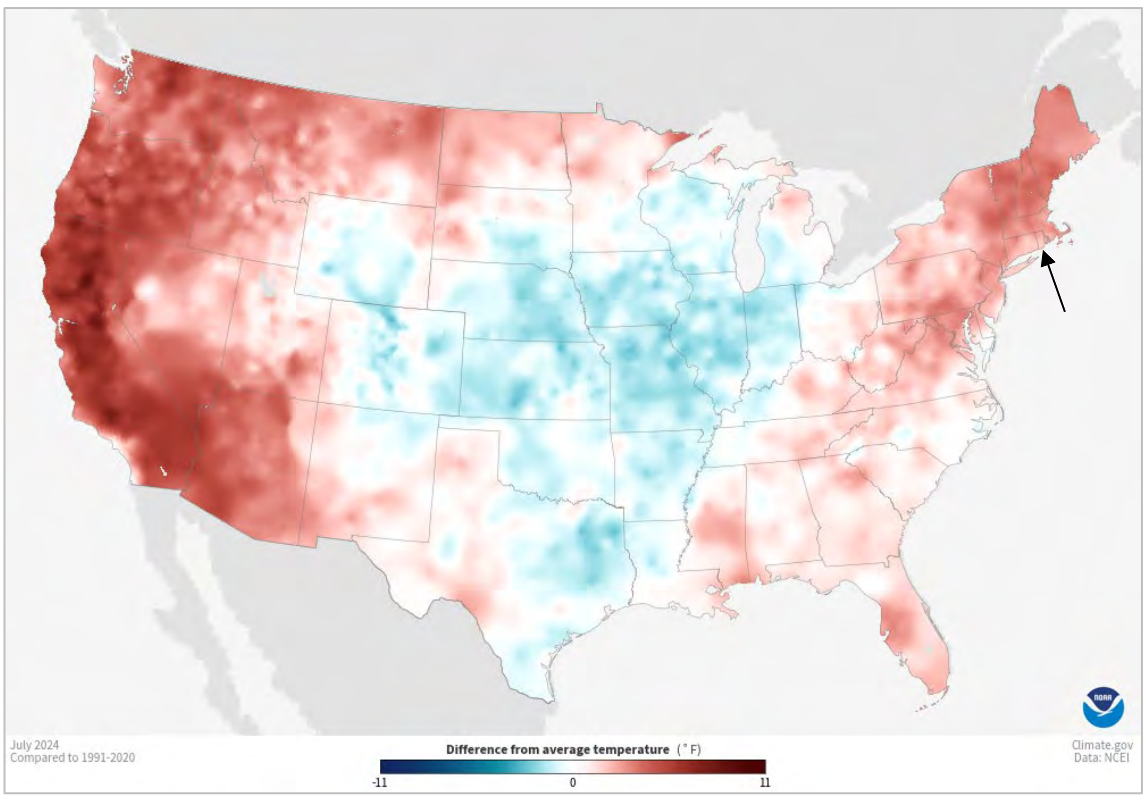
EAL: Expected Annual Loss

NRI: National Risk Index= (Expected Annual Loss x Social Vulnerability) ÷ Community Resilience

Based on the extent of past events and the criteria identified in Table 7, the extent of extreme temperatures in Exeter and West Greenwich are considered **Limited**, with potential for some injuries; short shutdown of some critical infrastructure and facilities; fewer than 10% of residential and commercial structures damaged; and a small number of local operations impacted for short amounts of time.

3.3.8.5 Probability of Future Occurrence

Predicting the probability of extreme temperature occurrences is tremendously challenging due to the large number of factors involved (RIEMA 2024). Available data suggests that both the average high temperatures and the record high temperature will likely increase over the coming years (Figure 48) (RIEMA 2024). Rhode Island falls into the +3-5^{o} above average range.



Source: Climate.gov (2025)

Figure 48- Rhode Island July Temperature Difference from Average (1991-2020)

Based on previous occurrences and the criteria identified in Table 8, it is **Likely** that Exeter and West Greenwich will experience extreme temperatures in the calendar year; there is a between 50-89.9% annual probability of occurring.

3.3.8.6 Impact

In Exeter and West Greenwich, personal exposure to dangerous heat conditions may lead to heat cramps, heat exhaustion, and heat stroke. These are especially important to monitor in the elderly, children, and vulnerable populations that are not able to move to cooler conditions. Agriculture and animals are also vulnerable to extremely high temperatures.

Extreme cold conditions may occur during, after, or without any connection to a winter storm. Exposure to extreme cold can lead to hypothermia and frostbite. Agriculture and animals are also vulnerable to extreme cold temperatures.

The Centers for Disease Control and Prevention (CDC) identifies the following six groups as being especially vulnerable to extreme temperatures:

- Older Adults (aged 65)
- Infants and Children
- Individuals with Chronic Conditions
- Low-income Individuals
- Athletes
- Outdoor workers

Longer periods of elevated heat, particularly in July and August, have raised concerns about vulnerable segments of the population, including elderly and disabled residents who are homebound, those living in older housing stock without air conditioning, lower-income residents who may have difficulty with utility bills for temperature control in their homes, and residents living in close proximity to areas at increased potential for wildfires (RIIB MRP 2023).

3.3.8.7 Future Conditions

Nature of the hazard	Future climate conditions are not likely to influence the nature of future extreme temperature events in Exeter and West Greenwich.
Location	Extreme temperatures are a regional hazard, and future climate conditions are not likely to alter the location of these events in the future in Exeter and West Greenwich.
Extent	Table 39 shows Exeter's historical and future projections for average temperatures by season under different future climate conditions models.

Table 39- ClimRR Climate Projection Report- Temperature (Exeter)

Temperature	Hist.	Mid-Century RCP 4.5	Mid-Century RCP 8.5	End-Of-Century RCP 4.5	End-Of-Century RCP 8.5
ANNUAL					
Maximum Avg Temperature (Degrees F)	54.61	59.16	57.71	60.84	64.21
Minimum Avg Temperature (Degrees F)	40.39	45	44.15	46.87	51.11
AUTUMN					
Maximum Avg Temperature (Degrees F)	60.26	-	63.93	-	68.85
Minimum Avg Temperature (Degrees F)	45.53	-	49.31	-	54.72
WINTER					
Maximum Avg Temperature (Degrees F)	38.67	-	42.14	-	46.66
Minimum Avg Temperature (Degrees F)	24.06	-	28.12	-	33.79
SPRING					
Maximum Avg Temperature (Degrees F)	55.74	-	60.31	-	63.95
Minimum Avg Temperature (Degrees F)	40.87	-	45.43	-	49.72
SUMMER					
Maximum Avg Temperature (Degrees F)	74.49	-	78.78	-	83.05
Minimum Avg Temperature (Degrees F)	60.43	-	64.96	-	70.22

Source: Climate Risk and Resilience Portal (ClimRR) 2024

Overall Annual Temperature Analysis: Under RCP 4.5 the annual maximum temperature at end-of-century is 60.84°F which represents a +6.23°F change from the baseline. Under RCP 8.5 the annual maximum temperature at end-of-century is 64.21°F which represents a +9.60°F change from the baseline.

Table 40 shows West Greenwich's historical and future projections for average temperatures by season under different future climate conditions models.

Table 40- ClimRR Climate Projection Report- Temperature (W. Greenwich)

Temperature	Hist.	Mid-Century RCP 4.5	Mid-Century RCP 8.5	End-Of-Century RCP 4.5	End-Of-Century RCP 8.5
ANNUAL					
Maximum Avg Temperature (Degrees F)	54.51	59.07	57.63	60.75	64.18
Minimum Avg Temperature (Degrees F)	40.22	44.83	44.02	46.7	50.95
AUTUMN					
Maximum Avg Temperature (Degrees F)	60.19	-	63.9	-	68.88
Minimum Avg Temperature (Degrees F)	45.43	-	49.23	-	54.6
WINTER					
Maximum Avg Temperature (Degrees F)	38.15	-	41.63	-	46.21
Minimum Avg Temperature (Degrees F)	23.8	-	27.91	-	33.6
SPRING					
Maximum Avg Temperature (Degrees F)	55.74	-	60.32	-	64.05
Minimum Avg Temperature (Degrees F)	40.62	-	45.22	-	49.52
SUMMER					
Maximum Avg Temperature (Degrees F)	74.74	-	79.09	-	83.4
Minimum Avg Temperature (Degrees F)	60.3	-	64.85	-	70.08

Source: Climate Risk and Resilience Portal (ClimRR) 2024

<u>Overall Annual Temperature Analysis</u>: Under RCP 4.5 the annual maximum temperature at end-of-century is 60.75°F which represents a +6.24°F change from the baseline. Under RCP 8.5 the annual maximum temperature at end-of-century is 64.18°F which represents a +9.68°F change from the baseline.

Table 41 shows Exeter's historical and future projections for heat index.

Heat index is a measure of how hot weather feels to humans when factoring in both relative humidity and the actual temperature. Heat index is an important gauge of heat-related risks. Readings above 105°F typically represent dangerous conditions, with readings above 125°F being extremely dangerous to humans.

Table 41- ClimRR Climate Projection Report- Heat Index (Exeter)

Heat_Index	Historical	Mid-Century	End-of-Century
SUMMER			
Daily Max Heat Index (Degrees F)	77.32	81.74	89.38
Seasonal Max Heat Index (Degrees F)	90.84	102.06	120.04
Days with Max Heat Index Over 95 (Days)	0.26	2.74	22.79
Days with Max Heat Index Over 105 (Days)	0	0.5	4.96
Days with Max Heat Index Over 115 (Days)	0	0.3	1.6
Days with Max Heat Index Over 125 (Days)	0	0.19	0.66

Source: Climate Risk and Resilience Portal (ClimRR) 2024

Overall Heat Analysis: Historically, the number of summer days with a heat index above 95°F was 0.26 days. By end- century under RCP8.5, 22.79 summer days are projected to have a heat index above 95°F, representing an increase of +22.53 days. Summer days with heat index above 115°F have been rarer, with 0.00 such days in the historical period and a projected 1.60 by end-century (RCP8.5), representing a change of +1.60 days.

It is likely that future climate conditions will influence the extent of future extreme temperature events in Exeter.

Table 42 shows West Greenwich's historical and future projections for heat index.

Table 42- ClimRR Climate Projection Report- Heat Index (W. Greenwich)

Heat_Index	Historical	Mid-Century	End-of-Century
SUMMER			
Daily Max Heat Index (Degrees F)	77.33	81.72	89.16
Seasonal Max Heat Index (Degrees F)	90.79	102.08	117.99
Days with Max Heat Index Over 95 (Days)	0.31	2.63	21.93
Days with Max Heat Index Over 105 (Days)	0	0.45	4.26
Days with Max Heat Index Over 115 (Days)	0	0.33	1.16
Days with Max Heat Index Over 125 (Days)	0	0.23	0.46

Source: Climate Risk and Resilience Portal (ClimRR) 2024

Overall Heat Analysis: Historically, the number of summer days with a heat index above 95°F was 0.31 days. By end- century under RCP8.5, 21.93 summer days are projected to have a heat index above 95°F, representing an increase of +21.62 days. Summer days with

	heat index above 115°F have been rarer, with 0.00 such days in the historical period and a projected 1.16 by end-century (RCP8.5), representing a change of +1.16 days. It is likely that future climate conditions will influence the extent of future extreme temperature events in West Greenwich.
Impact	As global temperatures continue to rise, Exeter and West Greenwich will likely experience hotter summer/fall seasons and less cold winter/spring seasons. Temperature extremes most directly affect health by compromising the body's ability to regulate its internal temperature. Loss of internal temperature control can result in various illnesses, including heat cramps, heat exhaustion, heatstroke, and hyperthermia from extreme heat events. Temperature extremes related to heat can also worsen chronic conditions such as cardiovascular disease, respiratory disease, cerebrovascular disease, and diabetes-related conditions. The elderly, children, the homeless, and those who work outside are most susceptible to heat-related impacts. Extreme heat events are likely to also impact livestock, power grid infrastructure, and food production.
Probability of Future Events	As global temperatures continue to rise, it is likely that Exeter and West Greenwich will experience more frequent occurrences of extreme heat during the summer, but less extreme cold events during the winter.
Changes in Population Patterns	It is possible that future extreme temperature events will cause changes in population patterns in Exeter and West Greenwich as the aging population of the Towns' residents may relocate to other regions of the country to get away from these extreme temperature events. Additionally, an increase in population would likely have similar impacts as land use development increases.
Changes in Land Use Development	It is possible that future extreme temperature events will cause changes in land use development in Exeter and West Greenwich as land previously unsuitable becomes available for development. Increased extreme temperature events may influence future land use development through water resource management as extreme temperatures can affect water availability, prompting the need for efficient water management systems. Developments may focus on water conservation techniques and infrastructure for recycling and capturing rainwater. Older buildings may need retrofitting to meet new considerations for extreme temperatures and new buildings may need to incorporate design features that enhance resilience to extreme heat and cold, such as improved insulation, reflective roofing materials, and energy-efficient windows.

The 2024 State of Rhode Island HMP states:

Temperatures in Rhode Island have risen by 4° F since the early 1900s, with the number of hot days above the long-term average since the 1990s. Additionally, the greatest number of warm nights has been recorded over the 2015–2020 period. Very cold days have been mostly below average since the 1980s (RIEMA 2024).

3.3.9 Tornadoes

3.3.9.1 Description

A tornado is a violent, dangerous, rotating column of air that is in contact with both the surface of the earth and a cumulonimbus cloud or, in rare cases, the base of a cumulus cloud. Tornadoes come in many shapes and sizes but are typically in the form of a visible condensation funnel, whose narrow end touches the earth and is often encircled by a cloud of debris and dust. Tornadoes are produced when cool air overrides a layer of warm air, forcing the warm air to rise rapidly.

Figure 49- Tornado Watch Issued for Rhode Island

The damage from a tornado is a result of the high wind velocity and wind-blown debris. Tornado season is generally March through August, although tornadoes can occur at any time of year. Over 80% of all tornadoes strike between noon and midnight. During an average year, about 1,000 tornadoes are reported across the United States, resulting in 80 deaths and over 1,500 injuries. The most violent tornadoes are capable of tremendous destruction with wind speeds of 250 mph or more. Damage paths can be more than one-mile-wide and 50 miles long.

3.3.9.2 Location

All of Exeter and West Greenwich are susceptible to tornadoes.

Figure 50 shows the nationwide tornado/wind zones. Rhode Island is located in Zone 2, which equates to ~160 mph winds.

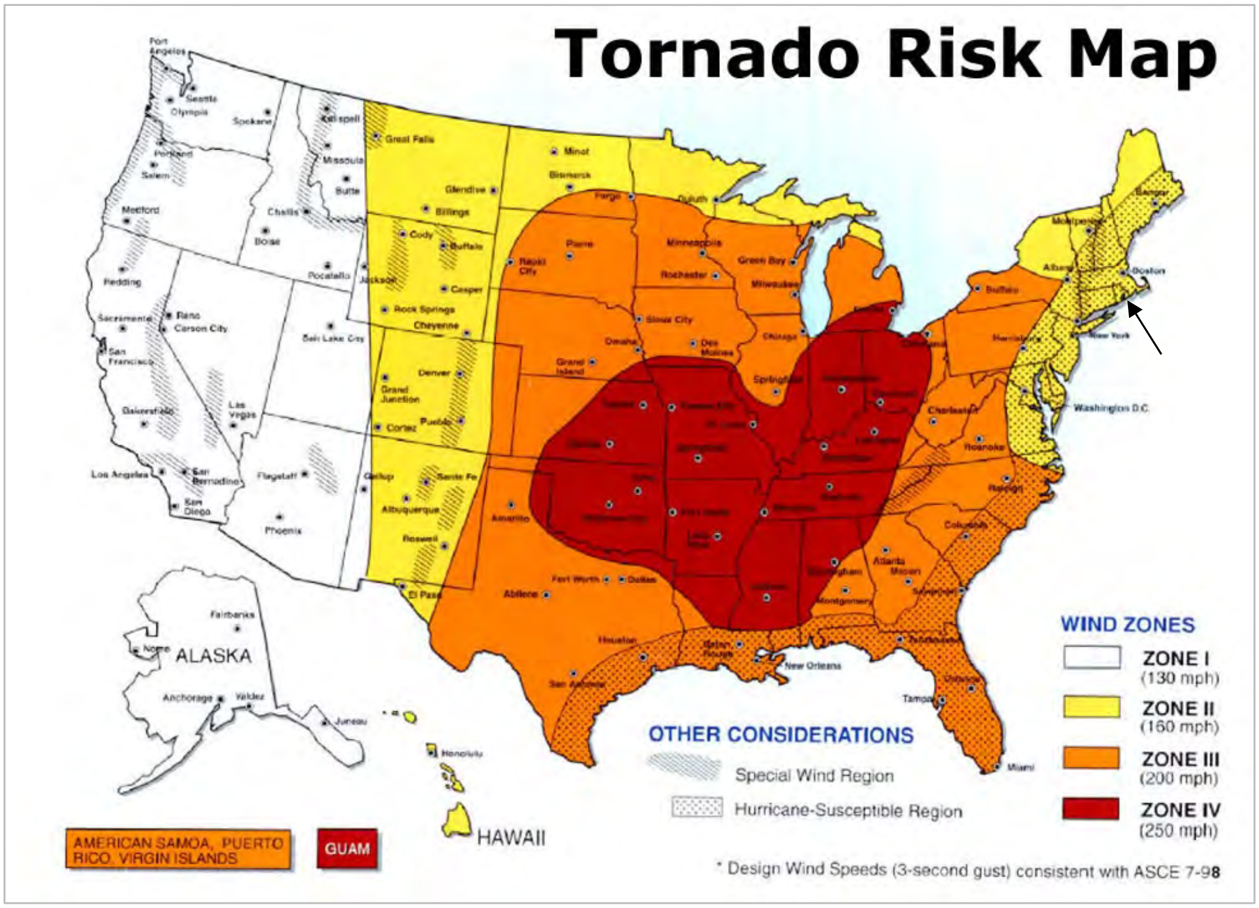
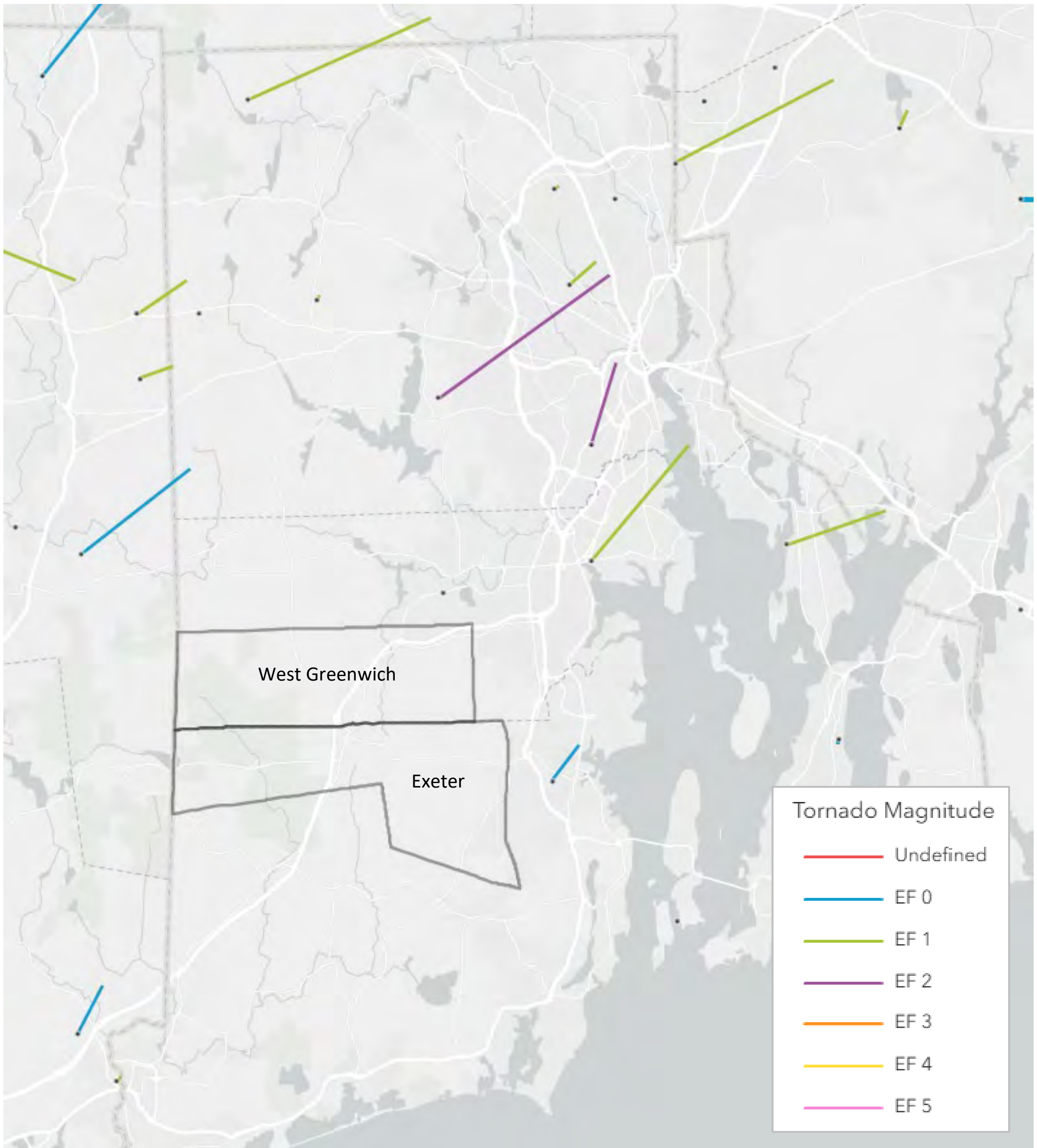


Figure 50- Nationwide Tornado Zones

3.3.9.3 History

Figure 51 shows historical tornado tracks near Exeter and West Greenwich from 1950-2023. The circles represent the touchdown locations of the tornadoes. No tornadoes have crossed within Exeter or West Greenwich's town boundaries.



Source: NWS Storm Predication Center 2024- Tornado

Figure 51- Historical Tornado Tracts in Rhode Island (1950-2023)

Rhode Island has experienced one Presidential Disaster Declaration related to tornadoes (Table 43). This Declaration was due to a series of tornadoes that occurred from September 10 to September 13, 2023 in Providence County (north of Exeter and West Greenwich).

Since the 2005 HMPs, there has been one Rhode Island Presidential Disaster Declaration relating to tornadoes, but Exeter and West Greenwich were not impacted by this event.

Table 43- State of Rhode Island Presidentially Declared Disasters Relating to Tornadoes

Designation	Incident Period	Declaration Date	Incident Type
DR-4753-RI	09/10 – 09/13/2023	01/07/2024	Severe Storms, Flooding, and Tornadoes (Providence County)

Source: FEMA 2024

3.3.9.4 Extent

Tornadoes are categorized according to the damage they produce using the Enhanced Fujita Scale (EF Scale), which is shown in Table 44. An F0 tornado causes the least amount of damage, while an F5 tornado causes the most amount of damage. It is important to note that the size of a tornado is not necessarily an indication of its intensity.

Table 44- Enhanced Fujita Scale

EF #	3 Second Gust	Damage Scale
0	65-85 mph	**Light damage.** Some damage to chimneys; branches broken off trees; shallow-rooted trees pushed over; sign boards damaged.
1	86-110 mph	**Moderate damage.** Peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos blown off roads.
2	111-135 mph	**Considerable damage.** Roofs torn off frame houses; mobile homes demolished; boxcars overturned; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.
3	136-165 mph	**Severe damage.** Roofs and some walls were torn off well-constructed houses; trains overturned; most trees in forest uprooted; heavy cars lifted off the ground and thrown.
4	166-200 mph	**Devastating damage.** Well-constructed houses leveled; structures with weak foundations blown away some distance; cars thrown generating large missiles.
5	>200 mph	**Incredible damage**. Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 300 feet; trees debarked; incredible phenomena will occur.

FEMA's National Risk Index states that Exeter and West Greenwich have the following planning significance related to tornadoes:

Jurisdiction	Tornado NRI	Tornado EAL
Exeter	Relatively Low	Relatively Low
West Greenwich	Relatively Low	Relatively Low

Source: FEMA National Risk Index (www.hazards.fema.gov/nri/map)

EAL: Expected Annual Loss

NRI: National Risk Index= (Expected Annual Loss x Social Vulnerability) ÷ Community Resilience

Based on the extent of past events and the criteria identified in Table 7, the extent of tornadoes in Exeter and West Greenwich are considered **Limited**, with potential for some injuries; short shutdown of some critical infrastructure and facilities; fewer than 10% of residential and commercial structures damaged; and a small number of local operations impacted for short amounts of time.

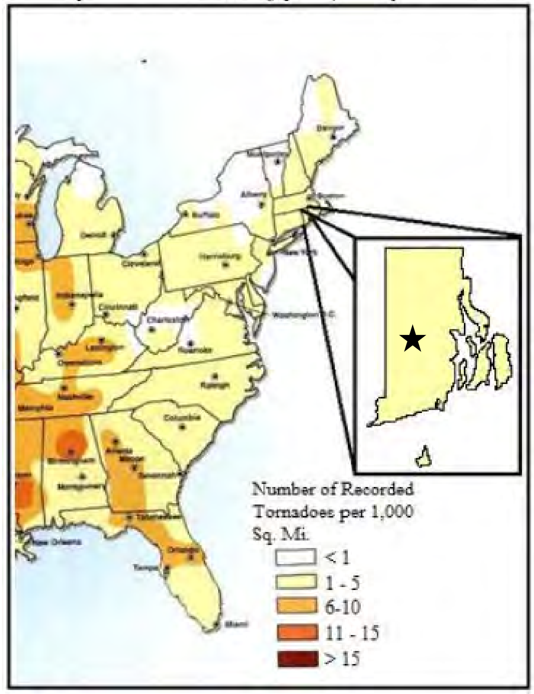
However, if a tornado were to pass directly through either Town, the impacts could be catastrophic.

3.3.9.5 Probability of Future Occurrence

Predicting the probability of tornado occurrences is tremendously challenging due to the large number of factors involved and the random nature of formation. Data from the NCEI indicates that Rhode Island can expect infrequent tornado events based on the 14 statewide events recorded from 1950 to 2023. Available historical tornado data suggests that Rhode Island can expect future tornadoes to range from EF0 to EF2 on the Enhanced Fujita Scale.

Figure 52 shows Rhode Island's tornado activity per 1,000 miles. The entire state falls within the category of 1-5 tornadoes per 1,000 square miles.

Based on previous occurrences and the criteria identified in Table 8, it is **Possible** that Exeter and West Greenwich will experience a tornado event in the next year; there is between 1-49.9% annual probability of occurring.



Source: RIEMA 2024

Figure 52- Rhode Island Tornado Activity per 1,000 Square Miles

3.3.9.6 Impact

In Exeter and West Greenwich, tornadoes could cause significant damage to structures, trees and utility lines, and flying debris can cause injuries to residents. Loss of power due to damaged power lines and infrastructure may prevent access to potable water from private wells. Mobile homes are generally more vulnerable to tornado damage than steel framed structures.

3.3.9.7 Future Conditions

The 2024 State of Rhode Island HMP states:

The relationship between climate change and tornadoes is complex, and while there is ongoing research in this area, it is not fully understood. Tornadoes are small-scale, short-lived weather phenomena that can be influenced by a variety of atmospheric factors, including temperature, humidity, wind patterns, and atmospheric instability. Climate change can influence some of these factors, which may, in turn, affect tornado activity.

Tornadoes typically form when warm, moist air near the surface clashes with cooler, drier air aloft, creating atmospheric instability. Climate change can alter temperature and humidity patterns, potentially affecting the conditions necessary for tornado formation. Additionally, climate change can lead to more extreme and variable weather patterns. While this may not necessarily increase the overall number of tornadoes, it could lead to more unpredictable and severe tornado events when they do occur. Some research suggests that climate change could lead to longer tornado seasons, with tornadoes occurring outside of their typical timeframes.

It's important to emphasize that while there may be some links between climate change and tornado activity, these links are not fully understood, and it is difficult to attribute specific tornado events to climate change. Tornadoes are influenced by a complex interplay of factors, and any changes in tornado patterns may vary by region (RIEMA 2024).

Nature of the hazard	Unlike temperature or precipitation trends, the influence of future climate conditions on tornadoes is far more difficult to discern. Numerous complex atmospheric conditions combine to generate a tornado, and researchers are still developing tools to help discern potential human influence from natural variability. Currently, most of the research stops short of connecting historical changes in tornado behavior to a warming climate (NOAA 2023). At this point in time, it is possible that future climate conditions may influence the nature of future tornadoes in Exeter and West Greenwich, but additional data is needed.
Location	While the influence of future climate conditions on tornadoes is still being researched, there is preliminary evidence to support that tornadoes are touching down in new locations. The HMPCs state that tornado watches are becoming more frequent than they have been historically. At this point in time, it is possible that future climate conditions may influence the location of future tornadoes in Exeter and West Greenwich, but additional data is needed.
Extent	While the direct attribution between future climate conditions and tornado frequency and magnitude is still being studied, there is a link between climate and tornadoes in the mid-west and Tornado Alley (Texas State 2024). There are currently no studies that discuss the extent of future tornadoes in New England. At this point in time, it is possible that future climate conditions may influence the extent of future tornadoes in Exeter and West Greenwich, but additional data is needed.
Impact	While the full understanding of how future climate conditions are influencing tornadoes in New England is still being researched, historical tornadoes in Exeter and West Greenwich have not had severe impacts. If tornadoes become more frequent and more severe than historical ones, then impacts to the Town are likely to increase with increased potential for infrastructure damages and potential physical impacts to residents.
Probability of Future Events	Research suggests there is a greater risk of more off-season tornadoes in a warmer future climate. This could mean more tornadic activity at a time of year when people are expecting it the least. Results are inconclusive for whether tornadoes could become more or less frequent during the traditional severe weather season (NOAA 2023). At this point in time, it is possible that future climate conditions may influence the probability of future tornadoes in Exeter and West Greenwich, but additional data is needed.
Changes in Population Patterns	While the full understanding of how future climate conditions are influencing tornadoes in New England is still being researched, historical tornadoes in Exeter and West Greenwich have not had severe impacts. Therefore, it is possible that future tornadoes will impact future population patterns in Exeter and West Greenwich. Additionally, an increase in population would likely have similar impacts as land use development increases.
Changes in Land Use Development	While the full understanding of how future climate conditions are influencing tornadoes in New England is still being researched, historical tornadoes in Exeter and West Greenwich have not had severe impacts. Therefore, it is possible that future tornadoes will impact future land use development in Exeter and West Greenwich. Increased tornado events may influence future land use development through building and safety standards as areas with frequent tornadoes may require the use of tornado-resistant designs and materials, potentially including reinforced structures, safe rooms, and storm shelters. Roads and utilities may need to be designed for resilience against tornadoes, which could lead to improved standards for utility and road construction and maintenance to ensure access during and after severe weather events. Future land use planning might prioritize community education programs about tornado risks and preparedness, promoting awareness and proactive measures in new developments.

3.3.10 Earthquake

3.3.10.1 Description

An earthquake is the result of a sudden release of energy in the Earth's crust that creates seismic waves. This sudden movement can be felt at sometimes very distant sites from the epicenter, and it usually occurs without warning. The movement can build rapidly after just a few seconds and cause significant, sometimes catastrophic, damage and severe numbers of casualties, and this often-violent motion or shaking is the most common effect of earthquakes.

The seismicity or seismic activity of an area refers to the frequency, type and size of earthquakes experienced over a period of time. Earthquakes are measured by a seismometer. The size or magnitude is recorded on a device known as a seismograph.

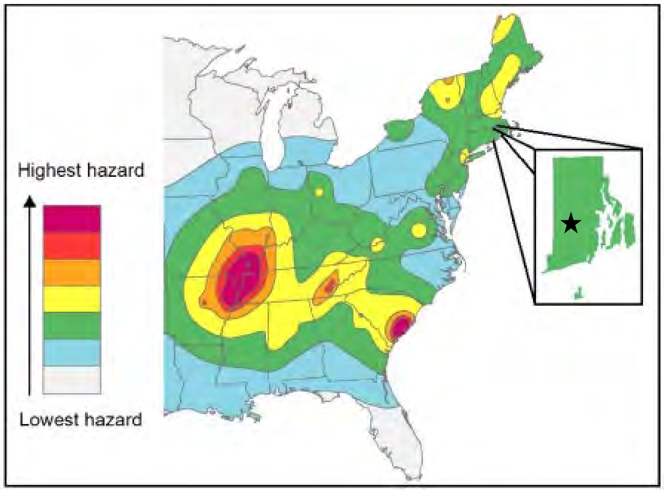
Despite the low probability of a high impact earthquake, physical characteristics in Rhode Island may increase earthquake vulnerability:

- Hard Rock: Due to the geological makeup of New England's base rock, seismic energy is conducted on a greater scale (4-10) times that of an equivalent Richter magnitude earthquake in California).
- Soft Soil: Many coastal regions of New England are made up of soft soils. These soils can magnify an earthquake as much as two times.
- Structures: The New England region, being one of the first settled areas of the United States, has an abundance of older, unreinforced masonry structures that are inherently brittle and very vulnerable to seismic forces.
- Low Public Awareness of Vulnerability: Little public recognition of earthquake threat, and no established system of educating or informing the public of the threat or how to prepare for or respond during an earthquake. Therefore, higher losses will occur here than in other regions of the country.

3.3.10.2 Location

Rhode Island is located in the North Atlantic tectonic plate and is in a region of historically low seismicity. Additionally, the underlying geology of the State is largely composed of unsorted rock of varying size that is considered geologically stable and not prone to seismic amplification (RIEMA 2024).

Figure 53 shows the earthquake hazard potential for the eastern United States, with the entire state of Rhode Island being towards the lower end of the hazard potential. The Towns of Exeter and West Greenwich are indicated with the star on the map below.



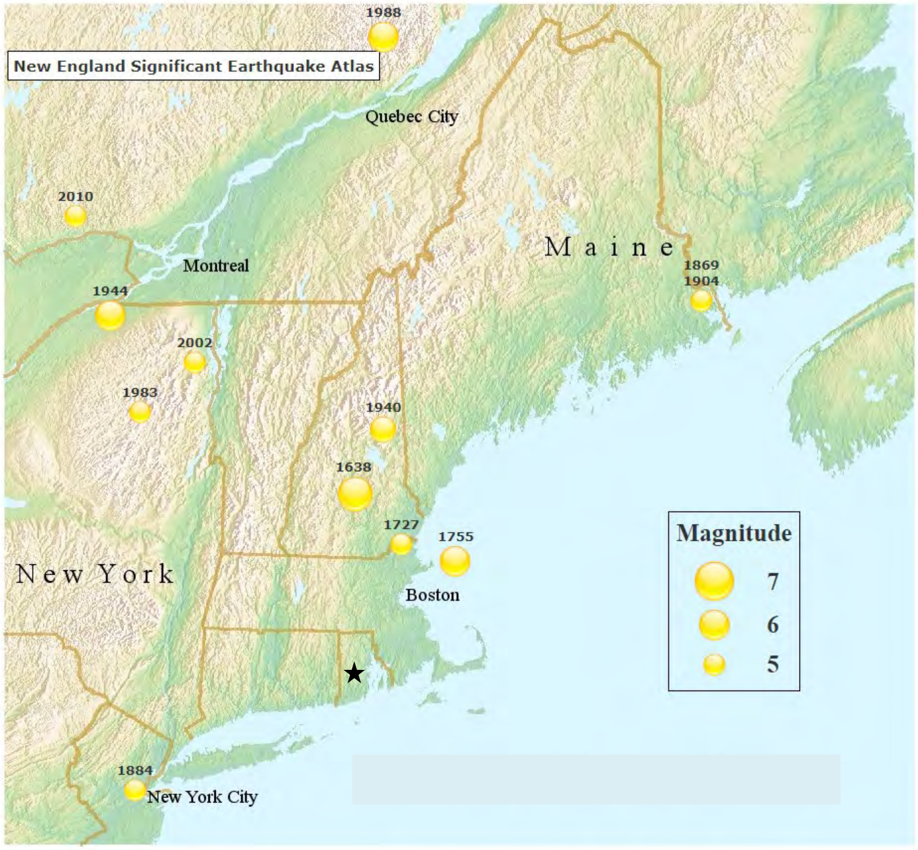
Source: USGS 2018

Figure 53- Rhode Island Earthquake Hazard Map

3.3.10.3 History

The United States Geologic Survey (USGS) and the Boston College Weston Observatory maintain earthquake records for the State of Rhode Island (RIEMA 2024). Data indicates that while the State has had numerous earthquakes, the largest on record occurred in June 1951 in Kingston and was measured at a 4.6 on the Richter Scale. For both the USGS and Weston Observatory, reported earthquakes before 1951 had no recorded measured intensity (RIEMA 2024).

The Richter Scale measures the energy released by an earthquake using a seismograph. The Mercalli Intensity Scale measures the intensity of an earthquake by observing its effect on people, the environment and the earth's surface. The Modified Mercalli Scale (MMI) is the current standard for measuring intensity of earthquakes. The MMI is outlined in Table 46.



Source: Boston College Weston Observatory 2024

Figure 54- Map of Significant Earthquakes in New England

Table 45 lists historical earthquakes, M3.0 and greater within 60 miles of Exeter and West Greenwich, from 1900 – October 18, 2024. No damage was reported in Exeter and West Greenwich as a result of any of these earthquakes.

Since the 2005 HMPs, there have been 2 earthquakes with a magnitude 3.0 and greater within 60 miles of Exeter and West Greenwich.

Table 45- Historical Earthquakes M3.0 and Greater within 60 miles of Exeter and West Greenwich

Date	Latitude	Longitude	Magnitude	Location
03/11/1976	41.56	-71.21	3.5	5 km SE of Portsmouth, Rhode Island
12/20/1977	41.84	-70.7	3.1	7 km NW of White Island Shores, Massachusetts
10/21/1981	41.15	-72.58	3.8	14 km S of Madison Center, Connecticut
01/27/1982	41.87	-70.97	3	2 km WNW of North Lakeville, Massachusetts
06/17/1982	41.508	-72.377	3	6 km E of Moodus, Connecticut
08/24/1989	41.614	-70.899	3	2 km S of Fairhaven, Massachusetts
03/22/1996	41.69	-71.242	3.1	2 km NE of Bristol, Rhode Island
01/12/2015	41.7482	-71.9019	3.3	0 km NE of Wauregan, Connecticut
11/08/2020	41.5208	-70.9546	3.6	10 km S of Bliss Corner, Massachusetts

Source: USGS 2024

3.3.10.4 Extent

Both the intensity and magnitude are considered during the measurement of the severity of earthquakes. The observed level of damage and effects on people, nature, and human structures are variables when describing the intensity. The severity of intensity generally increases with the amount of energy released and decreases with distance from the fault or epicenter of the earthquake. The scale most often used in the U.S. to measure intensity is the MMI Scale.

As shown in Table 46, the MMI Scale consists of 10 increasing levels of intensity that range from imperceptible to catastrophic destruction. Peak ground acceleration (PGA) is also used to measure earthquake intensity by quantifying how hard the earth shakes in a given location or measured as acceleration due to gravity (g). The USGS describes the MMI Scale as:

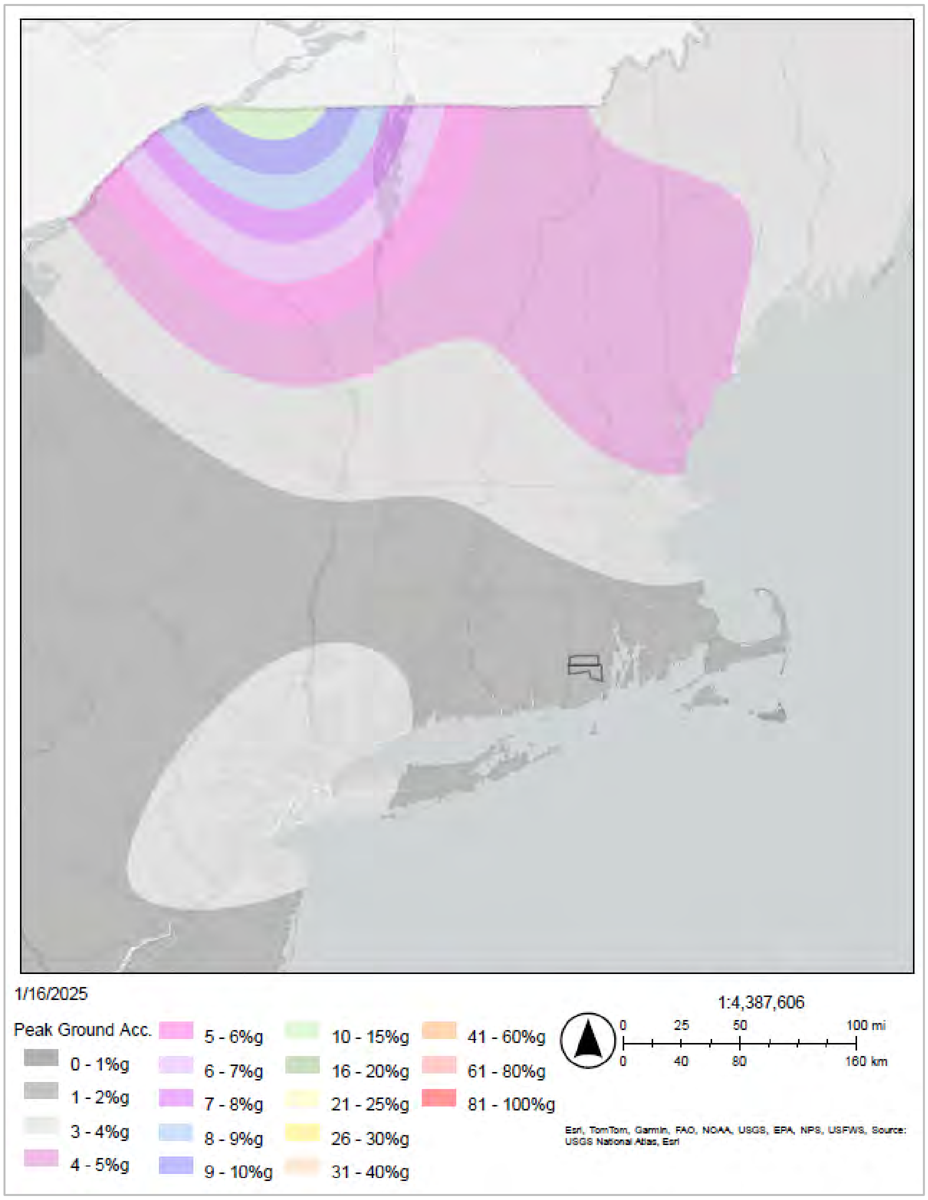
"The effect of an earthquake on the Earth's surface is called the intensity. The intensity scale consists of a series of certain key responses such as people awakening, movement of furniture, damage to chimneys, and finally - total destruction. Although numerous intensity scales have been developed over the last several hundred years to evaluate the effects of earthquakes, the one currently used in the United States is the MMI Scale. The MMI value assigned to a specific site after an earthquake has a more meaningful measure of severity to the non-scientist than the magnitude because intensity refers to the effects actually experienced at that place."

The following table is an abbreviated description of the comparisons of earthquake magnitude, intensity, PGA, perceived shaking, and damage.

Table 46- Magnitude/Intensity/Ground-Shaking Comparisons

Magnitude	Intensity	PGA (%g)	Perceived Shaking	Damage
1.0-3.0	I	<0.0464	Not felt	None
3.0-3.9	II-III	0.0464-0.297	Weak	None
4.0-4.9	IV	0.297-2.76	Light	None
	V	2.76-11.5	Moderate	Very light
5.0-5.9	VI	11.5-21.5	Strong	Light
	VII	21.5-40.1	Very Strong	Moderate
6.0-6.9	VIII	40.1-74.7	Severe	Moderate/Heavy
	IX	74.7-139	Violent	Heavy
7.0+	X+	>139	Extreme	Very Heavy

Figure 55 shows Rhode Island's PGA potential. The entire Exeter and West Greenwich Planning Area is located in the 2% g category, which falls in the Magnitude 3.0-3.9/Intensity II-III (weak shaking, no damage) category above.



Source: RIEMA 2024

Figure 55- Rhode Island Potential Peak Ground Acceleration Map

FEMA's National Risk Index states that Exeter and West Greenwich have the following planning significance related to earthquake:

Jurisdiction	Earthquake NRI	Earthquake EAL
Exeter	Very Low	Very Low
West Greenwich	Very Low	Very Low

Source: FEMA National Risk Index (www.hazards.fema.gov/nri/map)

EAL: Expected Annual Loss

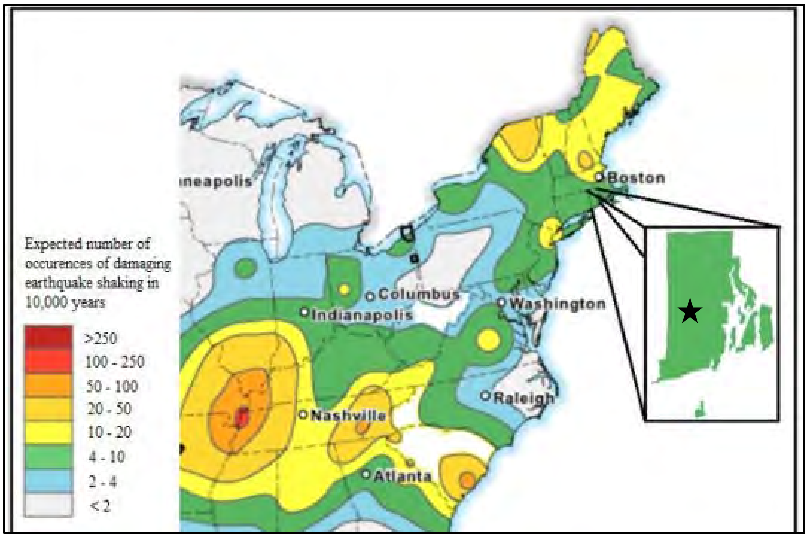
NRI: National Risk Index= (Expected Annual Loss x Social Vulnerability) ÷ Community Resilience

Based on the extent of past events and the criteria identified in Table 7, the extent of earthquakes in Exeter and West Greenwich are considered **Negligible** with the potential of minor injuries; no shutdown of critical infrastructure and facilities; scattered incidental residential and commercial structure damage; and few or no operations impacted for short amounts of time.

3.3.10.5 Probability of Future Occurrence

While it is not possible to predict an earthquake, the USGS has developed earthquake probability maps that use the most recent earthquake rate and probability models to predict future earthquake potential.

Figure 56 illustrates potential earthquake events in Rhode Island. This map estimates the number of damaging earthquakes in 10,000 years. The entire state of Rhode Island is in the category of 4-10 expected number of earthquakes in 10,000 years.



Source: USGS 2022b

Figure 56- Rhode Island Earthquake Probability

Based on previous events and the criteria identified in Table 8, it is **Possible** that Exeter and West Greenwich will experience an earthquake event in the calendar year; there is a between 1-49.9% annual probability of occurring. However, it is unlikely that future earthquakes will cause significant damage to the Towns.

3.3.10.6 Impact

The HMPCs recognizes that the potential for an earthquake to significantly shake the Towns of Exeter and West Greenwich is low, but the hazard could afflict damage in both Towns, causing power outages, building collapses, water main breaks, dam failures, gas leaks, fires, and injuries or deaths. Loss of power due to damaged power lines and infrastructure may prevent access to potable water from private wells.

Structures in Exeter and West Greenwich may be particularly vulnerable to the effect of a moderate to large earthquake as seismic design criteria are not required for either new building construction or old building renovation. Buildings that are most at risk from earthquakes are the old masonry buildings and large structures such as those in the Historic Districts.

3.3.10.7 Future Conditions

It is unlikely that future climate conditions will influence the nature, location, extent, impact, or recurrence probability of future earthquakes on human timescales, including population and land use and development (RIEMA 2024).

3.3.11 Hazardous Materials Incident

3.3.11.1 Description

Hazardous materials incidents are an incredibly common hazard affecting communities. These events can happen at any scale, from poorly maintained vehicles leaking fluids onto roadways and parking spots to large scale incidents that can disrupt the normal functioning of a community as well as whole ecosystems. Because of the breadth of scope of hazardous materials incidents, many go unreported and undetected, further complicating mitigation efforts.

Hazardous materials incidents can be unintentional or intentional, like pouring household chemicals into the drain instead of disposing of them properly. Unfortunately, bad actors can exploit these necessary but hazardous materials to cause harm.

In addition to a standalone hazardous materials incident, naturals hazards such as floods and hurricanes can rupture pipelines and overturn containers, creating domino effects and compounding the difficulty of normal response and recovery activities.

The Federal Motor Carrier Safety Administration identifies nine classes of hazardous materials (FMCSA 2013):

1. Explosives
2. Gases
3. Flammable Liquid and Combustible Liquid
4. Flammable Solid, Spontaneously Combustible, and Dangerous When Wet
5. Oxidizer and Organic Peroxide
6. Poison (Toxic) and Poison Inhalation Hazard
7. Radioactive
8. Corrosive
9. Miscellaneous

The 2024 State of Rhode Island Hazard Mitigation Plan lists two types of hazardous substances:

- Extremely Hazardous Substances: Materials that have acutely toxic chemical or physical properties and may cause irreversible damage or death to people or harm the environment if released or used outside their intended use.
- Hazardous Substances: Materials posing a threat to human health and/or the environment, or any substance designated by the EPA to be reported if a designated quantity of the substance is spilled into waterways, aquifers, or water supplies or is otherwise released into the environment.

The 2024 State of Rhode Island Hazard Mitigation Plan lists the following examples of transportation incidents:

- Chemical Spills on Highways: Accidents involving trucks carrying hazardous chemicals can result in spills on highways. This can lead to the incident of toxic, flammable, or corrosive substances, posing risks to people, the environment, and emergency responders.
- Train Derailments: Train derailments can result in the incident of hazardous materials from tanker

cars. These incidents can occur on both freight and passenger rail lines and may involve chemicals, fuels, or other hazardous substances.

- Aircraft Hazmat Incidents: Cargo planes and commercial aircraft can carry hazardous materials as cargo. Incidents may involve leaks, fires, or other issues related to hazardous materials on board.
- Marine Spills: Incidents involving the transport of hazardous materials by sea can lead to marine spills. These spills may involve oil, chemicals, or other substances, and can have significant environmental and economic consequences.
- Pipeline Leaks: Pipelines transport hazardous liquids and gases over long distances. Leaks or ruptures in pipelines can result in the incident of hazardous materials into the environment.
- Radiological Transport Incidents: The transport of radioactive materials, including medical isotopes and nuclear fuel, carries the risk of accidents that can result in the incident of radioactive substances. These incidents can have serious health and environmental consequences.
- Chemical Fires in Transit: Fires in transit vehicles carrying hazardous chemicals can be particularly challenging to control. Fires may cause chemical reactions, leading to toxic smoke or explosions.
- Cargo Container Incidents: Shipping containers transported by truck or rail can contain hazardous materials. Incidents involving these containers may include leaks, fires, or chemical reactions.
- Intermodal Transport Incidents: When goods are transferred between different modes of transportation (e.g., ship to truck), there is the potential for mishandling or spills during these transfers.

Based on the historical hazardous materials incidents (Table 48), the following types of contaminants have been released:

- Diesel fuel
- Waste oil
- Gasoline
- Transformer oil
- Hydraulic fluid
- Paint
- Paint thinner
- Kerosene
- Motor oil
- Pool chemicals
- Potassium hydroxide
- Toxic gas
- Resin
- Calcium carbonate
- Freon

3.3.11.2 Location

Due to the variety in type and scope, hazardous material incidents can occur anywhere within a community. The 2024 Rhode Island State Hazard Mitigation Plan identifies two categories of potential incident locations:

- Fixed Facility Incidents: Commercial Facilities and Superfund Sites
- Transportation Incidents: Highway, Railway, Pipeline, Air, and Water

Fixed facility incidents largely focus on Tier II and Resource Conservation and Recovery Act (RCRA) facilities. Tier II facilities produce or store chemicals subject to the Emergency Planning and Community Right-to-Know Act, Section 312, which mandates reporting on the following thresholds (EPA 2024a):

- Extremely Hazardous Substances: 500lbs or the threshold planning quantity, whichever is lower.
- Hazardous Substances: 10,000lbs
- Gasoline in underground tanks at retail gas stations: 75,000 gallons
- Diesel in underground tanks at retail gas stations: 100,000 gallons

The RCRA is the policy tool used by the EPA to regulate hazardous waste from “cradle-to-grave;” it categorizes facilities by their “interest” type. Exeter and West Greenwich, for example, are home to the following interest types:

Table 47- Resource Conservation and Recovery Act Facilities

Very Small Quantity Generators (VSQG)	• Less than 100 kg of hazardous waste during any calendar month and less than less than 1,000 kg of hazardous waste accumulated at any time. • Less than 1 kg of acutely hazardous waste (a subset of extremely hazardous substances that can be fatal to humans in small doses and even when handled properly) during any calendar month and accumulated at any time. • 100kg or less of any residue or contaminated soil, waste, or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste during any calendar month, and less than 100 kg of that material accumulated at any time
Small Quantity Generator (SQG)	• More than 100 and less than 1,000 kg of hazardous waste during any calendar month and less than 6,000 kg of hazardous waste accumulated at any time. • 100 kg or less of hazardous waste during any calendar month, and more than 1,000 kg of hazardous waste accumulated at any time
Large Quantity Generator (LQG)	• 1,000 kg or more of hazardous waste during any calendar month • More than 1 kg of acutely hazardous waste during any calendar month • More than 100 kg of any residue or contaminated soil, waste, or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste during any calendar month. • 1 kg or less of acutely hazardous waste during any calendar month, and more than 1 kg of acutely hazardous waste accumulated at any time • 100kg or less of any residue or contaminated soil, waste, or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste during any calendar month, and more than 100 kg of that material accumulated at any time
Other Hazardous Waste Activities	• Include: importers of hazardous waste; mixed hazardous/radioactive waste generators; small quantity on-site burner exemption sites; smelting, melting, and refining furnace exemption sites; short-term generators; underground injection control sites; off-site receiver of hazardous waste; recycler; or universal waste handler

Source: EPA 2013, EPA 2019b, EPA 2024b

Exeter and West Greenwich are also home to two brownfields, sites which pose a potential risk of hazardous materials incident through their expansion, redevelopment or reuse (RIDEM 2022). These sites are located at 659 South County Trail in Exeter and 86 Hopkins Hill Road in West Greenwich (Figure 57).

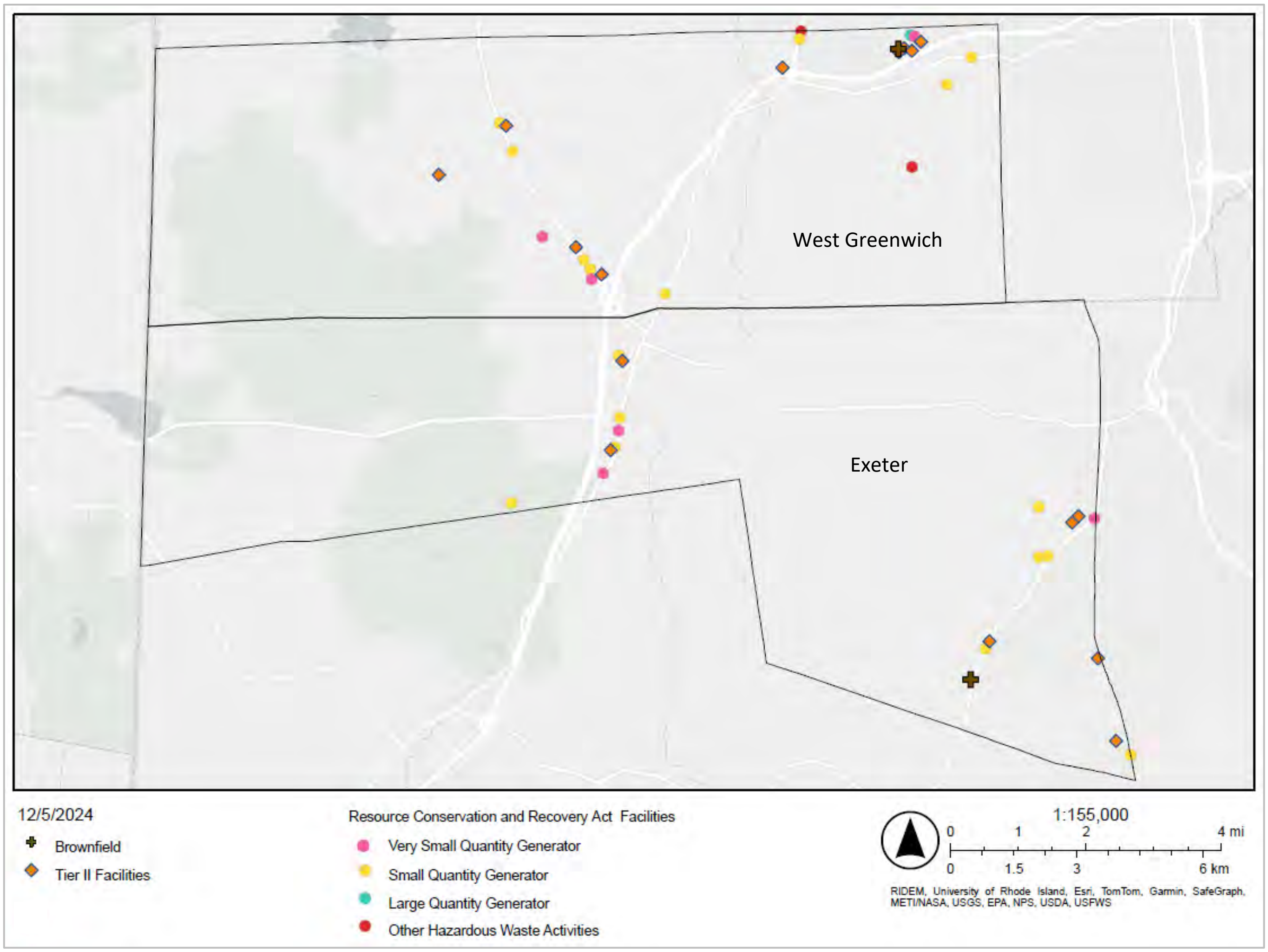


Figure 57- Brownfields, Tier II Facilities, and RCRA Facilities in Exeter and West Greenwich

Large-scale hazardous materials incidents and industrial pollution pose the highest risk to communities located near their points of production or storage as well as along major transportation arteries.

Currently, most hazardous materials incidents are small in scale and occur around major transportation corridors. Major transportation routes in Exeter and West Greenwich include I-95, Victory Hwy, Nooseneck Hill Rd, Division Rd, Ten Rod Rd, S. County Trail, and 1.8 miles of railroad tracks in southeast Exeter (Figure 58). The HMPC states that there is significant community concern around the local truck stops along these corridors.

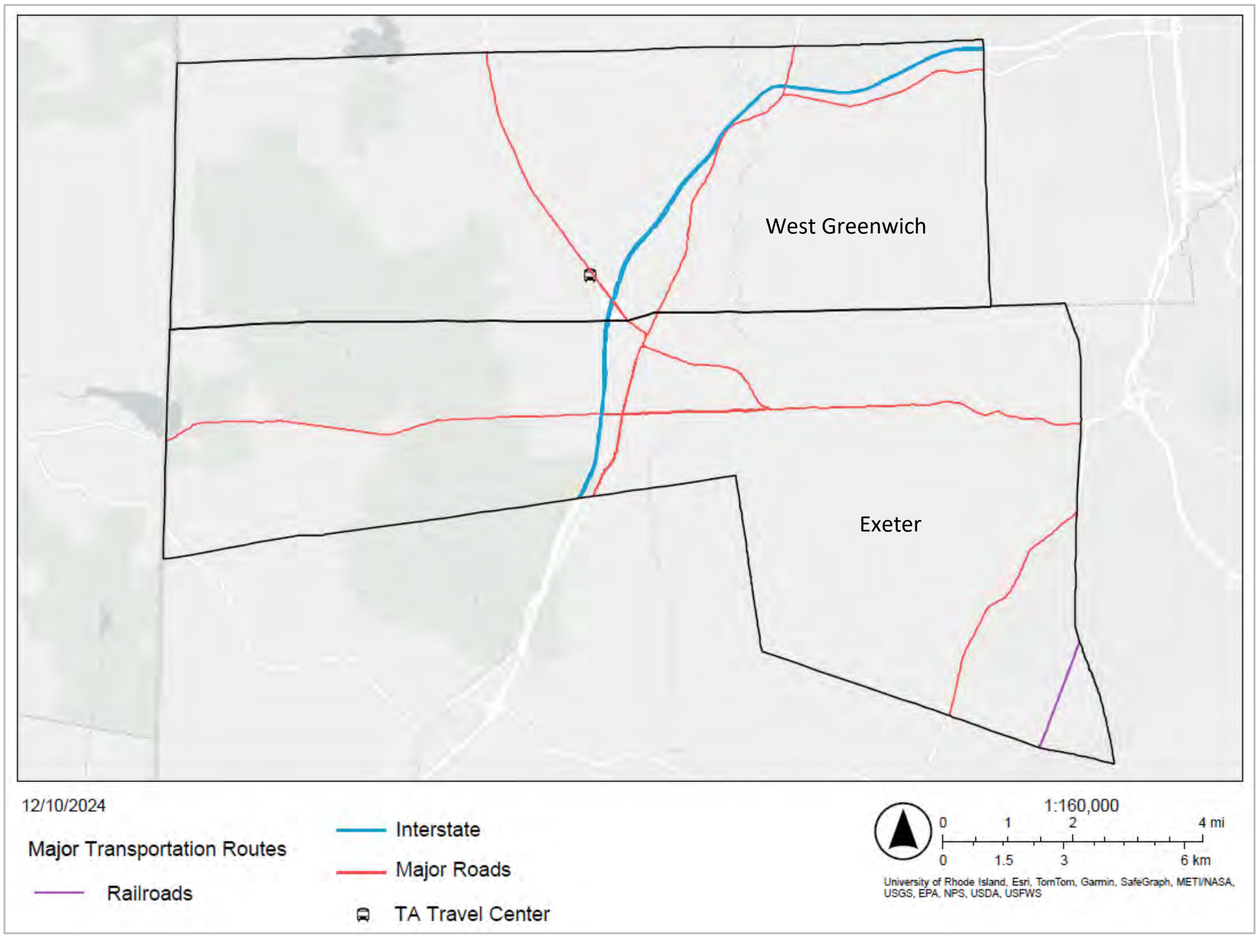


Figure 58- Major Transportation Routes in Exeter and West Greenwich

3.3.11.3 History

Based on HMPC comments, locally available data, data provided by RIDOT, and the 2024 Rhode Island State Hazard Mitigation Plan, there is no history of a major hazardous materials incident in Exeter and West Greenwich within the past 15 years. However, smaller spills are an everyday occurrence and go underreported. While these smaller spills pose much less risk to communities, they can add up slowly and begin to affect local watersheds and the environment.

Figure 59 provides the locations of historical hazardous materials incidents in Exeter and West Greenwich. Note: incidents without reported addresses (ex: I-95 in Exeter) are not included in this map. Table 48 provides details on these events.

The orange entries in Table 48 below represent hazardous materials releases which occurred at the TA Travel Center at 849 Victory Highway in West Greenwich. The HMPC has identified this truck stop as a local concern and potential hazard.

Since 2015, there have been 123 smaller hazardous materials incidents that have impacted Exeter and West Greenwich.

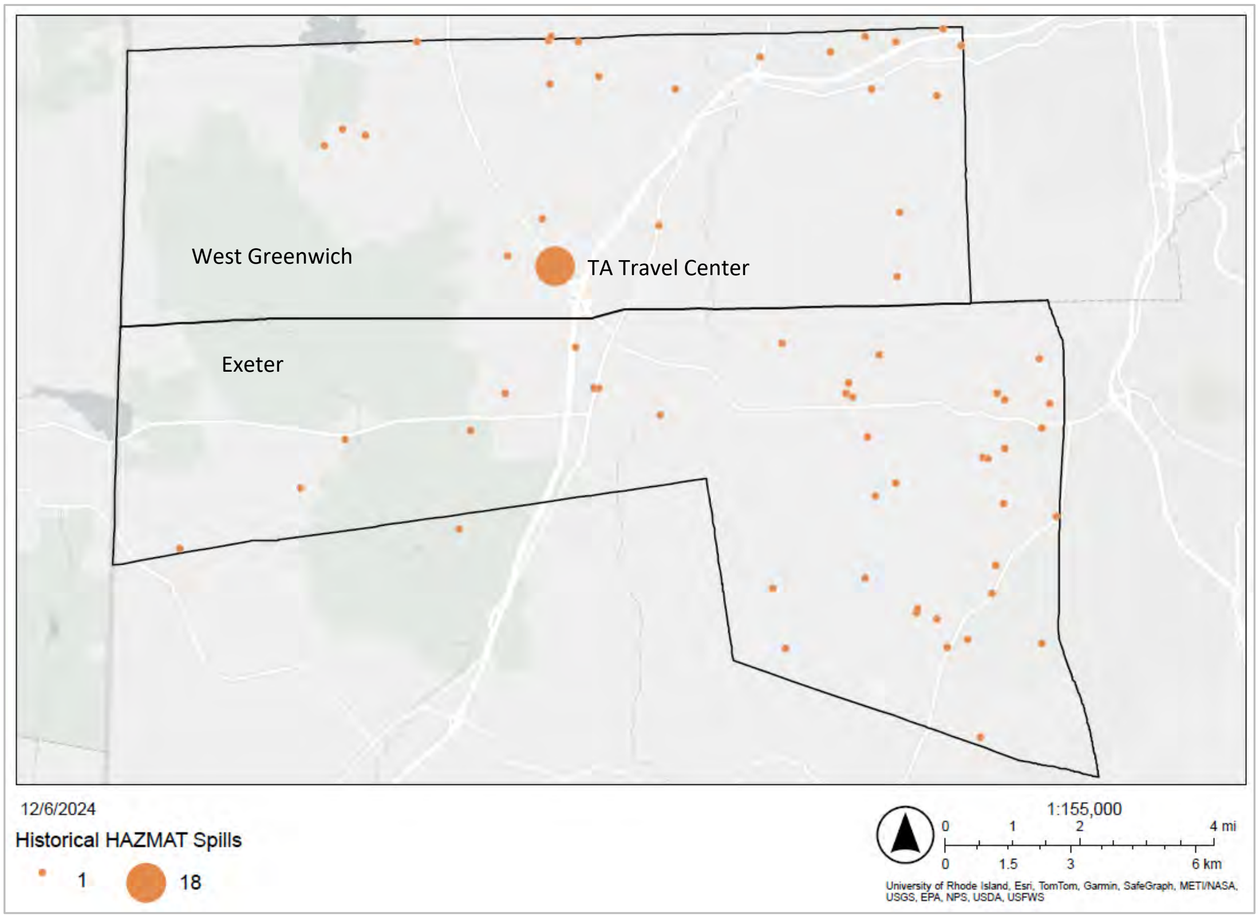


Figure 59- Locations of Historical Hazardous Materials Incidents in Exeter and West Greenwich

Table 48- Historical Hazardous Materials Incidents in Exeter and West Greenwich

Date	Community	Source	Extent	Narrative
11/8/2010	West Greenwich	Fuel Tank	100-gallons	Approximately 100 gallons of diesel spilled from a ruptured fuel tank. While the driver was exiting the property, they struck a short concrete wall, puncturing the tank. Rainy conditions at the time washed the spilled fuel across the street and into culverts on either side. The West Greenwich Fire Dept. deployed spill booms in response, while waiting for an environmental remediation contractor. 1,200 gallons of mixed oil and water was removed.
No data between 11/2010 – 11/2014				
11/25/2014	West Greenwich	Waste Oil	3-gallons	Approximately 3 gallons of waste oil spilled onto soil. Employees of the facility used a spill kit to address the spill and placed the affected soil into drums for removal.
3/4/2015	Exeter	Fuel Pump	30-gallons	Car drove off with fuel nozzle still attached.
4/22/2015	Exeter	Transformer	10-gallons	Transformer oil leak due to corrosion.
4/28/2015	West Greenwich	Gas Tank	10-gallons	Gas tank fell off the back of a truck.
6/6/2015	Exeter	Heavy Equipment	40-gallons	Machinery was being accidentally dragged by a truck and caught fire, releasing hydraulic oil to the road and soil.

Date	Community	Source	Extent	Narrative
6/9/2015	West Greenwich	Abandoned Cans	(10) 1-gallon cans	Abandoned cans of paint were found on the side of the road.
6/11/2015	West Greenwich	Transformer	12-gallons	Downed transformer due to MVA.
9/19/2015	West Greenwich	Motor Vehicle	1-gallon	Small release of hydraulic oil from vehicle.
9/30/2015	Exeter	Abandoned Container	3.5-gallons	Abandoned container of waste oil.
10/30/2015	Exeter	Transformer	20-gallons	Transformer oil spill due to vandalism.
12/14/2015	West Greenwich	Abandoned Containers	16-gallons	Abandoned container of waste oil and small containers of flammable paint found in abandoned house.
12/16/2015	West Greenwich	Fuel Line	4-gallons	Leak from damaged fuel line from vandalism (attempting to steal copper).
1/23/2016	West Greenwich	Transformer	13-gallons	Downed transformer due to MVA.
2/1/2016	Exeter	Oil Tank	160-gallons	Leaking kerosene tank due to age-of-tank failure.
3/9/2016	West Greenwich	Abandoned Drums	70-gallons	Drums filled with waste oil found after a scheduled pickup.
3/22/2016	Exeter	Oil Tank	50-gallons	Heating oil leak from tank due to age-of-tank failure.
8/22/2016	Exeter	Oil Tank	0.25-gallons	Small heating oil leak due to age-of-tank failure.
12/4/2016	Exeter	Oil Tank	275-gallons	Heating oil leak from tank due to potential vandalism.
1/11/2017	Exeter	Transformer	2-gallons	Downed transformer due to snowstorm.
2/10/2017	West Greenwich	Transformer	3-gallons	Downed transformer due to snowstorm.
3/14/2017	West Greenwich	Tractor Trailer	60-gallons	Diesel spill from MVA resulting in soil contamination.
3/16/2017	West Greenwich	Garbage Truck	6-gallons	Motor oil leak from oil pan on truck.
3/29/2017	West Greenwich	Liquid Spills		
4/29/2017	Exeter	Historical Oil Spill	25-gallons	Unfinished remediation was reported at the property from a previous heating oil release.
5/5/2017	West Greenwich	Truck	1-gallon	Small fuel leak from truck fire.
5/15/2017	Exeter	Oil Tank	15-gallons	An oil tank was removed from a property, cut up, and transported in a truck bed while leaking along the roadway.
6/20/2017	Exeter	Tractor Trailer	2-gallons	Small release of fluids from tractor trailer rollover.
6/20/2017	West Greenwich	Motor Vehicle	10-gallons	Gas tank punctured on motor vehicle and leaked along the highway.
6/20/2017	Exeter	Liquid Spills		
6/21/2017	Exeter	Tractor Trailer	30-gallons	Motor oil, gasoline and hydraulic oil leak from truck rollover.
7/7/2017	Exeter	Liquid Spills		
8/15/2017	West Greenwich	Transformer	13-gallons	Transformer oil release due to unknown cause.
11/3/2017	West Greenwich	Transformer	5-gallons	Transformer oil release due to unknown cause.
11/13/2017	West Greenwich	Transformer	1-gallon	Transformer oil release due to unknown cause.
12/3/2017	West Greenwich	Oil Tank	0.25-gallons	Small heating oil tank leak.
1/15/2018	West Greenwich	Oil Tank	4-gallons	Leaking heating oil tank.
3/3/2018	Exeter	Transformer	10-gallons	Transformer oil leak due to storm.
3/4/2018	West Greenwich	Liquid Spills		
3/8/2018	Exeter	Transformer	3-gallons	Transformer oil leak due to downed tree.
3/8/2018	Exeter	Transformer	3-gallons	Transformer oil leak due to storm.

Date	Community	Source	Extent	Narrative
3/14/2018	Exeter	Transformer	9-gallons	Transformer oil leak due to storm.
5/26/2018	Exeter	Transformer	2-gallons	Transformer oil leak due to unknown cause.
7/11/2018	Exeter	Shed Fire	N/A	Pool chemicals involved in fire; extinguished and no release of any chemicals.
7/18/2018	West Greenwich	Punctured Drum	20-gallons	Potassium hydroxide release due to punctured drum.
8/13/2018	West Greenwich	Motor Vehicle	4-gallons	Small fuel leak due to MVA.
8/27/2018	Exeter	Oil Tank	1-gallon	Leaking heating oil tank.
10/8/2018	West Greenwich	Motor Vehicle	5-gallon	Small fuel spill from MVA.
10/9/2018	Exeter	Abandoned Buckets	(8) 1-gallon buckets	Buckets with old motor oil found on side of the road.
11/2/2018	Exeter	Motor Vehicle	Minimal	Minimal amount of gasoline down the highway due to MVA; most fuel burnt up in the fire.
12/3/2018	Exeter	Motor Vehicle	20-gallons	Fuel and other fluids leaked from MVA.
1/15/2019	West Greenwich	Motor Vehicle	1-gallon	Small motor oil leak from vehicle.
1/28/2019	Exeter	Motor Vehicle	5-gallons	Small fuel leak from MVA.
4/20/2019	West Greenwich	Delivery Truck	0.25-gallons	Small heating oil spill from truck.
5/1/2019	Exeter	Delivery Truck	2-gallons	Small diesel release from tank overfill.
5/29/2019	West Greenwich	Liquid Spills		
7/13/2019	Exeter	Abandoned Buckets	(6) 5-gallon buckets	New buckets with fuel found in woods.
8/7/2019	West Greenwich	Tractor Trailer	100-gallons	Operator failure while refueling resulting in large fuel leak. A malfunctioning switch-over valve on a truck fuel tank caused a 100 gallon spill. 800 lbs oily debris was removed. No drains or waterways were affected.
8/7/2019	West Greenwich	Fuel Pump	5-gallons	Broken nozzle on pump resulting in fuel leak (unreported; employees found cleaning when DEM arrived for separate incident). 120 lbs oily debris was removed. No drains or waterways were affected.
8/13/2019	West Greenwich	Unknown	15-gallons	An unknown source caused a 15 gallon spill. Responders were unsure if diesel had affected nearby waterways or wells due to rain in the area at the time. Three 55-gal drums of oily debris was removed.
8/21/2019	West Greenwich	Heavy Equipment	30-gallons	Hydraulic oil leak from mechanical issue with heavy equipment.
9/19/2019	Exeter	Bucket Truck	10-gallons	Blown hydraulic line caused release onto gravel.
9/27/2019	West Greenwich	Fuel Pump	3-gallons	An overfilled fuel tank caused a 3 gallon spill at the pump station. The facility responded with absorbent material and stored the debris for removal. 500 lbs oily debris was removed. No drains or waterways were affected.
10/15/2019	West Greenwich	Fuel Pump	50-gallons	An overfilled fuel tank caused a 50 gallon spill, requiring an environmental remediation contractor for cleanup. No drains or waterways were affected.
10/21/2019	Exeter	Transformer	15-gallons	Downed tree caused damage to a transformer resulting in a transformer oil leak.
10/24/2019	West Greenwich	Abandoned Buckets	(7) 5-gallon buckets	Buckets found on the side of the road containing waste petroleum product.

Date	Community	Source	Extent	Narrative
11/21/2019	Exeter	Motor Vehicle	Immediate area	Chemical reaction in vehicle resulting in the release of toxic gases; neutralized by HazMat Team. Gases dissipated naturally.
11/26/2019	West Greenwich	Tractor Trailer	5-gallons	Leak from tractor trailer fuel tank.
12/5/2019	West Greenwich	Transformer	14-gallons	Downed transformer due to MVA.
12/10/2019	West Greenwich	Paint Cans	30-gallons	Abandoned paint cans on DEM property.
12/19/2019	West Greenwich	Runoff	Retention Pond	While on-site for unrelated incident, oil was found floating in the retention pond from likely historical incident.
12/19/2019	West Greenwich	Fuel Pumps	30-gallons	An overfilled fuel tank caused a 30 gallon spill at the facility, requiring an environmental remediation contractor for cleanup. One 55-gal drum of oily debris.
1/28/2020	West Greenwich	Tractor Trailer	40-gallons	A mechanical failure on a fuel tank caused a 40 gallon fuel spill across a soil area 2 feet by 120 feet. The spill required an environmental remediation contractor for cleanup, including the removal of 33 tons of affected soil.
6/4/2020	Exeter	Abandoned buckets	(2) 5-gallon containers	Flammable resin spilled from tipped over containers.
8/17/2020	West Greenwich	Tractor Trailer	25-gallons	A 25 gallon spill required an environmental remediation contractor for cleanup. Eight 55-gal drums of oily debris was removed. No drains or waterways were affected.
11/8/2020	West Greenwich	Motor Vehicles	5-gallons	Vandalism causing a release of fuel from several vehicles.
1/19/2021	West Greenwich	Abandoned buckets	(2) 5-gallon Buckets	Buckets containing motor oil on side of road.
3/27/2021	West Greenwich	Abandoned Drum/Tote	55-gallons	Oil spill on roadway from dumped tote and 55-gallon drum.
3/29/2021	West Greenwich	Liquid Spills		
5/17/2021	Exeter	Motor Vehicle	15 gallons	Diesel release from MVA involving tow truck.
8/3/2021	West Greenwich	Oil Truck	0.5-gallons	Small leak of heating oil from delivery truck.
8/23/2021	Exeter	Transformer	1-gallon	Transformer oil spill due to hurricane.
9/15/2021	West Greenwich	Motor Vehicle	20-gallons	Hydraulic oil leak from damaged vehicle.
10/5/2021	West Greenwich	Liquid Spills		
10/5/2021	West Greenwich	Liquid Spills		
10/28/2021	West Greenwich	Transformer	4-gallons	Small leak from downed transformer due to windstorm.
10/28/2021	West Greenwich	Transformer	9-gallons	Small leak from downed transformer due to windstorm.
11/15/2021	Exeter	Liquid Spills		
12/3/2021	West Greenwich	Fuel Pumps	20-gallons	Unknown cause; diesel release at fuel pumps.
1/19/2022	West Greenwich	Tractor Trailer	25-gallons	A 25 gallon spill required an environmental remediation contractor for cleanup. No drains or waterways were affected.
1/26/2022	Exeter	Motor Vehicle	1-2 gallons	Motor oil spill due to MVA.
2/18/2022	Exeter	Transformer	16-gallons	Downed pole caused transformer oil release.
2/21/2022	Exeter	N/A	(6) 5-quart containers	Abandoned containers of drain oil.
2/24/2022	West Greenwich	Fuel Pumps	50-gallons	An unattended fuel pump caused an overnight spill of 50 gallons, through which other vehicles drove, moving

Date	Community	Source	Extent	Narrative
				spilled fuel into the street. This spill required an environmental remediation contractor and a sweeper truck for cleanup.
3/3/2022	Exeter	Transformer	7-gallons	Leak from downed pole-mounted transformer.
4/19/2022	Exeter	Transformer	7-gallons	Leak from downed pole-mounted transformer.
5/16/2022	Exeter	Motor Vehicle	1-gallon	Motor oil spill due to MVA.
6/16/2022	Exeter	Illegal Dumping	20-pounds	Calcium Carbonate dumped on private property.
6/29/2022	West Greenwich	Oil Tank	10-gallons	Heating oil spill at mobile home.
8/24/2022	West Greenwich	Tractor Trailer	Unknown	A disgruntled customer released 4 lbs of Freon inside of the facility, requiring ventilation of the building.
9/5/2022	Exeter	Liquid Spills		
10/17/2022	West Greenwich	Transformer	19-gallons	Leak from downed pole-mounted transformer.
4/20/2023	Exeter	Oil Tank	5 gal	Home heating oil release.
6/23/2023	Exeter	Heavy Equipment	0.25 gallons	Small hydraulic oil leak from equipment.
6/23/2023	West Greenwich	Liquid Spills		
8/10/2023	West Greenwich	Motor Vehicle	4 gallons	Hydraulic line rupture; absorbent boom deployed in storm drains to absorb all oil.
8/12/2023	West Greenwich	Box Truck	10 gallons	Improper tank filling at the facility caused a 10 gallon spill. The manager of the facility prevented the West Greenwich Fire Dept. from using absorbent materials and elected instead to pour water over the spill. The spill required an environmental remediation contractor for cleanup.
10/2/2023	West Greenwich	Liquid Spills		
10/25/2023	Exeter	Oil Tank	5 gallons	Home heating oil release.
12/5/2023	Exeter	Mobile Home Oil Tank	5 gallons	Small heating oil spill at mobile home.
1/11/2024	Exeter		Abandoned Paint Cans	
2/9/2024	West Greenwich	Oil Tank	1 gallon	Home heating oil release.
3/11/2024	West Greenwich	Transformer	1 gallon	Small transformer oil release due to storm.
3/23/2024	Exeter	Oil Tank	60 gallons	Home heating oil release.
3/25/2024	Exeter		Abandoned Buckets	2 abandoned containers of paint thinner.
4/23/2024	Exeter		Abandoned Cans	2 abandoned 5-gallon cans of fuel.
4/23/2024	Exeter		Abandoned Drum	Abandoned drum of an unknown fuel.
4/24/2024	Exeter		Abandoned Cans	Several abandoned containers of fuel.
5/11/2024	West Greenwich		Inside home	Pool chemical reaction inside home.
5/13/2024	West Greenwich	Motor Vehicle	5-gallons	Diesel spill from vehicle.
5/23/2024	West Greenwich	Fuel Pump	15-gallons	Diesel release at fuel pumps. An overnight, unreported, 15 gallon spill was discovered during an inspection of the facility by RIDEM employees. Facility employees used absorbent materials to address the spill.

Date	Community	Source	Extent	Narrative
7/6/2024	West Greenwich	Oil Tank	20-gallons	Home heating oil release.
8/20/2024	Exeter	Transformer	2-gallons	Small transformer oil release due to MVA.
9/18/2024	Exeter	Heavy Equipment	1 gallon	Small hydraulic oil release from equipment.

Source: RIDOT, RIDEM Office of Emergency Response

3.3.11.4 Extent

The extent of a hazardous materials incident is linked directly to the quantity of the release and the local conditions at the time of incident, such as: incident scope, material in question, method of incident, and local weather conditions. The Rhode Island Department of Environmental Management has established the following benchmarks for hazardous materials incidents:

Table 49- Extent of Oil and Hazardous Materials Spills

Type of Spill	Spill Level	Severity	Material Involved	Size	Extent	Population Affected	Resourced Needed
Oil Spill	Minor	From a known and limited source, no deaths, and only minor injuries if present	Oil	Less than 100 gallons in inland waters and less than 1,000 gallons in coastal waters	Limited to initial area of incident and unlikely to spread (ex. 300 sq ft or less)	Limited; evacuation will be limited to immediate area and can be secured in a short period of time and for a limited duration.	Normally handled by local emergency responders
	Moderate	Poses an uncertain risk to the environment, no deaths, and injuries from minor to severe	Oil	100-1,000 gallons in inland waters or 1,000 to 10,000 in coastal waters, or any volume that poses a threat to the public's health or welfare	Does not disrupt normal community functions, but may cover a large area physically	Evacuations will we considered but achievable with local resources, will not require extended sheltering.	Local agencies may require assistance from other agencies, RIEMA must be notified; US Coast Guard National Response Center may need to be notified
	Major	Results in a serious fire, explosion, or environmental contamination over a large area and will likely grow; injuries and deaths have occurred	Oil	Greater than 1,000 gallons in inland waters or 10,000 gallons in coastal waters; any quantity that substantially threatens the public's health or welfare or that generates wide public interest	A large area may be impacted, potentially disrupting essential community services; extensive environmental contamination is possible	The spill presents an immediate danger to the public and response personnel; evacuations will impact much of the population and disrupt everyday life for several days or more.	Local responders will need assistance from several outside sources.; RIEMA and US Coast Guard National Response Center must be notified; incident command is likely to request [RIDEM] support
Hazardo us	Minor	From a known and limited source, no deaths, and only minor injuries if	Identified material that is not radioactive, water reactive, or	A limited amount of a hazardous substance from	Limited to initial area of incident and unlikely to spread (ex. 300 sq	Limited; evacuation will be limited to immediate area and can be secured in a	Normally handled by local emergency responders,

Type of Spill	Spill Level	Severity	Material Involved	Size	Extent	Population Affected	Resourced Needed
		present	hypergolic; generally, a flammable or combustible liquid; occasionally corrosives.	a small container; generally, 55 gallons or less	ft or less)	short period of time and for a limited duration.	including automatic mutual aid agreements
	Moderate	A spill, incident, or potential incident of a known or unknown hazardous substance; no deaths, and injuries from minor to severe	Toxic, reactive, flammable, corrosive, or biological substance.	Varies in size based upon container size and incident type (ex: small leak, complete container failure)	Limited to several blocks or buildings, but may require special resources to respond	Evacuations will we considered but achievable with local resources will not require extended sheltering.	Local agencies may require assistance from other agencies, RI EMA must be notified; US Coast Guard National Response Center may need to be notified
	Severe	A spill associated with a serious fire, explosion, or toxic/corrosive cloud; injuries and deaths have occurred	Substance producing a toxic/corrosive cloud, is highly reactive or unstable, is flammable or produces significant flammable vapors, is radioactive, or is a chemical/ biological pathogen.	Large amount of a hazardous material or a limited amount of a very dangerous substance	A large area may be impacted, potentially disrupting essential community services; extensive environmental contamination is possible	The spill presents an immediate danger to the public and response personnel; evacuations will impact much of the population and disrupt everyday life for several days or more; may require activation of shelters for evacuees.	Local responders will need assistance from several outside sources.; RIEMA and US Coast Guard National Response Center must be notified; incident command is likely to request [RIDEM] support
	Major	A spill or incident of a hazardous substance that has resulted in a serious fire, explosion or environmental contamination over an extended area	Substance that can be highly toxic, very reactive or unstable, flammable or explosive; etiological agents that are extremely pathogenic.	A large amount of hazardous substances that can affect large areas	Affects a large area and will likely grow; may affect smaller areas but higher density populations in urban areas	Presents an immediate danger to the public and response personnel; evacuations will affect a large area, requiring stages over several hours or days; a large number of the populace is affected.	Mutual aid and significant resources will be required; RIEMA and US Coast Guard National Response Center must be notified

Based on the lack of historical events of a major spill and the criteria identified in Table 7, the extent of hazardous materials incident in Exeter and West Greenwich has been **Limited**, with potential for some injuries; short shutdown of some critical infrastructure and facilities; fewer than 10% of residential and commercial structures damaged; and a small number of local operations impacted for short amounts of time. However, a larger, less common incident has the potential to cause serious harm to the communities, their residents, and the environment.

3.3.11.5 Probability of Future Occurrence

Based on previous events and the criteria identified in Table 8, it is **Highly Likely** that Exeter and West Greenwich will experience a hazardous material incident of any magnitude in the calendar year; there is a 100% annual probability of occurrence. This is due directly to the everyday nature of smaller spills such as poorly maintained vehicles and traffic accidents that spill coolant, oil, and fuel into roadways and drainage systems. On the other hand, larger incidents have a much lower probability but a significantly higher potential extent and impact.

3.3.11.6 Impact

The impact of a hazardous materials incident will depend upon the nature of the material as well as its location and extent.

Residents who live, work, and recreate nearby incidents will be affected to a greater degree than those farther from a gaseous or airborne source. Residents with asthma, breathing issues, and the elderly, young, and sick will be particularly affected by such an incident.

Flora and fauna may also be affected by the incident. Releases that enter waterbodies may affect the waterbody itself, the life within, and the surrounding soil, creating contamination that may require significant effort to remediate. Those contaminants may enter the food chain, affecting everything from algae to humans if they come into direct contact with the contaminated water or eat contaminated fish, wildlife, or vegetation.

The 2024 State of Rhode Island HMP states that:

Acute health effects from a hazardous materials release can include:

- <u>Chemical Exposure</u>: Depending on the type of hazardous material, exposure can lead to symptoms such as respiratory distress, skin burns, eye irritation, nausea, vomiting, and headaches.
- <u>Toxicity</u>: Exposure to highly toxic substances can cause severe poisoning, organ damage, and even death.
- <u>Asphyxiation</u>: Some hazardous materials, like certain gases, can displace oxygen and lead to asphyxiation when inhaled in high concentrations.
- <u>Physical Injuries</u>: Explosive releases or fires involving hazardous materials can cause physical injuries such as burns, cuts, and blunt force trauma.
- <u>Psychological Trauma</u>: Witnessing or being affected by a hazardous materials incident can lead to psychological trauma, including post-traumatic stress disorder and anxiety.

Long-term health effects from a hazardous materials release can include:

- <u>Chronic Illnesses</u>: Exposure to hazardous materials may lead to chronic health conditions, including cancer, respiratory diseases, neurological disorders, and reproductive problems.
- <u>Delayed Effects</u>: Some hazardous substances have delayed health effects, with symptoms appearing days, months, or even years after exposure.

Additionally, a hazardous material release can result in impacted populations requiring:

- <u>Evacuation</u>: To protect public safety, authorities may order evacuations of affected areas, displacing residents from their homes.
- <u>Temporary Shelter</u>: Evacuated individuals may require temporary shelter, food, and medical care.

While all citizens are vulnerable to the effects of hazardous materials, the socially vulnerable and at-risk populations are at most risk. These populations may have difficulty with medical issues, poverty, extremes in age, and communications due to language barriers. These populations suffer a disproportionate impact due to:

- Constrained financial resources potentially hampering evacuation
- Limited access to healthcare
- Limited access to information

As documented by the incident reports at the TA Travel Center in West Greenwich, even small releases can cause significant impacts. On January 28, 2020, the release of only 44 gallons of diesel required the removal and remediation of 33 tons of affected soil. However, if spills can be contained to impervious surfaces, response is much simpler and produces much less waste.

The costs associated with hazardous materials cleanups can be significant and complicated based on: the contaminants characteristics (toxicity, evaporation, flammability, etc); if the contaminant is mixed with another contaminant; property ownership; if the material was being transported when the release occurred; where the spill originated; how long the contaminant has been in the environment; surface and groundwater depths and flow rates; and proximity to drinking water sources.

3.3.11.7 Future Conditions

Nature of the Hazard	It is unlikely that future climate conditions will affect the nature of hazardous materials events in Exeter or West Greenwich.
Location	Future climate conditions are altering the location of natural hazards such as hurricanes, extreme weather, and wildfires; and facilities which do not have experience with these types of hazards may not be prepared to address them. As future climate conditions intensifies natural hazards that may result in a hazardous materials incident, it is possible that new locations which produce, store, and transport hazardous materials may be affected.
Extent	As future climate conditions intensifies natural hazards that may result in a hazardous materials incident, it is possible that local response times will increase with severity of events. As response times increase, hazardous materials releases may go unaddressed for longer, permitting much greater release volumes and spread.
Impact	As future climate conditions intensifies natural hazards that may result in a hazardous materials incident, the associated increase in extent of hazardous materials releases will increase potential impact of these events. With new locations and longer releases over larger areas, it is possible that a higher volume of released material has a greater chance of affecting populations, ecosystems, and the environment near and far from the release site.
Probability of Future Events	It is possible that future climate conditions will influence the probability of future hazardous materials incidents. While smaller spills and releases are already highly likely within a year and happen frequently from residential sources or traffic accidents, the rising intensity and frequency of natural hazards that may result in a hazardous materials incident will likely increase the probability of larger incidents from producers, transporters, and storage facilities.

Changes in Population Patterns	It is possible that future hazardous materials incidents will influence population patterns and where people will want to live. As many natural hazards are intensifying and becoming more frequent due to future climate conditions, increased hazardous materials incidents may force people to move away from hazardous areas. For instance, if a storm causes a chemical plant to leak or spill, nearby populations might be forced to relocate quickly to avoid exposure to toxic substances or drinking water supplies. If there are historic or potential incidents, residents may seek to live as far from the source as possible.
Changes in Land Use Development	It is possible that future hazardous materials incidents will influence land use development patterns in Exeter and West Greenwich. Future climate conditions can significantly influence land use development patterns in the aftermath of a hazardous materials incident or spill by ushing development away from vulnerable regions, altering zoning laws, and driving the repurposing of contaminated land. Additionally, the remediation of contaminated sites and the hardening/upgrading of infrastructure to handle the impacts of hazards influenced by future climate conditions will further shape long term land use trends.

The 2024 Rhode Island State HMP states:

"Changes in climate patterns, such as extreme weather events, floods, or wildfires, can influence the frequency and intensity of hazardous materials incidents. Events like hurricanes, floods, or wildfires may impact facilities handling hazardous materials."

3.3.12 Water Quality (PFAS, Cyanobacteria Blooms)

The protection of Exeter and West Greenwich's natural resources is a priority for both communities. Water quality protection can reduce risks by preventing exposures of contaminated water to the community, wildlife, and recreation users. The specific water quality issues that have been identified by the HMPC for inclusion in this HMP Update include Per- and polyfluoroalkyl substances (PFAS) and Cyanobacteria.

Integrated water protection planning has recently been a collaborative focus of FEMA and the USEPA. Ensuring that program goals and actions are aligned between mitigation plans and natural resource protection (i.e. water quality) plans can support resilience to flooding, drought, water contamination, erosion, and airborne particulates. Further, FEMA has drafted FEMA Community Rating System Program Activity requirement alignments between hazard mitigation plans and water quality planning:

Table 50- FEMA Draft Alignments Between HMPs and WQPs

Hazard Mitigation Planning (HMP)		CRS Program Activity	Water Quality Planning (WQP)	
CRS Activity can provide valuable information for the HMP	Information in the HMP could inform achievement of CRS Activity		CRS Activity can provide valuable information for the WQP	Information in the WQP could inform achievement of CRS Activity
	x	310 Elevation Certificates		
x		320 Map Information Service		
x	x	330 Outreach Projects	x	x
x		340 Hazard Disclosure		
x		350 Flood Protection Information		x
	x	360 Flood Protection Assistance		

Hazard Mitigation Planning (HMP)		CRS Program Activity	Water Quality Planning (WQP)	
CRS Activity can provide valuable information for the HMP	Information in the HMP could inform achievement of CRS Activity		CRS Activity can provide valuable information for the WQP	Information in the WQP could inform achievement of CRS Activity
		370 Flood Insurance Promotion		
x	x	410 Flood Hazard Mapping		
x	x	420 Open Space Preservation	x	x
x		430 Higher Regulatory Standards		x
x		440 Flood Data Maintenance	x	x
x	x	450 Stormwater Management	x	x
x	x	510 Floodplain Management Planning	x	x
x		520 Acquisition and Relocation	x	x
x		530 Flood Protection	x	x
		540 Drainage System Maintenance	x	x
x		610 Flood Warning and Response	x	
	x	620 Levees	x	x
	x	630 Dams	x	x

Source: 2019 ASFPM Conference – Integrating Natural and Nature-Based Infrastructure into Hazard Mitigation Plans: Creating Resilient and Sustainable Communities

3.3.12.1 Description

Per- and Polyfluoroalkyl Substances (PFAS)

Per- and Polyfluoroalkyl Substances (PFAS) were discovered in the 1930s with the invention of Teflon. The technology was used to create coatings and products the resist heat, oil, stains, grease, and water. The USEPA identifies PFAS as manufactured chemicals used in industry and consumer products since the 1940s. Today, they are used in waterproofing fabrics, Nylon, carpets, shampoo, paint, adhesives, food packaging, cookware, firefighting foam, and cosmetics.

Also known as “forever chemicals” from the January 2, 2018, Washington Post Article on PFAS, they have a strong carbon-fluorine bond that is thought to have a half-life (in humans) of several days up to eight years or more depending on the chemical. Half-life estimates on the environment are unknown at this time. PFAS bioaccumulate in fish and wildlife and move through soils. PFAS residues have been found in rainwater and drinking water.

There are thousands of variations of PFAS (some used more [and studied more] than others), and because of their widespread use, PFAS are found in the blood of people and animals all over the world.

Cyanobacteria

Cyanobacteria, also known as blue-green algae, are microscopic, photosynthetic bacteria that are naturally found in many freshwater ecosystems. These organisms either attach to a substance or float in the water column as individual cells or within colonies. A combination of excess nutrients, sunlight, and high temperatures can lead to a rapid increase in cyanobacteria, called a “bloom.”

Blooms are driven by eutrophication, which is an increase in nutrient availability in bodies of water. Eutrophication occurs naturally in seasonally stratified waterbodies when the lowest stratum, the hypolimnion, experiences hypoxia, a lack of sufficient oxygen. The metalimnion, a transitional layer of drastic temperature change, prevents mixing of the epilimnion, the oxygenated layer, with the hypolimnion. As the light and oxygen levels drop in the hypolimnion, organisms die and begin to decay, using up even more oxygen and creating eutrophy (Erratt et al. 2023).

Normally, the stratification of a body of water into low-light, high nutrient and sunny, standard-nutrient layers would limit the extent of a photosynthetic bacteria. However, eutrophication also comes from excess runoff from agricultural and urban areas, increasing the nutrient availability in all layers of stratified waterbodies, creating favorable conditions for blooms. As the bacteria dies, it consumes even greater oxygen and releases nutrients, leading to further eutrophication and potentially apoxia, a complete lack of oxygen in the ecosystem (Erratt et al. 2023).

Blooms of cyanobacteria generally occur in late summer into the early fall when water temperatures are warmest, waterbodies are stratified, and an abundance of sunlight and nutrients are available. Some species of cyanobacteria can also produce toxins, known as cyanotoxins. These toxins can potentially cause health risks for humans as well as wildlife, pets, and livestock. There are no visual properties of a cyanobacteria bloom that indicate the presence of toxins. It is only possible to determine if toxins are present with laboratory tests. If a cyanobacteria bloom is observed, it is best to take caution and stay out of the water to avoid any potential exposure to toxins (RIDEM 2024b).

It is important to note that not all species of cyanobacteria produce toxins and not all blooms are harmful. It is only possible to determine if harmful toxins are present with laboratory tests.

Cyanobacteria blooms generally have the following properties:

- Blooms are generally bright green or blue-green in color, but may be brown, red or purple.
- Water may look like thick pea soup and foam may create shoreline scums (Figure A & B).
- The water can also look cloudy with a green tint (Figure C).
- A slick film or colored streaks may cover the surface of the water like spilled paint (Figure D).
- The color of the bloom may give clues to the source, but confirmation of cyanobacteria can only be completed by a laboratory.

Duckweed and watermeal plants are commonly mistaken for cyanobacteria blooms. When a cyanobacteria bloom is stirred with a stick, cyanobacteria cells appear to dissolve in water like Kool-Aid, while duckweed and watermeal will remain tiny solid bits floating on the surface and other types of algae will typically clump like hair.

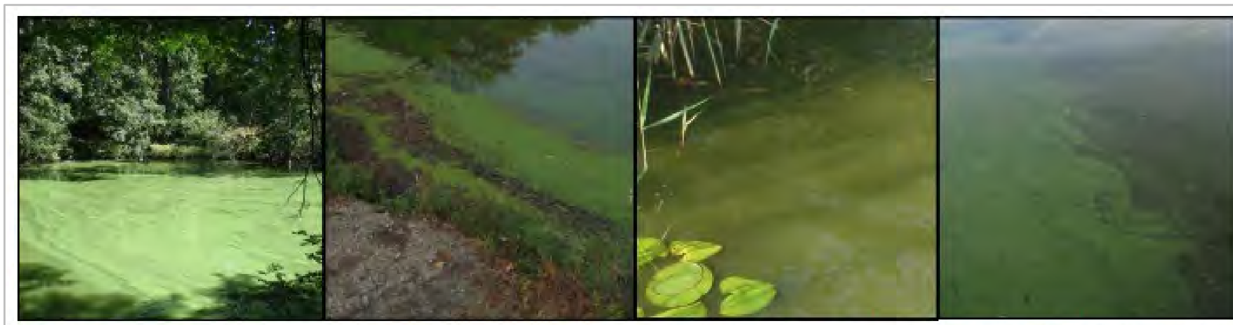


Figure A. Blue-green algae may make the water look like pea soup

Figure B. Thick green foam may wash ashore during a bloom

Figure C. Blue-green algae may make the water look cloudy with a green tint

Figure D. Film on surface of water can look like spilled paint

Source: RIDEM 2016

Figure 60- Examples of a Cyanobacteria Bloom

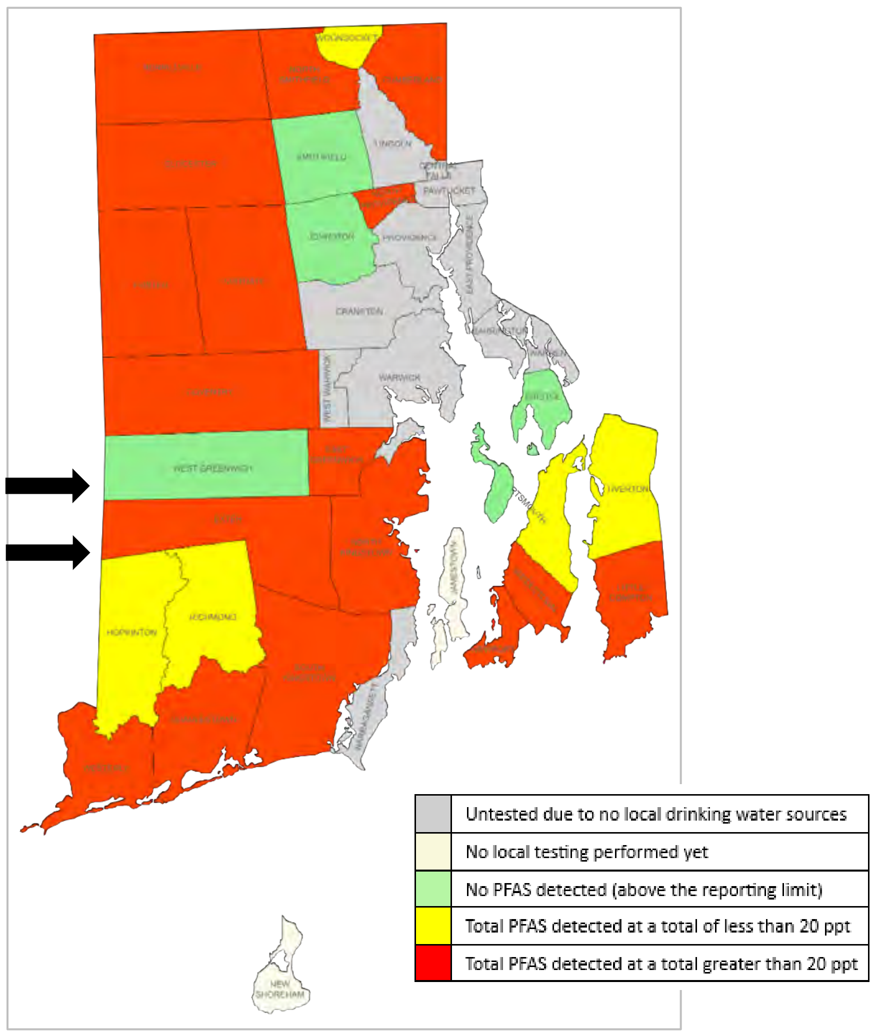
3.3.12.2 Location

PFAS

The Massachusetts Chapter of the Sierra Club's National Toxics Program has reviewed analytical data from samples collected by the State of Rhode Island from public water systems in 26 cities and towns in Rhode Island. PFAS have been detected in 81% of all tested communities.

Figure 61 shows the results of PFAS detection in Rhode Island. The specific results for Exeter and West Greenwich are:

Municipality	Total Number of PFAS Chemicals detected	Total Number of PFAS Chemicals tested	Total Amount of All PFAS Detected (ppt)
Exeter	6	14	53.98
West Greenwich	0	14	0.00
Note: Zero ppt technically can mean non-detection or detection below the reporting limit.			



Source: Sierra Club 2024

Figure 61- Rhode Island PFAS Detection (2017-2021)

Cyanobacteria

Cyanobacteria are naturally found in many freshwater ecosystems. In Exeter, harmful levels of cyanobacteria have been recorded at Boone Lake and in West Greenwich, harmful levels of cyanobacteria have been recorded at Lake Mishnock.

Under the right environmental conditions (warm water temperatures, abundance of sunlight and nutrients), cyanobacteria blooms have the potential to form wherever cyanobacteria are present. Cyanobacteria are the most common cause of harmful blooms in fresh water, such as lakes, ponds, or occasionally rivers.

Blooms of cyanobacteria generally occur in late summer into the early fall when water temperatures are warmest, and an abundance of sunlight and nutrients are available.

3.3.12.3 History

PFAS

In 2022, the Rhode Island State Legislature passed a law requiring public water systems (PWS) to sample for PFAS and established an interim state standard of 20 ppt. PWS with results greater than 20 ppt issue public advisories to their customers and coordinate with Rhode Island Department of Health on mitigation actions to reduce PFAS in the PWS.

The initial sampling requirement of all 170 community and non-transient non-community (NTNC) PWS to comply by August 2023 was met with one public water system not meeting the sampling requirement. A total of 14 PWS in Rhode Island exceeded the interim state standard in 2023. Of the 14 exceedances, three reported PFAS results greater than 70 ppt and were issued “DO NOT DRINK” notices. Ninety-eight (98) systems did not detect PFAS during the initial sampling in 2023.

The following table shows the highest PFAS levels detected during the 2023 sampling period:

Table 51- Rhode Island PFAS Detection Greater than 70 ppt in 2023

PWS Name	Location	# of People Served	Highest PFAS level detected (ppt)	Notes
Bruin Plastics	Glendale	50	133	
Exeter Job Corps	Exeter	300	198 40	This PWS has a connection to another PWS. See note below for Ladd Center.
Ladd Center	Exeter	129	334* 30	* This PWS removed a well from service resulting in a decrease in PFAS concentrations.

Note that the two Exeter locations with PFAS detection greater than 70 ppt were connected systems and Well #2 was turned off which resulted in the lower levels of PFAS concentrations (40 ppt and 30 ppt).

The following PWS exceeded the 20 ppt interim standard (but below 70 ppt) during the 2023 sampling event:

Table 52- Rhode Island PFAS Detection Greater than 20 ppt (and less than 70 ppt) in 2023

PWS Name	Location	# of People Served	Highest PFAS level detected (ppt)	Notes
Captain Isaac Paine School	Foster	460	42	
Carousel Industries	Exeter	200	55 17	This result is from a well that was reported to RIDOH on 9/28/23 as having been removed from distribution in 2020. The second highest PFAS result is also shown.
Coventry National Guard	Coventry	50	84 18	Well was turned off on 1/19/23 after this sample was reported and is no longer used. Because of this action, a DO NOT DRINK order was not issued. The second highest result is also shown. After the well was turned off, the blended drinking water being sent to consumers has shown a result of 7 ppt.
Jemp LLC	Scituate	28	31	
North Scituate Elementary School	Scituate	500	23	
North Smithfield Jr Sr High School	North Smithfield	1,200	31	This PWS has two wells that are combined. The combined water is blended together and is what is being sent to consumers. The blended drinking water being delivered to consumers has shown a result of 21 ppt.
Quonset Business Park	North Kingstown	13,000	21	*This PWS has three wells and two interconnections to other PWS supplies. The result of 21 ppt came from Well 14A. Well 14A was turned off on 10/4/23. The two other wells had these results: Well 9A (18 ppt) and Well 3A (18 ppt). The two interconnections are: Kent County Water Connection (PFAS not detected) and Town of North Kingstown. The Town of North Kingstown interconnection is an emergency connection that was not sampled. The PWS also sampled five other sites within its distribution system: Tower 1 (12 ppt), Tower 2 (19 ppt), Burlingham Road (18 ppt), Compass Circle (16 ppt), Davisville Road (21 ppt), and Davis Street (12 ppt).
University of RI	South Kingstown	19,354	43 39	*Well was turned off on 6/1/23 after this sample was reported and is no longer used. The second highest result is also displayed
West Glocester Elementary School	Glocester	541	44	This PWS has two wells that are combined. The combined water is blended together and is what is delivered to consumers. The blended drinking water being delivered

PWS Name	Location	# of People Served	Highest PFAS level detected (ppt)	Notes
				to consumers has shown a result of 31ppt.
Wood River Health Services	Hope Valley	150	28	
Wrights Farm	Burrillville	1,125	22	This PWS has two wells that are combined. This combined water is filtered and is being sent to customers. The combined filtered drinking water has shown a result of 3 ppt.

Source: RIDOH 2024

Of the remaining 156 PWS sampled, the following locations in Exeter and West Greenwich were sampled with the listed results.

Table 53- Exeter and West Greenwich PFAS Detection Less than 20 ppt in 2023

PWS Name	Location	# of People Served	Highest PFAS level detected (ppt) ND= Not Detected
Blueberry Heights Housing Cooperative Co	West Greenwich	44	ND
Carpenter Hall LLC DBA Zinnia Exeter	Exeter	74	ND
Exeter-W. Greenwich JR/SR High School	West Greenwich	906	ND
Greene School – Building 1, The	West Greenwich	250	ND
Greene School – Building 2 & 3 The	West Greenwich	25	ND
Greenwich Village Nursery School, Inc.	West Greenwich	35	ND
Kingston Center	Exeter	77	ND
Liberty Hill	Exeter	48	ND
Metcalf Elementary School	Exeter	687	ND
Mildred E Lineham School	West Greenwich	90	ND
Mobile Village, Inc.	Exeter	150	ND
Oak Harbor Village, LLC	Exeter	290	ND
Rochs Fresh Foods Facility	West Greenwich	50	3
Shadow Woods at Deer Brook	Exeter	300	15 This public water system uses two wells. Water being delivered to consumers has shown a result of 14 ppt.
Ski Pro, Inc.	Exeter	100	10
South Trail Commerce	Exeter	175	ND

PWS Name	Location	# of People Served	Highest PFAS level detected (ppt) ND= Not Detected
Split Rock Corporation	Exeter	110	ND
Wawaloam School	Exeter	290	ND
West Greenwich Town Hall	West Greenwich	40	ND

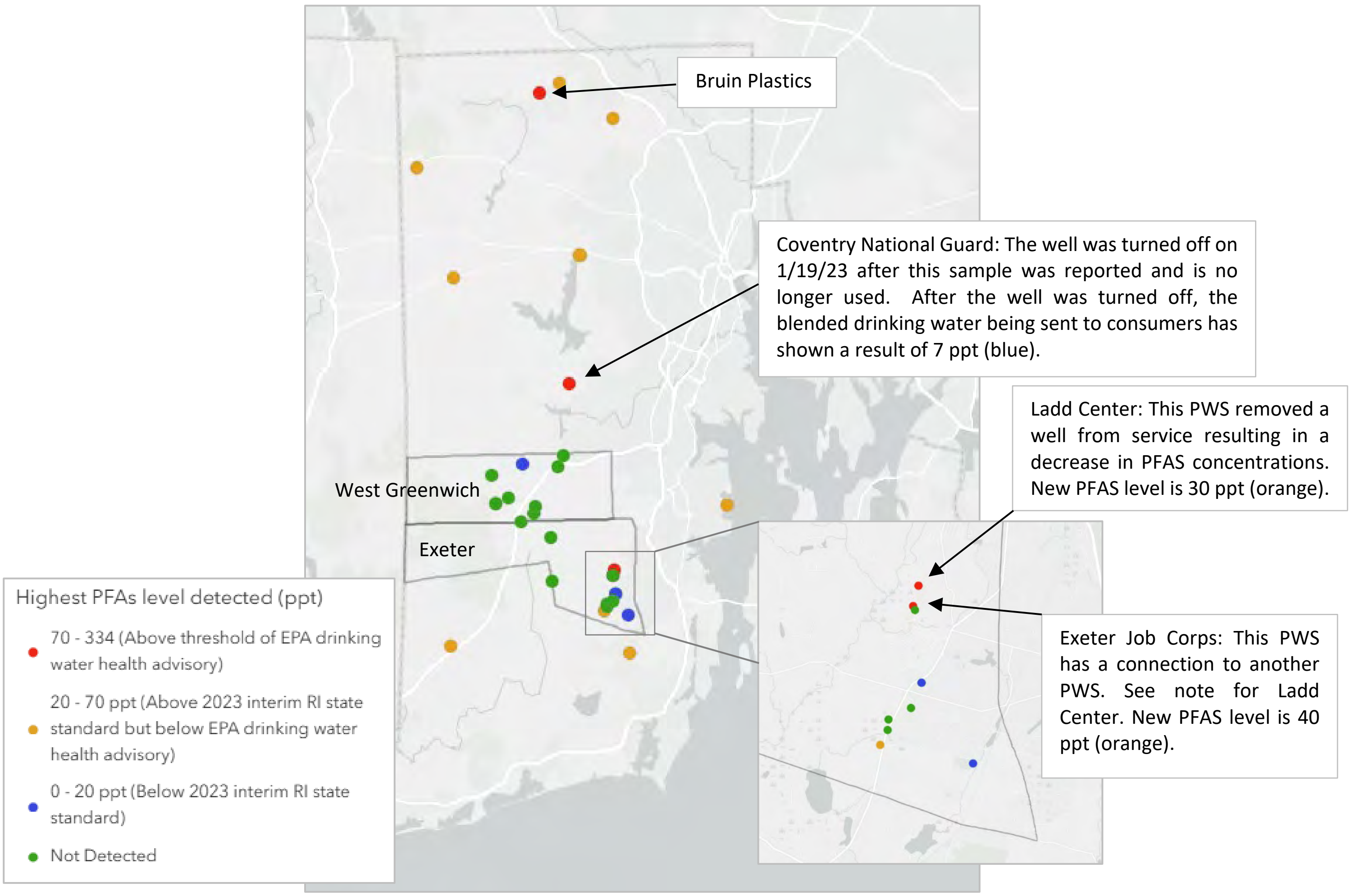


Figure 62- Highest Levels of PFAS Detected in Rhode Island (2023)

The Exeter Town Council and the State of Rhode Island Department of Health gave a PFAS in Drinking Water presentation on August 16, 2023. Results were presented as well as the plan for next steps which include:

- Investigation of sources
- Letters to private well-owners
- Ladd Center will be required to enter into consent agreement with RIDOH within 180 days.
- Ladd Center is required to monitor quarterly and notify Exeter Job Corps of results. Both systems

are required to provide continuously updated public notice to consumers until compliance is achieved.

Cyanobacteria

RIDEM began monitoring for cyanobacteria in 2011, with biweekly monitoring for ponds that frequently bloom beginning in 2017. Since the cyanobacteria monitoring program began in 2011, an advisory was issued for Boone Lake in Exeter for the first time in 2023 and Lake Mishnock in West Greenwich for the first time in 2024.

On June 19, 2023, RIDEM responded to a call regarding reports of "hairy algae" along the shoreline of a private residence on Mishnock Lake in West Greenwich. One sample was collected for analysis. The results of the sample are below. The total cell count was well below the advisory threshold of 70,000 cells per mL and no advisory was issued.

- **Toxin Concentration**: non-detectable
- **Colony Count (colonies/mL):** Anabaena: 80
- **Total Cell Count (cells/mL):** 1,840
- Table 54 provides details on the historical cyanobacteria advisories in Exeter and West Greenwich. An advisory was initiated due to samples exceeding the cell count advisory threshold of 70,000 cells/mL.

Table 54- Historical Cyanobacteria Advisories in Exeter and W. Greenwich (2011 – December 2024)

Town	Waterbody	Cell Count (cells/mL)	Advisory Posted	Advisory Lifted
Exeter	Boone Lake	Not released	10/1/2024	12/23/2024
Exeter	Boone Lake	Not released	8/9/2024	9/12/2024
Exeter	Boone Lake	Not released	7/10/2024	7/24/2024
West Greenwich	Lake Mishnock	Not released	7/11/2024	8/9/2024
Exeter	Boone Lake	299,000	7/11/2023	8/1/2023

Source: RIDEM 2024b

RIDEM posts information on current advisories on their website. Additionally, the Boone Lake Dam Management District posts information on advisories on their website for residents to stay informed.

3.3.12.4 Extent

PFAS

PFAS exposure occurs through touching, drinking, eating, or breathing in materials containing PFAS. Exposures can occur through drinking water, waste sites, fire extinguishing foam, manufacturing facilities, consumer products, food packaging, biosolids, and foods such as seafood and fish or dairy where the water or livestock have been exposed to PFAS. USEPA reports that very little PFAS in water can get into the body through the skin so touching water when bathing or washing dishes are unlikely to significantly increase health risks.

In April 2024, the USEPA announced the final National Primary Drinking Water Regulation for six PFAS and established legally enforceable levels (Maximum Contaminant Levels [MCL]) for the PFAS in drinking water. The EPA also provided health-based (non-enforceable) MCL Goals for these PFAS.

Table 55- EPA National Primary Drinking Water Regulation for Six PFAS

PFAS Compound	Final MCL Goal (non-enforceable)	Final MCL (enforceable levels)
PFOA	0	4.0 ppt
PFOS	0	4.0 ppt
PFHxS	10 ppt	10 ppt
PFNA	10 ppt	10 ppt
HFPO-DA (GenX Chemicals)	10 ppt	10 ppt
Mixtures containing two or more of PFHxS, PFNA, HFPO-DA, and PFBS	1 (unitless) Hazard Index	1 (unitless) Hazard Index

Source: EPA 2024c ppt – parts per trillion or ng/L

The Final Rule requires the following:

- Public water systems must monitor these PFAS and have until 2027 to complete initial monitoring, followed by ongoing compliance monitoring. Water systems must also provide the public with information on the levels of these PFAS in their drinking water beginning in 2027.
- Public water systems have until 2029 to implement solutions that reduce these PFAS if monitoring shows that drinking water levels exceed these MCLs.
- Beginning in 2029, public water systems that have PFAS in drinking water which violates one or more of these MCLs must take action to reduce levels of these PFAS in their drinking water and must provide notification to the public of the violation.

See Section 3.3.12.3 for levels of PFAS detected in Exeter and West Greenwich.

Based on the extent of past events and the criteria identified in Table 7, the extent of PFAS in Exeter are considered **Limited**, with potential for some injuries; short shutdown of some critical infrastructure and facilities; fewer than 10% of residential and commercial structures damaged; and a small number of local operations impacted for short amounts of time.

Based on the lack of historical events and the criteria identified in Table 7, the extent of PFAS in West Greenwich are considered **Negligible** with the potential of minor injuries; no shutdown of critical infrastructure and facilities; scattered incidental residential and commercial structure damage; and few or no operations impacted for short amounts of time.

Cyanobacteria

A cyanobacteria bloom can have extremely high cell densities of cyanobacteria- extremely high densities are typically defined as greater than 20,000 to 100,000 cells/mL (EPA 2019).

The Rhode Island Department of Health (RIDOH) and the Rhode Island Department of Environmental Management's Office of Water Resources (RIDEM OWR) work cooperatively to monitor for the presence of cyanobacteria blooms, evaluate the potential risk to the public, and issue advisories notifying the public of health concerns. The agencies jointly issue health/recreational advisories when any of the following three thresholds are met:

- Evidence of a visible cyanobacteria scum, mat, or pond/lake-wide cyanobacteria bloom.
- Cyanobacteria cell count exceeding 70,000 cells/mL.
- Toxin (Microcystins-LR) level of lysed cells meeting or exceeding 4.0 ppb (µg/L)

The advisories recommend that individuals avoid contact with the affected waterbody, including recreational activities such as swimming, boating, or fishing. People are also advised not to eat fish from the affected waterbody or to allow pets to wade in, swim in, or drink untreated water from the affected waters.

Historically, advisories have been posted at Boone Lake in Exeter and Lake Mishnock in West Greenwich. An advisory was issued for Boone Lake in Exeter from 7/11-8/1/2023 with a cell count of 299,000. The remaining cell counts for other advisories have not yet been posted by RIDEM in the Cyanobacteria Monitoring Program 2024 Report.

Historical advisories across Rhode Island have lasted from as little as 14 days to over 150 days (RIDEM 2024b).

Based on the extent of past events and the criteria identified in Table 7, the extent of cyanobacteria blooms in Exeter and West Greenwich are considered **Negligible** with the potential of minor injuries; no shutdown of critical infrastructure and facilities; scattered incidental residential and commercial structure damage; and few or no operations impacted for short amounts of time.

3.3.12.5 Probability of Future Occurrence

PFAS

Due to the presence of PFAS throughout Rhode Island, including in some PWS in the Towns of Exeter and West Greenwich, and the criteria identified in Table 8, it is **Highly Likely** that PFAS will occur in the future in Exeter and West Greenwich; there is a greater than 90% annual probability of occurring.

The results of the Investigation of Sources, as well as a more comprehensive PFAS study focused on private drinking water wells will provide a better understanding of the range of PFAS contamination in the watershed supplying drinking water. Additionally, an assessment of the availability and distribution of mitigations already applied and a data gap assessment to determine additional mitigation needs on private drinking water wells will help understand the effectivity of the mitigation methods to reduce the PFAS levels in drinking water.

Cyanobacteria

Due to history of past cyanobacteria presence and advisories in the Towns of Exeter and West Greenwich, and the criteria identified in Table 8, it is **Highly Likely** that cyanobacteria blooms will occur in the future in waterbodies in Exeter and West Greenwich; there is a greater than 90% annual probability of occurring.

3.3.12.6 Impact

PFAS

Certain PFAS can cause health risks such as: cancer, weight effects, immune effects, reproductive effects, and developmental effects. Some PFAS can cause health risks even at very low levels.

Cyanobacteria

Contact with toxic cyanobacteria blooms pose a significant threat to human and animal health.

Humans whose skin has come into contact with toxic cyanobacteria can develop rashes, blisters and hives, and eye and nose irritations. If swallowed, humans may experience diarrhea, vomiting or neurotoxicity. Humans exhibiting neurotoxicity may feel numb lips, tingling in fingers and toes, and dizziness (RIDEM 2016).

Pets, livestock and waterfowl that ingest water with cyanobacteria toxins can also experience sickness, paralysis or even death. Neurotoxicity in animals is characterized by salivation, weakness, staggering, difficulty breathing, and convulsions (RIDEM 2016).

If these symptoms are experienced or observed in pets and children after contact with a cyanobacteria bloom, consult a medical professional (RIDEM 2016).

3.3.12.7 Future Conditions

PFAS	Nature of the hazard	Future climate conditions are unlikely to influence the nature of future PFAS contamination events
	Location	Future climate conditions are possible to influence the location of future PFAS areas of contamination in Exeter and West Greenwich as surface and groundwater moves through the soils and waterways that were not historically flooded may become inundated with contaminated water due to increased precipitation in the future.
	Extent	It is possible that future climate conditions will influence the extent of future PFAS contamination events. With the reduction in manufacturing and uses, there may be decreases in the extent of concentrations of PFAS and geographic footprints over time. With increased precipitation in the future that may displace suspended PFAS, the geographic extent may increase. This same increase in precipitation may decrease or dilute the concentrations of PFAS in watersheds.
	Impact	Impacts associated with PFAS contamination are still being researched but those known are linked to cancers, high cholesterol, immunity sensitivities and developmental issues. Future conditions associated with future climate conditions such as increases in drought related airborne dust increasing air quality issues for those with immunity sensitivities are possible.
	Probability of Future Events	It is possible that future climate conditions will influence the probability of future PFAS contamination events. The USEPA has created MCLs for 6 of potentially thousands of types of PFAS. Until PFAS types and MCLs as well as human and environmental impacts are clearly defined and understood, it is difficult to predict how future climate conditions may influence PFAS contamination events or how PFAS move through the environment.
	Changes in Population Patterns	It is possible that future climate conditions will influence population patterns in Exeter and West Greenwich. It is likely that future PFAS contamination in Exeter and West Greenwich will influence population patterns and where people will want to live. If known drinking water contamination exists, residents may move away from the area.
	Changes in Land Use Development	It is possible that future climate conditions will influence land use development patterns in Exeter and West Greenwich. It is likely that future PFAS contamination in Exeter and West Greenwich will influence land use development patterns and where people will want to live. If known drinking water contamination exists, residents may move away from the area. Floodplains and areas prone to runoff may be deemed unsuitable for development, and new land use regulations may be implemented to prevent further contamination. New regulations could include restrictions on building in high-risk areas or mandates for increased testing and remediation efforts. To mitigate the spread of PFAS from known contamination sources, planners may implement buffer zones around industrial sites, landfills, or former military sites where PFAS were used or disposed of. This could restrict the development of residential or commercial properties near these areas.
Cyano-bacteria	Nature of the hazard	It is likely that future climate conditions will influence the nature of future cyanobacteria blooms in Rhode Island. Warmer temperatures and nutrient-rich

		conditions can stress the bacteria in ways that lead to more frequent or greater production of toxins.
	Location	As temperatures rise and precipitation patterns change, cyanobacteria blooms are likely to spread to new areas, particularly in regions and waterbodies that were previously too cold or had insufficient nutrient runoff. This could lead to the appearance of blooms in areas where they were previously rare or non-existent, further increasing the risk to human health, agriculture, and biodiversity. The influence of future climate conditions on cyanobacteria blooms has already been detected in Exeter and West Greenwich, as advisories for waterbodies in Exeter and West Greenwich were issued advisories for the first time in 2023 and 2024, respectively, since the RIDEM began monitoring for cyanobacteria in 2011.
	Extent	Future climate conditions will likely expand the range of intensities of cyanobacteria blooms, both geographically and temporally. Warmer temperatures, altered precipitation patterns, increased nutrient runoff, and more frequent extreme weather events are all expected to create conditions that favor more intense and widespread blooms. Some areas may experience more severe blooms, while others could see the emergence of blooms in areas that were previously less affected. Additionally, these blooms may last longer and be more toxic, posing increasing risks to human health, aquatic ecosystems, and local economies. This increase in events will result in an increase in the magnitude and severity of cyanobacteria blooms, potentially increasing cell count, and an increased number of advisories posted to waterbodies exceeding the cell count advisory threshold of 70,000 cells/mL.
	Impact	It is likely that future climate conditions will exacerbate the impacts of cyanobacterial blooms by increasing their frequency, intensity, and duration, which will affect public health, ecosystems, water quality, and economies. These changes will require more resources for monitoring, management, and mitigation, and will have far-reaching consequences for both human and environmental well-being. Increased impacts may include: • **Pollution of drinking water**: Cyanobacteria blooms can lead to significant degradation of water quality. The toxins released by cyanobacteria can contaminate drinking water sources, requiring expensive water treatment processes to remove toxins, which increases the cost of water supply. In extreme cases, water utilities might have to temporarily shut down water intakes or issue boil-water advisories, affecting communities relying on surface water for drinking and other daily needs. • **Agricultural losses**: In regions where water is used for irrigation, the presence of toxic cyanobacteria blooms in water sources can affect crop yields and lead to economic losses. Water contaminated by cyanotoxins may also affect livestock health, particularly when animals drink or swim in affected water. • **More frequent monitoring**: As blooms become more common and spread to new areas due to future climate conditions, governments and organizations will need to invest more in monitoring water quality, tracking bloom patterns, and testing for toxins.
	Probability of Future Events	Warmer water temperatures, longer growing seasons, and more frequent nutrient inputs (from rainfall and runoff) will likely increase the frequency of cyanobacteria blooms.

		In 2023, Boone Lake (Exeter), Coomer Lake (Glocester) and Indian Lake (South Kingstown) were issued advisories for the first time since the cyanobacteria monitoring program began in 2011 (RIDEM 2023b).
	Changes in Population Patterns	Future climate conditions will likely cause shifts in human population patterns in areas affected by cyanobacteria blooms, driven by factors like migration due to water scarcity, public health risks, economic disruption, and competition for resources. These changes will be particularly pronounced in vulnerable communities that rely heavily on freshwater bodies for drinking, agriculture, and livelihoods. Communities experiencing the worst effects of cyanobacteria blooms may relocate to urban areas that have alternate water sources.
	Changes in Land Use Development	Future climate conditions-induced cyanobacteria blooms will likely shape future land use development by prompting changes in zoning regulations, influencing the location and design of new developments, and driving investments in water treatment infrastructure. The future of land use will likely involve more careful planning to ensure that communities can adapt to the growing challenges posed by cyanobacteria blooms in a changing climate. Additionally, an increase in population would likely have similar impacts as land use development increases to accommodate a growing population.

3.3.13 Cybersecurity

3.3.13.1 Description

Financial, Communication, Information, and Security Systems across all public and private sectors are vulnerable to acts of cyberwarfare, cyberterrorism, and cybercrime. The State of Rhode Island Hazard Mitigation Plan describes a cyber-attack as the "deliberate and malicious attempt to compromise the security of computer systems, networks, devices, or data". These types of incidents aim to steal sensitive information, disrupting operations, gain unauthorized access, or demand ransom payments.

Common threat actors are motivated by a variety of outcomes.

- **Cybercriminals** are individuals or groups that use computers, networks, and digital tools to commit illegal activities, often driven by financial gain, data theft, or the desire to cause disruption. They operate with malicious intent, using tactics such as unauthorized access to systems, phishing to trick individuals into revealing sensitive information, and deploying malware like ransomware or spyware to damage, steal, or lock data. Cybercriminals also engage in identity theft and financial fraud, exploiting digital platforms for credit card theft, online scams, and money laundering. They remain a persistent and evolving threat to digital security.
- **Nation-States** represent a significant threat, notably to national security, due to their involvement in sophisticated, long-term cyber operations known as advanced persistent threats (APTs). These activities are typically well-funded, highly targeted, and are driven by threat actors who are often highly motivated and well-educated. Their goal is to gather intelligence, gain strategic advantages, disrupt, or even destroy systems. The persistence and skill of these actors, combined with substantial funding, make their actions harder to detect and counter.
- **Terrorist Groups** leverage digital tools and cyber tactics to advance their agendas, often targeting critical systems to disrupt operations, spread propaganda, or instill fear. Their activities may include launching cyber-attacks, exploiting vulnerabilities to gain access to sensitive systems, or using online platforms to recruit, fundraise, and coordinate their efforts. These groups pose significant threats by combining ideological motives with increasingly sophisticated cyber

capabilities.

- **Thrill-Seekers** Thrill-Seeker are individuals motivated by excitement or the challenge of hacking into systems. They often lack malicious intent but enjoy testing their skills and exploring systems for personal satisfaction. Examples include:
  - **Script kiddies**, who use pre-made tools to disrupt systems without deep technical knowledge, and
  - **Gray hat hackers**, who exploit vulnerabilities to gain attention or highlight security flaws. While their actions may not always aim to cause harm, they can still result in unintended disruptions and pose risks to organizations.
- **Insider Threats** are increasing and can be categorized into the following types:
  - **Unintentional Insiders**: Also known as incautious insiders, these employees do not intend to cause harm but may inadvertently expose the organization to risks. This can result from careless actions, such as mishandling data, falling for phishing scams, or ignoring security protocols due to lack of awareness.
  - **Intentional Insiders**: Individuals who deliberately misuse their access to harm the organization, often for personal gain, such as financial reward, or to act on personal grievances. These insiders may act alone or collaborate with external threat actors. Although this type of insider threat is less common, this type of insider has the potential to cause a great deal of harm.
  - **Collusive Threats**: In this scenario, an insider collaborates with an external threat actor or another insider to exploit organizational systems, data, or resources. Collusive threats are particularly dangerous because they combine internal access with external malicious intent, making detection and prevention more challenging.
  - **Third-Party Threats**: These are risks posed by external vendors, contractors, or partners who have authorized access to certain organizational systems or data. Even though they are not employees, they can inadvertently or intentionally compromise security, especially if their security practices are weak or they become compromised by threat actors.
- **Hackers** are not all the same; the level of threat they pose, if any, varies widely, making it important to differentiate between the various types of hackers based on their motivations and actions. While hackers can present a threat, they are not inherently threat actors. Hackers use their technical skills to manipulate or explore systems, with intentions ranging from constructive problem-solving to malicious exploitation:
  - **Black Hat Hackers**: Operate with malicious intent, targeting systems to steal data, cause disruption, or exploit vulnerabilities for personal or financial gain.
  - **White Hat Hackers**: Ethical hackers who work with organizations to identify and fix vulnerabilities, enhancing cybersecurity defenses.
  - **Gray Hat Hackers**: Operate in a gray area, hacking into systems without permission to expose vulnerabilities, sometimes offering to fix them for a fee.
  - **Green Hat Hackers**: Beginners in the hacking community who are eager to learn from experienced hackers.
  - **Blue Hat Hackers**: Professionals hired by organizations to test systems for vulnerabilities before launch.
  - **Red Hat Hackers**: Focus on countering black hat hackers, often using aggressive tactics to stop malicious actors.
  - **Script Kiddies**: Inexperienced individuals who use pre-written scripts or tools to hack, motivated more by boredom or curiosity than technical knowledge.

- o **Hacktivists**: Politically or socially motivated hackers who use their skills to advance causes or ideologies.

Understanding these distinctions is critical to addressing cybersecurity threats while recognizing that not all hackers are malicious actors.

3.3.13.2 Location

The entire State of Rhode Island, including the Towns of Exeter and West Greenwich are vulnerable to cybersecurity incidents. Any person, infrastructure, or entity that relies on the internet is vulnerable to cybersecurity threats.

3.3.13.3 History

The Center for Strategic and International Studies has compiled a list of cyber incidents between 2006 and the beginning of 2023. The following table shows the number of events, and the entities involved in events where the losses were in excess of a million dollars.

Table 56- Global Historic Cyber Events with Losses Exceeding $1M USD (2003- February 2023)

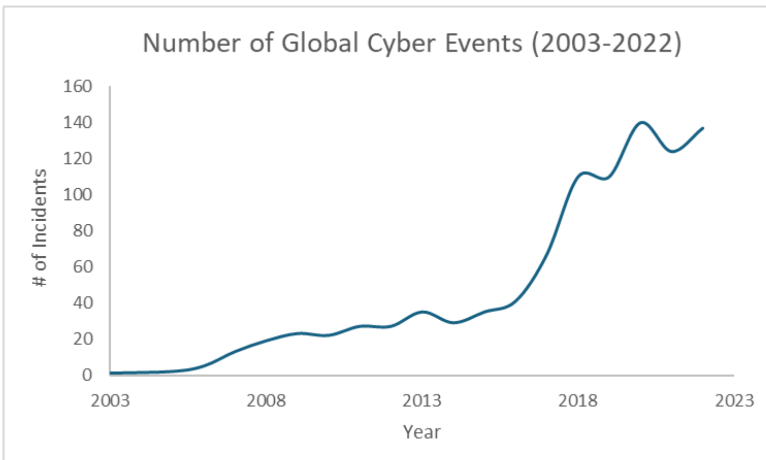
Year	# of Incidents	Countries/Entities Involved
2003	1	China, US
2005	2	China, US
2006	5	China, US, Russia, UK
2007	13	China, US, unknown, Russia, Estonia, UK, Israel, Syria, France, Tiawan
2008	19	UK, China, US, TJX, CENTCOM, Scotland, Pakistan, Georgia, Russia, Marathon, Exxon, Conoco, RNC, DNC, Tibet, India, Belgium, Germany, Afghanistan, Wikileaks, Japan, Korea
2009	23	Iraq, US, WSJ, UN, Russia, DOD, Ukraine, Korea, Germany, China, John Hopkins, NASA, HSIN, Merrick, Tiawan, USMC, Iran, Canada, Coca-Cola, France, FAA, Pakistan, Israel, Hamas, Hezbollah
2010	22	India, Pakistan, UK, US, Australia, WSJ, Siemens, ANSDAQ, Russia, Canada, China, France, Latvian, Rio Tinto, Google, Vietnam, NATO, EU, Intel, Google, Adobe, Iran, Twitter, Morgan Stanley, MI5, PLA
2011	27	US, China, Norway, NASA, USGS, Apple, Azerbaijan, China, Australia, Japan, Mitsubishi, Korea, German, Citibank, IMF, Sony, Oak Ridge, Google, RSA, Lockheed Martin, EU, Canada, France, South Africa
2012	27	Al-Qaida, US, Russia, Central Asia, Eastern Europe, Iran, BOA, NYSE, Chase, Capital One, Sun Trust, Telvent Canada, Aramco, Lebanon, India, NSA, China, UK, PLA, Canada, Israel, Syria, Sudan, Japan, NASA, Qatar
2013	35	Finland, Vietnam, Germany, NSA, US Navy, Iran, China, DOD, US Civil Aviation, North Korea, Syria, Russia, PLA, US Transportation Command, Ukraine, Australian Security Intelligence Organization, Israel, US Electrical Grid, Iran, India, Pakistan, Saudia Arabian Ministry of Defense, Saudi Government, UAE, Oman, USACOE National Inventory of Dams, DHS, Big Oil, ThyssenKrupp, NYT, WSJ, WP, Bloomberg, Japan, US Banks, US Weapons Systems Designs
2014	29	Tehran, Syria, Target, OPM, China, India, Indian Government, Iran, US, Alcoa, US Satellite Corporations, Canada, US Office of Personnel Management, Poland, Turkey, Germany, Italy, France, Spain, DHS, Community Health Systems, Home Depot, Austria, Switzerland, Hong Kong, Pharma, Australian Mining, Russia, NATO, EU, Ukraine, Dairy Queen, iCloud, Department of State, NOAA, NWS, USPS, North Korea, Sony, Asia, Middle East, Europe, Canada
2015	35	German Steel Mill, France, Canada, Anthem, China, Iran, Europe, Middle East, US State Department, ISIS, DOD, Yemen, Saudi Arabia, IRS, Russia, United Airlines, Pacnet, North Korea, Germany, Office of Personnel Management, Japan Pension Service, Hacking Team, Sudan, Ethiopia, Morocco, UAE, Joint Chiefs of Staff, The Hague, Central Asia, Pakistan, Dutch Safety Board, Fox-IT, Australia Submarine Contractor, Tehran, CIA, ROK National Intelligence Service, Australian Bureau of Meteorology
2016	41	Czech Republic, Armenia, Azerbaijan, Sri Lanka, Israel, US, Britain, Austrian, FAAC, SWIFT, Bangladesh, US Department of Justice, DHS, FBI, IRS, Russia, Finland, 21st Century Oncology, North Korea, South Korea, MedStar Health, Microsoft, Philippine Commission on Elections, German Christian Democratic Union, Russia, China, US Steel, Saudi Arabia, Iran, Germany, Iran, Turkey, Belarus, Mongolia, Eastern Europe, DDOS, DNC, India, DCNS, Hong Kong, Oracle, Brazil, NSA, Pastebin, Yahoo, Japanese Defense Ministry, National Intelligence, DHS, Liberia, Saudi Aramco, Saudi General Authority of Civil aviation, AdultFriendFinder, SanFrancisco Municipal Transportation Agency, Ukrenergo, Kiev

Year	# of Incidents	Countries/Entities Involved
2017	67	Sweden, Russia, Ukraine, Singapore, Ministry of Defense, India, Pakistan, HUD, NOAA, Cornell, University, NYU, Iran, Saudi Arabia, US, Wikileaks, China, Twitter, DOD, South Korea, NSA, Danish Defense Intelligence Service, Japan, Lazarus Group, North Korea, US Defense Contractors, Irland, Israel, Iran, France, Lebanon, WhatsApp, NSA, Boyusec, UK, Maersk, Montenegro, NYT, Mexico, Qatari, UAE, UniCredit, Italy, US Energy Facilities, Wolf Creek Nuclear Operating Corporation, Turkey, Jordan, Germany, Saudi Arabia, Israel, UK Energy, Southeast Asian Military and Government Organization, Swedish Transport Agency, Scottish Parliament, British Parliament, India, Pakistan Security and Military Organizations, South Korean Bitcount Exchange, Estonia, Cambodia, Equifax, SEC, US Cyber Command, NATO, Poland, Baltic States, Saudi Arabia, Australian Government, Poland, CyCon, Yahoo, NotPetya, Vietnam, ASEAN Organization, Uber, Siemens, Moody's Analytics, Trimble, CASIC, Taiwan, Schneider Electric
2018	110	India, Lebanon, Norway, Japan, NEM, China, African Union, US Navy Contractor, DHS, Russia, Pyeongchang Olympic Games, US, UK, Germany, North Korea, UN, SWIFT, Turkey, Under Armor, Columbia, FBI, US Department of Justic, US Department of Treasury, Iran, Baltimore Maryland 911, City of Atlanta, US DOD, Central America, Sint. Maarten, Netherlands, Hamas, Fatah, US Allie Foreign Affairs ministries, Mexican Banks, Pakistan, Afghanistan, Facebook, Google Play market, Android, US Navy Contractor, France, Germany, Switzerland, Ukraine, Exactis, DDoS, Cambodian National Election Commission, Cambodian Senate, Cambodian Parliament, DNC, Hillary Clinton campaign, Singapore, Finland, Italian Navy, Senate election campaign, US Electric utilities, Middle East Electric Utility companies, US Senators, 76 Universities in 14 countries, Cosmos Bank, Starwood Hotel Chain, Vietnamese Defense, Energy, and Government, Ukraine Orthodox church, ISIS, Kurds, Netherlands, US State Department, 45 countries governments including US, Canada, France, UK, Balkans, FIFA, Westinghouse Electric, Organization for the Prohibition of Chemical Weapons, Anti-Doping Agencies, Ukraine Security Service, Medicare, Medicaid, Trump, Saudi Arabia Petrochemical Plant, US Aerospace, Austal, Telegram, Instagram, Pakastani Air Force, US State Department, ATMs across Asia and Africa, Atlanta GA, Lebanon, German parliament, German military, American hotel chain, Siapem (Italian oil company), Scotland, Russian oil company, NATO, US Navy contractors, New Zealand, EU Communications system, Chile
2019	110	Germany, Iran, US, Russia, Ukraine, SEC, South Korea, US DNC, Former US Intelligence Personnel, UAE, France, North Korea, Center for Strategic and International Studies, Visma, China Ministry of State Security, Airbus, Australian Federal Parliament, Election Security groups, Internet Research Agency, US International Civil Aviation Organization, 27 US Universities, India Government websites, Pakistan, 200 oil and gas and heavy machinery global companies, Egyptian human rights activists, Indonesia's National Election Commission, EU Elections, Israeli security firm, Vietnam, Israel elections, ISIS, US DOE, Los Angeles County, Salt Lake County, Israeli defense firms, Bayer, UK banks/government, Finland elections, Lithuania Defense Minister, General Electric, Ukraine Military/Government, Amnesty International, Hamas, Iran, Philippines, Australian University, Telecom in Iraq Pakistan and Tajikistan, Telegram, NERC, Internation Cell Phone Providers, Yandex, US Cybercommand, Croatian Government Agencies, Libya, African elections, Microsoft, LinkedIn, USCG, Merchant Vessel Networks, East Asia Government Agencies, BASF, Siemens, Henkel, ProtonMail, Capital One, US Utility Companies, Venezuela, Bahraini government agencies, India, Czech Republic Foreign Ministry, Huawei/African Countries, US Cancer Institutes, Uyghur, 60 universities in US Australia UK Canada Hong Kong and Switzerland, Tibet, Dalai Lama, Eastern Europe, Central Asia, US Utility Companies, Airbus, Egyptian government, Myanmar, Taiwan, Vietnam, Indonesia, Mongolia, Tibet, Xinjiang, Trump campaign, Morocco, Georgia, WhatsApp, UK Labor Party, Microsoft, Kazakh, BMW, Hyundai, 22 nations government agencies across North America Europe and Asia, Cambodia, Bapco
2020	140	Austrian foreign ministry, Israeli NSO, Pakistani Government officials, Russia, Ukrainian Energy, 2 US Municipalities, Mitsubishi, China, Turkish Government, UN, Iran, Wesat, Iran, Malaysian government, US Defense Information Systems Agency, Mexico Economy Ministry, CIA, Uzbekistan, Iran Industrial Companies, Saudi mobile operators, South Korea, North Korea, Iran, WHO, Estonia, Republic of Georgia, Azerbaijan SCADA Systems of wind turbines, Vietnam, Wuhan, Chinese Ministry of Emergency Management, USDHHS, Israel utility systems, Poland War Studies University, Google Play app, Taiwanese petrochemical companies, PLA, Foreign science and tech ministries in Australia Indonesia Philippines Vietnam Thailand Myanmar Brunei, Iranian Port, Mitsubishi Electric, Pakistan telecom, Taiwan, EasyJet, Air transportation in Kuwait and Saudi Arabia, Norway's State Investment Fund, FSB, GRU, Japan Italy Germany and UK businesses, US Defense contractors, Indian government agencies and banks, Australia, Morocco, Turkey, Syria, Uyghur, Tibet, CIA, UK Elections, Canada, UK, US, Vatican, Israel, NATO, Taiwan semiconductor vendors, Tiawan government agencies, Ukraine elections, Afghanistan, Pakistan, ATMs, New Zealand Stock Exchange, US Security Council, Norway, Tbilisi Georgia, North Africa and Middle East countries, Chinese Ministry of State Security, US IT Government Healthcare Finance and Media, German hospital, Iran's Islamic Revolutionary Guard Corps, Android, Spanish research centers, Government agencies in NATO countries, CMA CGM SA, Universal Health Systems, Pharmaceutical Company, International Maritime Organization, Azerbaijani government, Windows, Diplomatic entities and NGOs in Africa Asia and Europe, US Census Bureau, US

Year	# of Incidents	Countries/Entities Involved
		Cyber Command, Microsoft, Iran Ports and Maritime Organization, Tokyo Olympics, US Defense Industrial Base, Government and Telecom in Iraq Kuwait Turkey and UAE, Universities in Australia Canada UK US Netherlands Singapore Denmark Sweden, Aerospace and Defense Companies in Russia, US State and Local Government networks and aviation networks, Greece, Munich Security Conference, State Election Websites, Indian Pharmaceutical company, Hamas, COVID vaccine research facilities, AstraZeneca, Foxconn, Google Play Store, Shirbit, SolarWinds, Pfizer, European Medicines Agency, National Data Center of Mongolia, Facebook, 40 Israeli companies, Al Jazeera, African Union, Finnish parliament, Scottish Environmental Protection Agency, Johnson & Johnson, Novavax
2021	124	New Zealand Central Bank, China, Major gaming and gambling countries, North Korea, Hezbollah, Iran, Oldsmar Florida Water Supply, India, Pakistan, Kazakhstan, Pakistan Atomic Energy Commission, Pakistan Air Force, Kashmir Elections, French IT providers, UAE, Pfizer, Amsterdam, Netherlands, Germany, Sweden, Ukraine, Security Service of Ukraine, Vietnam, Russia, Tibet, Oxford University, Microsoft, Azerbaijan, Bahrain Israel, Saudi Arabia, UAE, Lithuania State Security Department, European Medicines Agency, Polish Security Services, Poland National Atomic Energy Agency and Health Ministry, Indian Transportation Sector, Facebook, Uyghur, US Cyber Command, Columbia Elections, German National Elections, Nine Entertainment, US State Department, Israel, Times of India, Vietnam, European Commission, EU, French Security, NYC Metropolitan Transportation Authority, Swedish Sports Confederation, MI5, LinkedIn, US and European Defense Contractors via VPN, Palestinian Intelligence, 20 low-cost global airlines, NATO, Bundestag, German parliament, Russian Navy contractor, Belgium, Volue, Colonial Pipeline, (academia, airlines, construction, energy, equipment, financial, freight, government, health, IT, law enforcement, manufacturing, marketing, retail, pharma in Australia, Belgium, Brazil, Canada, China, Costa Rica, Czech Republic, France, Germany, India, Indonesia, Italy, Jordan, Peru, Poland, Portugal, Spain, UAE, UK, US), Health Service Executive, South Korea Government, Korea Internet and Security Agency, ROK Ministry of Foreign Affairs, International Atomic Energy Agency Nuclear Security Officer, Seoul National University, Daishin Securities, Fijitsu, JBS, Korea Atomic Energy Research Institute, LineStar Integrity Services, Colonial Pipeline, Netherlands Polic Internal Network, iConstituent, WhatsApp, Sol Oriens, DOE, US Naval Institute, MS Office 365 Cloud Services, Russia Foreign Intelligence Service, Verizon, Metropolitan Water District, Telegram, Afghan government, Afghan National Security Council, Ukrainian Ministry of Defense, Kaseya, Iran, Norway, Facebook, Oil and Natural Gas Pipeline Companies in the US, iPhone, Android, South Africa Transnet Port Terminals, Microsoft Exchange, Myanmar, Philippines, Saudi Arabian Oil Company, Estonia, Tallinn, Southeast Asian Telecommunication providers (5), Lazio Italy, Slovak government, Iranian prison, Belarus Police and Interior Ministry, Kurds, Norwegian Government, Norway National Defense and Security Intelligence, UN, Hungary Election, Lithuanian Defense Ministry, Voicenter, Roshan, Israeli Defense Ministry, Brazil, Indonesia State Cyber and Password Agency, Persian Gulf ports of entry, Iranian Fuel Cards, Telecommunications Networks, Robinhood, FBI Law Enforcement Enterprise Portal, UK Labor Party, China airlines, US Defense Contractor, Android, Windows Devices, CS Energy, US Defense and Technology firms, Huawei, Twitter, Belgium Ministry of Defense
2022	137	DRPK, Russia, Maariv, Jerusalem Post, Israel, Ukraine, International Committee of the Red Cross, Iran, WeChat, Australian Prime Minister, Greek Parliament, Minecraft Tournament, Andorra Telecom, Canadian Foreign Ministry, North Korea, China, German Pharma and Tech firms, UK Foreign office, Wall Street Journal, Palestine, Hamas, Belgium and German Oil Terminals, US Defense contractors, Pakistan, India, US NSA, Ukrainian Defense Ministry Ukraine Banks, UK, Ukrainian Cabinet of Ministers and Ministries of Foreign Affairs Infrastructure and Education, Google Chrome, Israeli Government websites, 6 US State Government Agencies, National Research Council Canada, Russian Emergency Situations Ministry, Tass, European Banking Authority, Microsoft, CNCERT/CC, Greenland Parliamentary Authority, Russian Energy Ministry, State Statistics Service, Federal Penitentiary Service and Bailiff Service, Viasat, Pakistani government, Indian Government, Marshall Islands National Telecommunications Authority, Ukraine National Post Office, Ukrainian Energy Facility, Ukraine Power Grid, Ukrainian Media, Energy semiconductor and telecom in US Israel Russia Canada, Indian State Load Dispatch Centers, Telegram, WhatsApp, Hamas, Facebook, Twitter, Finnish Ministries of Defense and Foreign Affairs, Ronin Network, Catalonians, European Commission, iPhones, Costa Rican Ministry of Finance, France Poland Portugal Embassy Officials, Romanian National Directorate Ministry of Defense Border Police National Railway Company and OTP Bank, Italian Senate Ministry of Defense and National Health Institute, RuTube, Greenland Healthcare system, Grand Ethiopian Renaissance Dam, Jordan Ministry of Foreign Affairs, Port of London Authority, Norwegian public institution, Germany's Greens Party, Outlook, MS Office 365, Harmony's Horizon, Lynas Rare Earths, Jerusalem and Eliat public address systems, Media Today, Hyghur, Iranian Steel Companies, US Major Telecom Networks, Lithuania state railway airport media companies and government ministries, NSA TAO, Ukrainian media company, Albanian Prime Minister and Parliament, Lithuania state-owned energy provider, YouTube Twitter, British Army, Belgium Ministries of Interior and Defense, Shanghai Police, ICCO, Pakistan Air

Year	# of Incidents	Countries/Entities Involved
		Force, Eastern Europe Government and Defense Firms, Estonia, Montenegro, South Staffordshire Water, DESFA, Latvian Parliament, Ukraine nuclear power plants, Finnish Parliament, Taiwan government, Italy energy agency (GSE), UK MI5, Mexican Defense Ministry, Anonymous, Iranian government, China Northwestern Polytechnical University, NSA, Bosnia, Herzegovina, Telecom internet and universities in Middle East and Africa, Albanian Government networks, US State government Colorado Kentucky and Mississippi, US airports, Bulgarian Defense Ministry Interior Ministry Justice Ministry and Constitutional Court, Australian Department of Defense, Southeast Asia, USB Drives, Pakistani government military and companies, Guadeloupe government, Vanuatu government, Danish State Railways, US Merit Systems Protection Board, Bahraini government elections, energy and logistics in Ukraine and Poland, UAE, former US intelligence, Indian hospital, VTB, Amnesty International of Canada, SBA COVID funds, French hospital, Danish defense ministry, Vatican City, Saudi Arabia government, US UK France healthcare organizations, Italy Ministry of Agriculture, Jalisco, FBI InfraGard
2023 (through February)	26	Moldovan, Asia Pacific government military and civilian networks, Malaysian National Defense, Albanian government, Costa Rica's Ministry of Public Works, Iran, Australian and US public infrastructure, Nepalese government, Russia, UK Postal Service, Serbian government, US Federal Civilian Executive Branch, Litvian Ministry of Defense, Hospitals in Netherlands and other countries in Europe, China, EU Commission, Italy Revenue Agency, Technion University, Bahrain international airport and news agency, Iranian intelligence services, Acea, Polish public, NATO, Turkish airbase,

Source: Center for Strategic and International Studies 2023



Source: Center for Strategic and International Studies 2023

Figure 63- Number of Global Cyber Events (2003-2022)

The State of Rhode Island has experienced the following cyber events:

Table 57- State of Rhode Island Historic Cyber Events

Year	Location/Entity	Event Type
2016	Rhode Island State Police	Ransomware
2016	City of Providence	Hack
2016	University Gastroenterology	Ransomware
2018	Department of Children, Youth, and Families, Department of Human Services, and Department of Behavioral Healthcare, Developmental Disabilities and Hospitals	Phishing
2018	State Treasurer's Office	Phishing
2018	Thundermist Health Center, Providence County	Ransomware
2019	Town of East Greenwich	Ransomware
2019	Town of East Greenwich and East Greenwich Police Department	Ransomware

Year	Location/Entity	Event Type
2019	Pawtucket Fire Department	Ransomware
2019	Newport School	Malware
2019	Town of Coventry Public School	Ransomware
2019	Town of New Bedford	Ransomware
2020	Care New England, Providence County	Malware
2020	Town of Exeter	Ransomware
2022	Providence	Hacking, data breach
2022	Narragansett Bay Commission, Providence County	Ransomware
2022	Rhode Island Public Transit Authority	Hacking, data breach
2023	CharterCARE Hospital System	Ransomware
2023	Roger Williams Medical Center and Our Lady of Fatima	Ransomware
2023	North Kingstown	Ransomware
2023	Donald W Wyatt Detention Facility	Ransomware
2024	Providence Public Schools	Ransomware
2024	RIBridges (Rhode Island Health and Social Services)	Ransomware

Source: RIEMA 2024

Between 2019 and 2020, at least seven Rhode Island municipalities have fallen victim to a ransomware attack, according to Rhode Island State Police. One of those towns spent six figures to unlock its data (WPRI 2020). The Town of Exeter was included in these string of attacks.

The Manager of the Exeter IT Department, James Angi states: "We coordinated with the appropriate authorities, including state police, who were able to determine how our security was breached. "We did not pay any ransom and were able to restore all our data from backups."

Since this event, Exeter has increased its IT security measures to prevent future attacks. The Town of West Greenwich has not been impacted by a cybersecurity attack. The December 2024 RIBridges System ransomware attack has compromised the personal information of hundreds of thousands of Rhode Island residents and the complete impacts and extent of the attack are still being evaluated.

3.3.13.4 Extent

Cybersecurity threats and outcomes vary. The following table describes the types of attacks with examples of the threat and potential outcomes.

Table 58- Cybersecurity Threats and Potential Outcomes

Malware	Malicious software, such as viruses, worms, Trojans, ransomware, and spyware, is used to infect and compromise a computer or network. Malware can cause damage, steal information, or provide unauthorized access.
Phishing	Phishing attacks involve tricking individuals into revealing sensitive information, such as passwords or financial details, by posing as a legitimate entity. Phishing emails, websites, and messages are common tools for attackers.
Denial-of-Service	An attack that overwhelms a target system or network with traffic, rendering it inaccessible.
Distributed Denial-of-Service	An attack that involves multiple compromised devices (a botnet) flooding a target with traffic, making it impossible to function effectively.
Man-in-the-Middle	In these attacks, an attacker intercepts and possibly alters communications between two parties without their knowledge. This can lead to data interception, eavesdropping, or impersonation.

SQL Injection	Attackers inject malicious SQL code into input fields of a web application to manipulate a database, potentially gaining unauthorized access or extracting data.
Zero-Day Vulnerabilities	Attackers leverage security vulnerabilities in software or hardware that are not yet known to the vendor or public. These vulnerabilities are known as "zero-days."
Brute Force	Attackers attempt to gain access to an account or system by trying all possible password combinations until the correct one is found.
Dictionary	Attackers use precompiled lists of common passwords to guess login credentials.
Social Engineering	This involves manipulating individuals into divulging confidential information or performing actions that compromise security. It often relies on psychological manipulation.
Ransomware	Attackers encrypt a victim's data and demand a ransom in exchange for the decryption key. Payment does not guarantee data recovery, and it encourages further attacks.
Insider Attacks	Malicious or negligent actions by individuals within an organization can pose significant cybersecurity risks, as they may have access to sensitive information and systems.
Supply Chain	Attackers target suppliers, vendors, or partners to compromise the security of products or services, which can affect downstream organizations and consumers.
Internet of Things	Devices connected to the internet, such as smart appliances and sensors, can be targeted to gain unauthorized access or control.

Source: State of Rhode Island 2024 Hazard Mitigation Plan Update

Based on the extent of past events and the criteria identified in Table 7, the extent of cybersecurity events in Exeter are considered **Limited**, with potential for some injuries; short shutdown of some critical infrastructure and facilities; fewer than 10% of residential and commercial structures damaged; and a small number of local operations impacted for short amounts of time.

Based on the lack of historical events and the criteria identified in Table 7, the extent of cybersecurity events in West Greenwich are considered **Negligible** with the potential of minor injuries; no shutdown of critical infrastructure and facilities; scattered incidental residential and commercial structure damage; and few or no operations impacted for short amounts of time.

3.3.13.5 Probability of Future Occurrence

As the reliance on the internet and smart devices continues to grow, so does the vulnerability. As shown in Table 56 and Figure 63, the number of cyber-attacks continues to increase annually, and the costs of these attacks are estimated to increase to 13.8 trillion dollars by 2028.

Based on the increasing number of cybersecurity events globally and the criteria identified in Table 8, it is Highly Likely (greater than 90% annual probability of occurring) that there will be an attempted cybersecurity event on the Towns of Exeter in West Greenwich in the calendar year; however, based on the security systems in place by the Towns IT Departments, it is **Possible** that Exeter and West Greenwich will be impacted by a cybersecurity event of any magnitude in the calendar year; there is a between 1-49.9% annual probability of occurring. The extent of these possible events may range from stealing an encrypted laptop to full data breach and data extortion that leaves the Town(s) without access to data, potential public lack of confidence in security, and financial implications.

3.3.13.6 Impact

Cyber related impacts range from minimal disruptions to catastrophic depending on the length of the incident, sensitivity of data, affected systems (internal and external). For example, a stolen encrypted laptop could have a minimal impact where a ransomware attack which encrypts the Towns' data could have a catastrophic impact on the Towns' ability to continue to operate, economic loss, public confidence, as well as emergency responders' ability to respond. Globally, cyber-attacks were estimated to have cost 8 trillion dollars in 2023. That number is expected to be 9.5 trillion in 2024, 10.5 trillion in 2025, and 13.8 trillion by 2028.

The elderly and disabled are more vulnerable to cyberattacks due to limited digital literacy, dependence on technology for daily activities and medical supplies, and increased susceptibility to exploitation by cybercriminals.

The Towns of Exeter and West Greenwich have identified the following vulnerabilities and priorities to focus mitigation efforts to reduce or eliminate impacts associated with cyber threats.

- <u>Vulnerabilities</u>: Essential Services, Critical Industrial Control Systems (wastewater treatment), Critical Facilities, Critical Devices, Communications Systems.
- <u>Priorities</u>: Residents, Vulnerable Populations, Property, Economy, Environment, Health Systems, Town Operations, Emergency Response, Infrastructure (Water/Wastewater, Transportation, Communications, Utilities).

Cyberattacks on critical infrastructure such as dams, traffic lights, and power grids have the potential to cause significant harm to public safety, the economy, the environment, and national security. Specific potential impacts may include:

- Dam failure: A cyberattack on a dam's control systems could lead to the failure of gates, valves, or even the dam itself. If the dam releases water unexpectedly, it could result in catastrophic flooding, affecting downstream communities, agriculture, and infrastructure. Dams are often essential for water supply, hydroelectric power generation, and irrigation. A failure could disrupt these services, leading to economic losses, particularly in agriculture and energy.
- Public safety: A cyberattack on traffic control systems can cause widespread traffic light outages, resulting in severe congestion and traffic jams. In high-traffic areas, this could lead to accidents, including collisions, injuries, and fatalities. In the event of an emergency (fire, medical, or police), malfunctioning traffic lights could delay first responders, exacerbating the situation and potentially leading to more severe outcomes.
- Power infrastructure: Cyberattacks targeting the electrical grid can lead to massive power outages affecting entire cities or regions. This could last for hours, days, or longer, depending on the severity of the attack. A power outage could shut down critical infrastructure, including hospitals, water treatment plants, and communication networks, severely impacting daily life and public health. Loss of power may prevent access to potable water from private wells.

3.3.13.7 Future Conditions

Climate change is not anticipated to influence future cybersecurity events in Exeter or West Greenwich. Increases in population and land use development (to support increases in population) will result in increases in instances of cyber threat due to the increase in users of the internet and smart devices. Decreases in population may result in decreases in cyber events due to decreased internet usage.

3.4 Summary of Vulnerability

This section outlines the risk and vulnerability processes from various hazard impacts in determining potential losses for the Towns.

This section addresses a portion of Element B of the Local Mitigation Plans regulation checklist.

Regulation Checklist- 44 CFR § 201.6 Local Mitigation Plans
ELEMENT B. Risk Assessment
B2. Does the plan include a summary of the jurisdiction's vulnerability and the impacts on the community from the identified hazards? Does this summary also address NFIP-insured structures that have been repetitively damaged by floods? (Requirement 44 CFR § 201.6(c)(2)(ii)) B2-a. Does the plan provide an overall summary of each jurisdiction's vulnerability to the identified hazards?
Source: FEMA 2025 (Local)

3.4.1 Overview

A vulnerability analysis estimates the exposure extent that may result from a hazard event, within a given area and with a given intensity. This analysis provides quantitative data that may be used to identify and prioritize potential mitigation measures. This then allows the communities to focus their efforts and attention on areas with the greatest risk of damage.

Table 59 and Table 60 show an overview of the Towns of Exeter and West Greenwich's infrastructure hazard vulnerability.

Table 59- Vulnerability Overview- Exeter

Hazard	Area's Hazard Vulnerability			
	% of Geographic Area	% of Critical Facilities	% of Roads % of Railroad	% of Residences
Severe Thunderstorm	100%	180/180= 100%	103/103 miles= 100% 2/2 miles= 100%	2,353/2,353= 100%
Dam Failure	20%	47/180= 26%	2/103 miles= 2 0.4/2 miles= 20%	148/2,353= 6%
Flooding	40%	37/180= 21%	7/103 miles= 7% 0.2/2 miles= 10%	596/2,353= 25%
Tropical & Extratropical Storms	100%	180/180= 100%	103/103 miles= 100% 2/2 miles= 100%	2,353/2,353= 100%
Severe Winter Weather	100%	180/180= 100%	103/103 miles= 100% 2/2 miles= 100%	2,353/2,353= 100%
Brushfire	100%	180/180= 100%	103/103 miles= 100% 2/2 miles= 100%	2,353/2,353= 100%
Drought	100%	180/180= 100%	103/103 miles= 100% 2/2 miles= 100%	2,353/2,353= 100%
Extreme Temperatures	100%	180/180= 100%	103/103 miles= 100% 2/2 miles= 100%	2,353/2,353= 100%
Tornadoes	100%	180/180= 100%	103/103 miles= 100% 2/2 miles= 100%	2,353/2,353= 100%
Earthquake	100%	180/180= 100%	103/103 miles= 100% 2/2 miles= 100%	2,353/2,353= 100%
Hazardous Materials	20%	69/180= 38%	29/103 miles= 28% 2/2 miles= 100%	983/2,353= 41%

Table 59- Vulnerability Overview- Exeter

Hazard	Area's Hazard Vulnerability			
	% of Geographic Area	% of Critical Facilities	% of Roads % of Railroad	% of Residences
Water Quality	PFAS and Cyanobacteria in drinking water is a public health concern, but impacts are not anticipated to cause infrastructure damage.			
Cybersecurity	100%	180/180= 100%	103/103 miles= 100% 2/2 miles= 100%	2,353/2,353= 100%

Table 60- Vulnerability Overview- West Greenwich

Hazard	Area's Hazard Vulnerability			
	% of Geographic Area	% of Critical Facilities	% of Roads	% of Residences
Severe Thunderstorm	100%	118/118= 100%	120/120 miles= 100%	2,482/2,482= 100%
Dam Failure	5%	30/118= 25%	1/120 miles= 1%	27/2,482= 1%
Flooding	20%	18/118= 15%	2/120 miles= 2%	94/2,482= 3%
Tropical & Extratropical Storms	100%	118/118= 100%	120/120 miles= 100%	2,482/2,482= 100%
Severe Winter Weather	100%	118/118= 100%	120/120 miles= 100%	2,482/2,482= 100%
Brushfire	100%	118/118= 100%	120/120 miles= 100%	2,482/2,482= 100%
Drought	100%	118/118= 100%	120/120 miles= 100%	2,482/2,482= 100%
Extreme Temperatures	100%	118/118= 100%	120/120 miles= 100%	2,482/2,482= 100%
Tornadoes	100%	118/118= 100%	120/120 miles= 100%	2,482/2,482= 100%
Earthquake	100%	118/118= 100%	120/120 miles= 100%	2,482/2,482= 100%
Hazardous Materials	30%	47/118= 40%	28/120 miles = 23%	45/120= 2%
Water Quality	PFAS and Cyanobacteria in drinking water is a public health concern, but impacts are not anticipated to cause infrastructure damage.			
Cybersecurity	100%	118/118= 100%	120/120 miles= 100%	2,482/2,482= 100%

3.4.2 Population and Residential Buildings

Current population and building data for the Towns of Exeter and West Greenwich were obtained from the 2024 US Census.

Estimated replacement values for residential building structures were obtained from the 2022 American Community Survey (US Census), which estimated the median home value per structure at $435,800 in Exeter and $447,100 in West Greenwich (US Census 2024- Table B25077). However, US Census replacement values are generally understated.

The United States Department of Housing and Urban Development (HUD) completed a new study in 2022 for Tribal communities throughout the United States and estimates an average 3-bedroom residential structure on the Narragansett Reservation in Charlestown, RI (18 miles S of West Greenwich) has a replacement value of $467,423 (HUD 2022). The more conservative HUD approximation for replacement value was used for this analysis.

Table 61- Estimated Population and Residential Building Inventory

Town	Population	Residential Buildings	
	2020 Census	Total Housing Units (US Census data- Table B25001)	Total Value of Buildings
Exeter	6,460	2,353	US Census: $1,025,437,400 HUD: **$1,099,846,319** (used for analysis)
West Greenwich	6,528	2,482	US Census: $1,109,702,200 HUD: **$1,160,143,886** (used for analysis)

Sources: US Census 2024, HUD 2022

3.4.3 Methodology

An analysis was conducted to assess the risks of each identified hazard. This analysis looked at the potential effects of each hazard on values of critical facilities at risk without considering the probability or level of damage. The analysis also represents the number of people at risk from each hazard but does not estimate the number of potential injuries or deaths.

The critical facilities identified in the 2005 HMPs were used as the foundation to complete this analysis. The HMPCs provided information on newly constructed facilities and these critical facilities were then added to the inventory.

An analysis in FEMA's Hazus software was carried out to determine potential losses due to earthquake, hurricane, and flooding events in Exeter and West Greenwich. The results of this analysis can be found in

For a consistent analysis of potential losses in Exeter and West Greenwich for all hazards outlined in this MJHM&FMP, the following methodology was used:

Hazard	Methodology
Severe Thunderstorm, Hurricane/Nor'easter, Severe Winter Weather, Brushfire, Drought, Extreme Temperatures, Tornado, Earthquake, Cybersecurity	It is assumed that the entire Exeter and West Greenwich Planning Area and all identified critical facilities (100%) are threatened by these hazards.
Dam Failure	RIDEM has a library of engineering reports for dams in Rhode Island. These reports contain information on the hazard potential assessment, estimated approximate flood impact area, and inundation maps, when available. The available inundation maps are digitized and are publicly available on ArcGIS online. Limited hydraulic analysis were available in RIDEM's library for some of the inundation maps to evaluate the extent of flooding due to a potential dam failure. The analysis completed was the National Weather Service's Simplified Dam Break Model. Critical facilities: The available digitized inundation maps were overlayed on the critical

Hazard	Methodology
	facilities data to determine the critical facilities in an inundation area. Residences: Available digitized inundation maps were overlayed on the Towns' 2023/2024 parcel map data. An "intersect" query was run to determine which parcels intersected an inundation area. Exeter and West Greenwich's parcel data was not in the same format, so different methodologies were used. For Exeter, the results of this query were then filtered by "Parcel Owner" to only count private ownership. For West Greenwich, the results of this query were then filtered by "Building Type" to remove any non-residential properties. The loss estimations utilizing this method are likely overestimated as a parcel may only partially be inundated during a dam failure, and the residential structure on the parcel may not have been affected. However, it is beyond the scope of this MJHM&FMP to determine the percentage of the residential structure that may be affected during a dam failure event.
Flooding	Critical facilities: The current FEMA FIRM maps were overlayed on the critical facilities data to determine the critical facilities in Special Flood Hazard Areas (SFHAs). Other areas or historically threatened facilities/residences gathered through meetings with the HMPCs, and public input were also identified. Residences: The current FEMA FIRM maps were overlayed on the Towns' 2023/2024 parcel data. An "intersect" query was run to determine which parcels intersected the 1% or 0.2% annual change flood hazard areas. The results of this query were then filtered by "Building Type" to remove any non-residential properties. The loss estimations utilizing this method are likely overestimated as a parcel may only partially be flooded during a 1% or 0.2% chance flood, and the residential structure on the parcel may not have been affected. However, it is beyond the scope of this MJHM&FMP to determine the percentage of the residential structure that may be affected during a flooding event.
Hazardous Materials	A 0.25 mile buffer from interstates, major roadways, and train tracks was created in GIS to determine if any critical facilities would be directly affected from a hazardous materials spill at these locations. These roadways included I-95, Victory Hwy, Nooseneck Hill Rd, Division Rd, Ten Rod Rd, S. County Trail, and 1.8 miles of railroad tracks in southeast Exeter. A 0.50 mile buffer around the TA Travel Center in West Greenwich was created in GIS as this facility has 18+ hazardous materials incidents and is a concern of the HMPC. An "intersect" query was run to determine which parcels intersected the buffer zone. The results of this query were then filtered by "Building Type" to remove any non-residential properties. This risk assessment does not account for the type of material spilled, topography of the land adjacent to the roadway, or potential costs for recovery/remediation. The potential of a spill from an airplane was not included.
Water Quality	PFAS and Cyanobacteria in drinking water is a public health concern, but impacts are not anticipated to cause infrastructure damage.

3.4.4 Data Limitations

The loss estimations in the vulnerability assessment used the best data currently available, and the methodologies used result in a risk approximation. These estimates may be used to understand relative risk from hazards and potential losses; however, uncertainties are inevitable in any loss estimation. This is due in part to incomplete scientific knowledge or data concerning hazards and their effects on the built environment, as well as the use of approximations and simplifications, when necessary, for a comprehensive analysis.

It should be noted that the results from the quantitative vulnerability assessment are limited to the exposure of people, buildings, and critical facilities and infrastructure to the identified hazards. It was beyond the scope of this MJHM&FMP Update to develop a more detailed or comprehensive assessment of risk. A more comprehensive assessment may include loss of facility/system function, annualized losses, people injured or killed, shelter requirements, and/or economic losses. Such impacts may be addressed with future updates of this MJHM&FMP Update or other planning documents.

3.4.5 Critical Facilities Inventory

A critical facility is defined as a facility that provides essential products and services to the public. They assist in preserving quality of life and fulfill important public safety, emergency response, and disaster recovery functions.

Table 62- Town of Exeter's Critical Facilities

Facility Type	Facility Name	Location	Facility Value	Owner	Hazards				
					Severe Thunderstorm, Tropical & Extratropical Storms, Severe Winter Weather, Brushfire, Drought, Extreme Temperatures, Tornadoes, Earthquake, Cyber	Dam Failure	Flooding	HAZMAT	Water Quality*
Government	Town Hall, Town Constables	675 Ten Rod Rd	$543,700	Town of Exeter	x			x	
	Future Town Hall	742 Ten Rod Rd	$432,200	Town of Exeter	x			x	
	Public Works Department	175 S. County Trail	$204,600	Town of Exeter	x			x	
	Transfer Station	890 Ten Rod Rd	$114,200	Town of Exeter	x			x	
	Animal Shelter	169 S. County Trail	$482,000	Town of Exeter	x			x	
Emergency Services	Fire District Dispatch Center, Fire District Rescue Building	669 Ten Rod Rd	$342,700	Exeter Fire District	x			x	
	Fire Dept 1: Station 1 (Headquarters)	305 Ten Rod Rd	$887,400	Exeter #1 Volunteer Fire Department	x			x	
	Fire Dept 1: Station 4	471 S. County Trail	$226,500	Exeter #1 Volunteer Fire Department	x			x	
	Fire Dept 2: Station 2 (Headquarters and EOC)	366 Nooseneck Hill Rd	$459,700	Exeter Volunteer Fire Co #2	x			x	
	Fire Dept 2: Station 3	50 Woody Hill Rd.	$132,800	Exeter Volunteer Fire Co #2	x			x	
	Yawgoo SAR Station	160 Yawgoo Valley Rd	$991,800	Ski Pro Inc.	x			x	
Education	Metcalf School	30 Nooseneck Hill Rd	$7,749,000	Regional School District	x			x	
	Wawaloam Elementary School	100 Victory Hwy.	$5,376,400	Town of Exeter	x			x	
	The Children's Village Early Learning Center	567 S. County Trail	$4,321,400	Oak Harbor Village LLC	x			x	
	EWG Junior/Senior High School & Admin Bldg	930 Nooseneck Hill Rd	$15,748,800	EWG Schools - Jr, Sr, Admin	x			x	
	Lineham School	859 Nooseneck Hill Rd	$1,211,700	EWG SCHOOL-LINEHAM EXETER-WES	x			x	
	Hidden Hills Early Learning Ctr	190 Yawgoo Valley Rd	$1,149,200	Ski Pro Inc. (bldg. only)	x			x	
	RI Fire Academy	4 Green Ln	$1,150,000	State of Rhode Island	x				
Utility	Communication Tower- Escoheag Hill Rd	45 Escoheag Hill Rd	$3,000,000^		x				
	Communication Tower- Exeter #2	366 Nooseneck Hill Rd	$3,000,000^		x			x	
	Communication Tower- Pine Hill	550 New London Turnpike	$3,000,000^		x				
	Communication Tower- Exeter Dispatch	669 Ten Rod Rd	$3,000,000^		x			x	
	Communication Tower- Yawgoo Valley	160 Yawgoo Valley Rd	$3,000,000^		x			x	
	R.I. Energy LNG Plant (serves Southern RI)	53 South County Trail	$885,600	R.I Energy	x			x	

Table 62- Town of Exeter's Critical Facilities

Facility Type	Facility Name	Location	Facility Value	Owner	Hazards				
					Severe Thunderstorm, Tropical & Extratropical Storms, Severe Winter Weather, Brushfire, Drought, Extreme Temperatures, Tornadoes, Earthquake, Cyber	Dam Failure	Flooding	HAZMAT	Water Quality*
Roads/Bridges/ Culverts	103 miles of road	Various locations	$51,500,000 ($500k per mile)	RIDOT, Town of Exeter	x	2 mi	7 mi	29 mi	
	2 miles of railroad	Southeast Exeter	$4,000,000 ($2M per mile)	Amtrak	x	0.4 mi	0.2 mi	2 mi	
	25 bridges	Various locations	$375,000,000 ($15M each)	RIDOT, Town of Exeter	x	4	16	13	
	11 culverts	Various locations	$5,500,000 ($500k each)	RIDOT, Town of Exeter	x	7	7	7	
Dams	30 Low Hazard Dams	Various locations	$30,000,000^	Various owners	x		9	2	
	2 Significant Hazard Dams	Various locations	$2,000,000^	Various owners	x		1		
	4 High Hazard Dams	Various locations	$4,000,000^	Various owners	x		4	1	
Community	Exeter Public Library	773 Ten Rod Rd	$1,093,200	Town of Exeter	x			x	
	USPS	260 S. County Trail	$271,200	First California Investments	x			x	
	Exeter Chapel	765 Ten Rod Rd	$1,756,400	Exeter Chapel Prophecy	x			x	
	The Saint Kateri Tekakwitha Catholic Church	84 Exeter Rd	$1,027,100	Roman Catholic Bishop Of Prov	x				
	Beacon Church	100 Exeter Rd	$1,936,200	Beacon Free Will Baptist Church Of RI	x			x	
	American Baptist Churches of Rhode Island	54 Exeter Rd	$2,630,800	American Baptist Church	x				
	Liberty Baptist Church	277 Liberty Church Rd	$275,100	Liberty Church	x				
	Austin Farm Road Agricultural Area (NRHP #77000009)	41°35′44″N 71°39′52″W	$500,000^		x			x	
	Baptist Church in Exeter/Chesnut Hill Baptist Church (NRHP #78000014)	41°34′52″N 71°33′28″W	$415,900	Baptist Church in Exeter	x			x	
	Fisherville Historic and Archeological District (NRHP #80000017)	41°33′52.7″N 71°33′44.0″W	$500,000^		x				
	Hallville Historic and Archeological District (NRHP #80000020)	239 Hallville Rd	$500,000^		x				
	Lawton's Mill (NRHP #80000022)	41°34′54″N 71°34′13″W	$500,000^		x			x	
	Simon Lillibridge Farm (NRHP #78000020)	75 Summit Rd	$500,000^		x				
	Parris Brook Historic and Archeological	Arcadia Management	$500,000^		x				

Table 62- Town of Exeter's Critical Facilities

Facility Type	Facility Name	Location	Facility Value	Owner	Hazards: Severe Thunderstorm, Tropical & Extratropical Storms, Severe Winter Weather, Brushfire, Drought, Extreme Temperatures, Tornadoes, Earthquake, Cyber	Dam Failure	Flooding	HAZMAT	Water Quality*
	District (NRHP #80000023)	Area							
	Queen's Fort (NRHP #80000024)	Off Stony Rd on the Exeter-North Kingstown line, about 1/4 of a mile west of Route 2	$500,000^		x				
	Sodom Mill Historic and Archeological District (NRHP #80000025)	Victory Hwy	$500,000^		x				
Vulnerable Populations	Kingston Center for Rehabilitation and Nursing (closing in 2025)	415 Gardner Rd	$888,900	Shady Acres Realty Associates LLC	x				
	Zinnia Healing Exeter- Addiction Treatment Center	251 Main St	$2,961,800	251 Exeter LLC	x				
	Pineview Apartments	6 Pine View Lane	$12,000,000	PV Exeter Apartments LP	x				
	Yawgoo Valley Apartments	155 Yawgoo Valley	$3,210,800	Exeter Property Group LLC	x				
	Mobile Village Inc. (mobile home community)	550 Victory Hwy	$2,019,800	Mobile Village Inc.	x				
	Split Rock Mobile Home Park (mobile home community)	480 South County Trail	$941,800	Split Rock Corporation	x				
	DCYF Female Youth Residential Facility	160 Main Street	$4,000,000	State of Rhode Island	x				
	Exeter Job Corps Student Housing	162 Main Street	$4,000,000	State of Rhode Island	x				
	Group Homes (x3)	Addresses redacted	$1,402,269	Various	x				
	Special Needs Residents (x57)	Addresses redacted	$26,643,111	Various	x			18	
		Total:	**$600,884,080**						

*Water quality is not expected to impact infrastructure

Table 63- Town of West Greenwich's Critical Facilities

Facility Type	Facility Name	Location	Facility Value	Owner	Hazards				
					Severe Thunderstorm, Tropical & Extratropical Storms, Severe Winter Weather, Brushfire, Drought, Extreme Temperatures, Tornadoes, Earthquake, Cyber	Dam Failure	Flooding	HAZMAT	Water Quality*
Government	Town Hall/Police Dept	280 Victory Hwy	$1,351,800	Town of West Greenwich	x			x	
	Town Hall Annex	302 Victory Hwy	$131,100	Town of West Greenwich	x			x	
Emergency Services	Lake Mishnock Fire Department	166 Mishnock Rd	$357,200	Lake Mishnock Vol Fire Co	x				
	West Greenwich Fire Company # 1	830 Nooseneck Hill Rd	$400,300	West Greenwich Volunteer	x			x	
	West Greenwich EMS / Rescue	733 Victory Hwy	$248,500	West Greenwich Community Rescue	x			x	
	Hianloland Fire Company Station 1	270 Victory Hwy	$506,300	Hianloland Fire Co	x			x	
	Hianloland Fire Company Station 2	244 Plain Rd	$300,300	Hianloland Fire Co #2	x				
	Rhode Island DMAT/ Medical Reserve Corps	50 Barnett Ln	$343,500	RI Disaster Medical Assistance	x			x	
Education	EWG Junior/Senior High School	930 Nooseneck Hill Rd	$15,748,800	EWG Schools - Jr, Sr, Admin	x			x	
	Lineham School	859 Nooseneck Hill Rd	$1,211,700	EWG School-Lineham Exeter-Wes	x			x	
	The Greene School	94 John Potter Rd	$1,268,000	The Greene School	x				
	URI W. Alton Jones Campus	401 Victory Hwy	$4,239,400	State of RI RIDEM	x				
Utility	Utility Station	92 Hopkins Hill Rd	$21,400	Rhode Island Energy	x			x	
	Solar- University 1 (74 solar acres)	830A Victory Hwy	$37,000,000 ($500k per solar acre)		x			x	
	Solar- Set Way (4 solar acres)	41 Nooseneck Hill Rd	$2,000,000 ($500k per solar acre)		x			x	
	Solar- Baton/Green (8 solar acres)	22 Victory Hwy	$4,000,000 ($500k per solar acre)		x			x	
	Solar- TPE/Hopkins Hill (35 solar acres)	725 Hopkins Hill Rd	$17,500,000 ($500k per solar acre)		x				
	Solar- Bates Trail (33 solar acres)	68 Bates Trail	$16,500,000 ($500k per solar acre)		x				
	Solar- University 2 (14 solar acres)	200 Robin Hollow Rd	$7,000,000 ($500k per solar acre)		x				
	Solar- Cemetery/Green (91 solar acres)	1001 Nooseneck Hill Rd	$45,500,000 ($500k per solar acre)		x			x	
	Solar- Hidden Valley (47 solar acres)	808 Hopkins Hill Rd	$23,500,000 ($500k per solar acre)		x				
	Solar- Robin Hollow (193 solar acres)	109 Robin Hollow Rd	$96,500,000 ($500k per solar acre)		x			x	

Table 63- Town of West Greenwich's Critical Facilities

Facility Type	Facility Name	Location	Facility Value	Owner	Hazards				
					Severe Thunderstorm, Tropical & Extratropical Storms, Severe Winter Weather, Brushfire, Drought, Extreme Temperatures, Tornadoes, Earthquake, Cyber	Dam Failure	Flooding	HAZMAT	Water Quality*
	Solar- White Brook (33 solar acres)	729 Victory Hwy	$16,500,000 ($500k per solar acre)		x			x	
	Solar- Studley (24 solar acres)	189 Weaver Hill Rd	$12,000,000 ($500k per solar acre)		x				
	Solar- Leyden (12 solar acres)	179 Plain Meeting House Rd	$6,000,000 ($500k per solar acre)		x				
Transportation	TA Travel Center	849 Victory Hwy	$1,291,600	TA West Greenwich LLC	x			x	
Roads/Bridges/ Culverts	120 miles of road	Various locations	$60,000,000 ($500k per mile)	RIDOT, Town of West Greenwich	x	1 mi	2 mi	28 mi	
	17 bridges	Various locations	$255,000,000 ($15M each)	RIDOT, Town of West Greenwich	x	2	7	9	
	4 culverts	Various locations	$2,000,000 ($500k each)	RIDOT, Town of West Greenwich	x	1	2	2	
Dams	27 Low hazard	Various locations	$27,000,000^	Various owners	x	27	9	4	
Community	Louttit Library/Playground/Pavilion	280 Victory Hwy	$1,351,800	Town of West Greenwich	x			x	
	RI Fish & Game Protective Association	254 Sharpe St	$79,700	Rhode Island Fish And Game	x				
	The Plain Meeting House/West Greenwich Baptist Church and Cemetery (NRHP #78000066)	275 Plain Rd	$99,300	West Greenwich Land Trust	x				
	Stephen Allen House (NRHP #78000060)	319 Sharpe St	$171,000	Greenfield, Frederick & Quinn, Wyoming	x			x	
	South County Rod & Gun Club	711 Hazard Rd	$79,900	South County Rod and Gun Club	x				
	Palmer Meeting House	195 Escoheag Hill Rd	$81,700	West Greenwich Land Trust	x				
	Wincheck Gun Club	300 New London Turnpike	$49,500	Wincheck Gun Club, Inc	x				
Vulnerable Populations	Senior Center (under construction)	260 Victory Hwy	$1,000,000	Town of West Greenwich	x			x	
	Special Needs Residents (x36)	Addresses redacted	$16,827,228	Various owners	x			13	
		Total:	**$675,160,028**						

*Water quality is not expected to impact infrastructure

Figure 64 shows the location of Exeter's identified critical facilities.

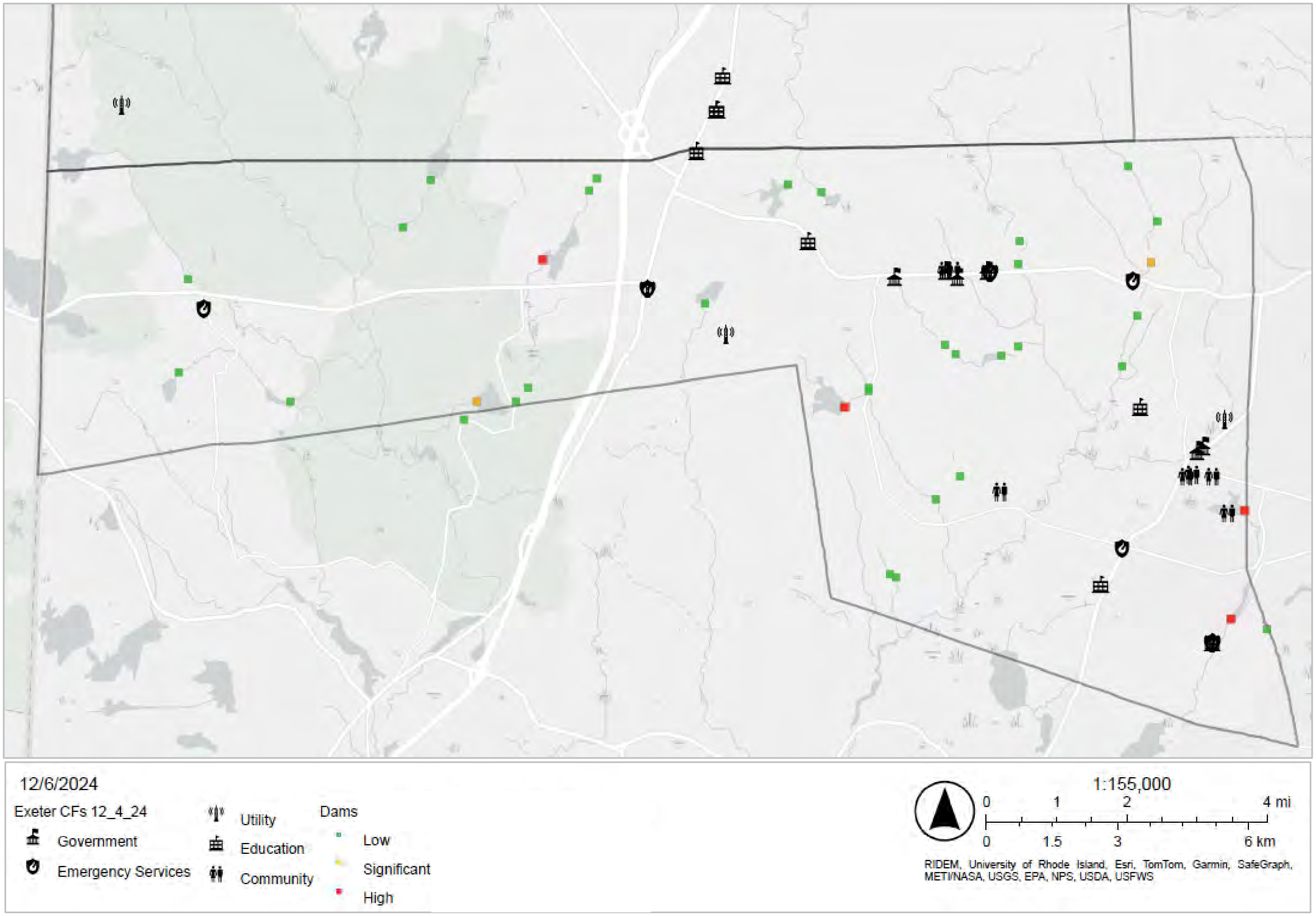


Figure 64- Map of Exeter's Critical Facilities

Figure 65 shows the location of West Greenwich's identified critical facilities.

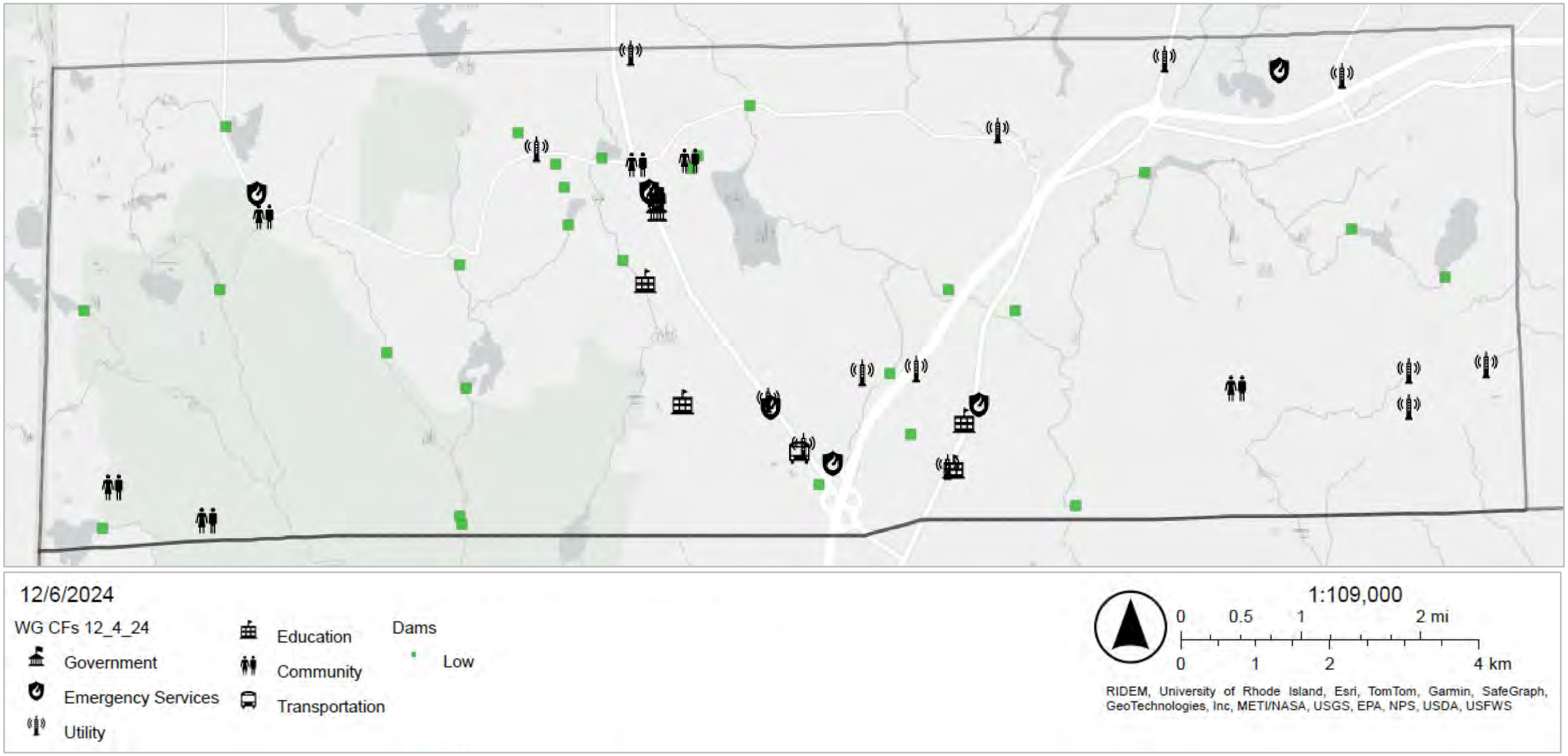


Figure 65- Map of West Greenwich's Critical Facilities

Figure 66 shows the location of vulnerable populations in Exeter and West Greenwich.

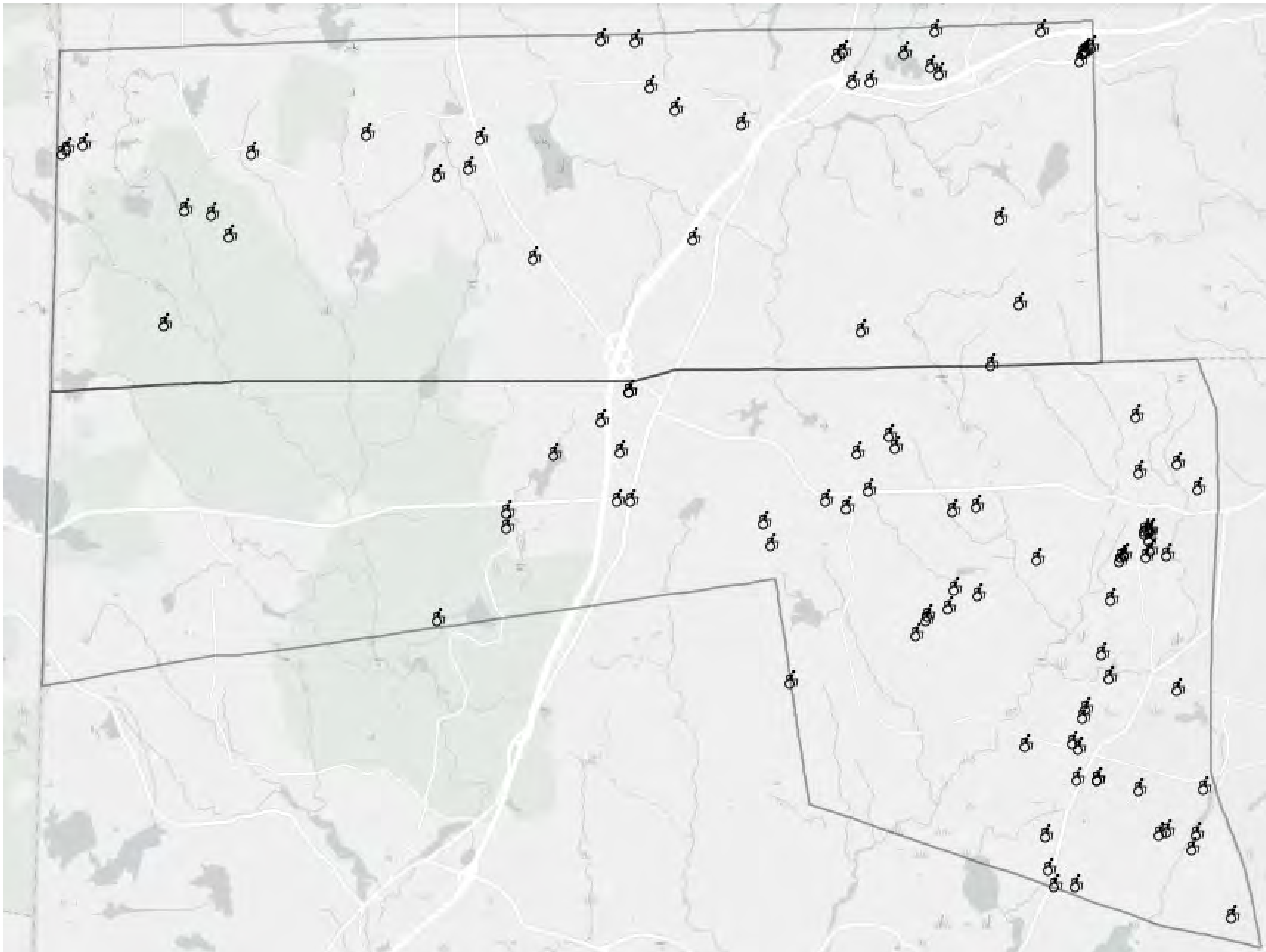


Figure 66- Map of Vulnerable Populations in Exeter and West Greenwich

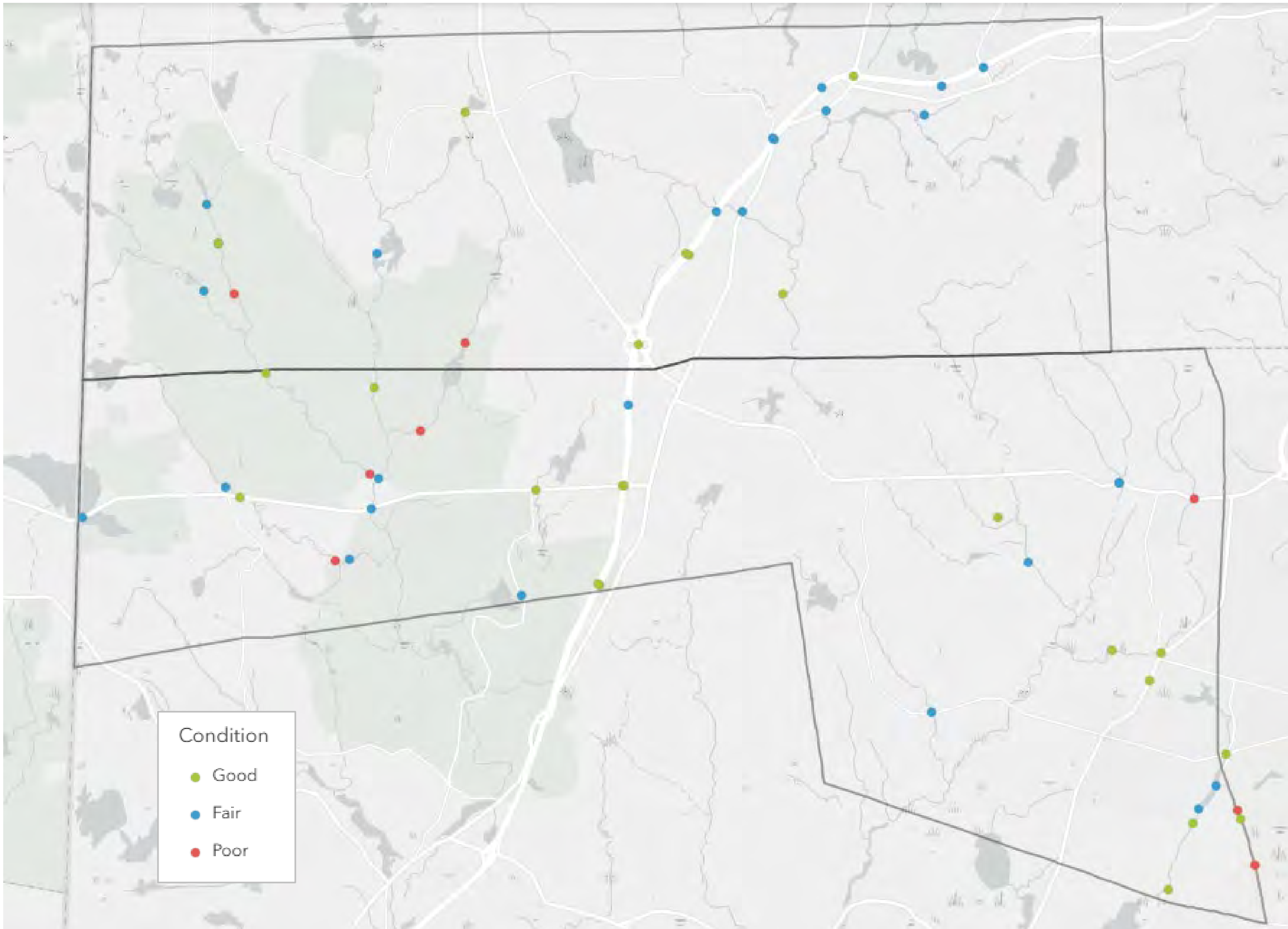


Figure 67- Condition of Bridges and Culverts in Exeter and West Greenwich

3.4.6 Vulnerability Exposure Analysis

Table 64 and Table 65 summarize the results of the vulnerability exposure analysis for loss estimations in the Towns of Exeter and West Greenwich.

Table 64- Critical Infrastructure Vulnerability Exposure Analysis- Exeter

	Government	Emergency Services	Education	Utility	Roads, Bridges, Culverts	Dams	Community	Vulnerable Populations	Total Potential Losses of Critical Facilities (excluding residences)	Residential Parcels
Severe Thunderstorm	# of CFs: 5 Value of CFs: $1,776,700	# of CFs: 6 Value of CFs: $3,040,900	# of CFs: 7 Value of CFs: $36,706,500	# of CFs: 6 Value of CFs: $15,885,600	# road miles: 103 # of railroad miles: 2 # of bridges: 25 # of culverts: 11 Value of CFs: $436,000,000	# of CFs: 36 Value of CFs: $36,000,000	# of CFs: 16 Value of CFs: $13,405,900	# of CFs: 68 Value of CFs: $58,068,480	# of CFs: 180 + 103 road miles + 2 rail miles Value of CFs: $600,884,080	# of homes: 2,353 Value: $1,099,843,319
Dam Failure	-	-	-	-	# road miles: 2 # of railroad miles: 0.4 # of bridges: 4 # of culverts: 7 Value of CFs: $65,300,000	# of CFs: 36 Value of CFs: $36,000,000	-	-	# of CFs: 47 + 2 road miles + 0.4 rail miles Value of CFs: $101,300,000	# of homes: 148 Value: $69,178,604
Flooding	-	-	-	-	# road miles: 7 # of railroad miles: 0.2 # of bridges: 16 # of culverts: 7 Value of CFs: $247,400,000	# of CFs: 14 Value of CFs: $14,000,000	-	-	# of CFs: 37 + 7 road miles + 0.2 rail miles Value of CFs: $261,400,000	# of homes: 596 Value: $278,584,108
Tropical & Extratropical Storms	# of CFs: 5 Value of CFs: $1,776,700	# of CFs: 6 Value of CFs: $3,040,900	# of CFs: 7 Value of CFs: $36,706,500	# of CFs: 6 Value of CFs: $15,885,600	# road miles: 103 # of railroad miles: 2 # of bridges: 25 # of culverts: 11 Value of CFs: $436,000,000	# of CFs: 36 Value of CFs: $36,000,000	# of CFs: 16 Value of CFs: $13,405,900	# of CFs: 68 Value of CFs: $58,068,480	# of CFs: 180 + 103 road miles + 2 rail miles Value of CFs: $600,884,080	# of homes: 2,353 Value: $1,099,843,319
Brushfire	# of CFs: 5 Value of CFs: $1,776,700	# of CFs: 6 Value of CFs: $3,040,900	# of CFs: 7 Value of CFs: $36,706,500	# of CFs: 6 Value of CFs: $15,885,600	# road miles: 103 # of railroad miles: 2 # of bridges: 25 # of culverts: 11 Value of CFs: $436,000,000	# of CFs: 36 Value of CFs: $36,000,000	# of CFs: 16 Value of CFs: $13,405,900	# of CFs: 68 Value of CFs: $58,068,480	# of CFs: 180 + 103 road miles + 2 rail miles Value of CFs: $600,884,080	# of homes: 2,353 Value: $1,099,843,319
Drought	# of CFs: 5 Value of CFs: $1,776,700	# of CFs: 6 Value of CFs: $3,040,900	# of CFs: 7 Value of CFs: $36,706,500	# of CFs: 6 Value of CFs: $15,885,600	# road miles: 103 # of railroad miles: 2 # of bridges: 25 # of culverts: 11 Value of CFs: $436,000,000	# of CFs: 36 Value of CFs: $36,000,000	# of CFs: 16 Value of CFs: $13,405,900	# of CFs: 68 Value of CFs: $58,068,480	# of CFs: 180 + 103 road miles + 2 rail miles Value of CFs: $600,884,080	# of homes: 2,353 Value: $1,099,843,319
Extreme Temperatures	# of CFs: 5 Value of CFs: $1,776,700	# of CFs: 6 Value of CFs: $3,040,900	# of CFs: 7 Value of CFs: $36,706,500	# of CFs: 6 Value of CFs: $15,885,600	# road miles: 103 # of railroad miles: 2 # of bridges: 25 # of culverts: 11 Value of CFs: $436,000,000	# of CFs: 36 Value of CFs: $36,000,000	# of CFs: 16 Value of CFs: $13,405,900	# of CFs: 68 Value of CFs: $58,068,480	# of CFs: 180 + 103 road miles + 2 rail miles Value of CFs: $600,884,080	# of homes: 2,353 Value: $1,099,843,319
Tornadoes	# of CFs: 5 Value of CFs: $1,776,700	# of CFs: 6 Value of CFs: $3,040,900	# of CFs: 7 Value of CFs: $36,706,500	# of CFs: 6 Value of CFs: $15,885,600	# road miles: 103 # of railroad miles: 2 # of bridges: 25 # of culverts: 11 Value of CFs: $436,000,000	# of CFs: 36 Value of CFs: $36,000,000	# of CFs: 16 Value of CFs: $13,405,900	# of CFs: 68 Value of CFs: $58,068,480	# of CFs: 180 + 103 road miles + 2 rail miles Value of CFs: $600,884,080	# of homes: 2,353 Value: $1,099,843,319
Earthquake	# of CFs: 5 Value of CFs: $1,776,700	# of CFs: 6 Value of CFs: $3,040,900	# of CFs: 7 Value of CFs: $36,706,500	# of CFs: 6 Value of CFs: $15,885,600	# road miles: 103 # of railroad miles: 2 # of bridges: 25 # of culverts: 11 Value of CFs: $436,000,000	# of CFs: 36 Value of CFs: $36,000,000	# of CFs: 16 Value of CFs: $13,405,900	# of CFs: 68 Value of CFs: $58,068,480	# of CFs: 180 + 103 road miles + 2 rail miles Value of CFs: $600,884,080	# of homes: 2,353 Value: $1,099,843,319

Table 64- Critical Infrastructure Vulnerability Exposure Analysis- Exeter

	Government	Emergency Services	Education	Utility	Roads, Bridges, Culverts	Dams	Community	Vulnerable Populations	Total Potential Losses of Critical Facilities (excluding residences)	Residential Parcels
Hazardous Materials Incident	# of CFs: 5 Value of CFs: $1,776,700	# of CFs: 6 Value of CFs: $3,040,900	# of CFs: 6 Value of CFs: $35,556,500	# of CFs: 4 Value of CFs: $9,885,600	# road miles: 29 # of railroad miles: 2 # of bridges: 13 # of culverts: 7 Value of CFs: $217,000,000	# of CFs: 3 Value of CFs: $3,000,000	# of CFs: 7 Value of CFs: $6,472,900	# of CFs: 18 Value of CFs: $8,413,614	# of CFs: 69 + 29 road miles + 2 rail miles Value of CFs: $285,146,214	# of homes: 983 Value: $459,476,809
Cybersecurity	# of CFs: 5 Value of CFs: $1,776,700	# of CFs: 6 Value of CFs: $3,040,900	# of CFs: 7 Value of CFs: $36,706,500	# of CFs: 6 Value of CFs: $15,885,600	# road miles: 103 # of railroad miles: 2 # of bridges: 25 # of culverts: 11 Value of CFs: $436,000,000	# of CFs: 36 Value of CFs: $36,000,000	# of CFs: 16 Value of CFs: $13,405,900	# of CFs: 68 Value of CFs: $58,068,480	# of CFs: 180 + 103 road miles + 2 rail miles Value of CFs: $600,884,080	# of homes: 2,353 Value: $1,099,843,319
Water Quality (PFAS, Cyanobacteria)	PFAS and Cyanobacteria in drinking water is a public health concern, but impacts are not anticipated to cause infrastructure damage. - -									

Table 65- Critical Infrastructure Vulnerability Exposure Analysis- West Greenwich

	Government	Emergency Services	Education	Utility	Roads, Bridges, Culverts	Dams	Community	Transportation	Vulnerable Populations	Total Potential Losses of Critical Facilities (excluding residences)	Residential Parcels
Severe Thunderstorm	# of CFs: 2 Value of CFs: $1,482,900	# of CFs: 6 Value of CFs: $2,156,100	# of CFs: 4 Value of CFs: $22,467,900	# of CFs: 13 Value of CFs: $284,021,400	# road miles: 120 # of bridges: 17 # of culverts: 4 Value of CFs: $317,000,000	# of CFs: 27 Value of CFs: $27,000,000	# of CFs: 7 Value of CFs: $1,912,900	# of CFs: 1 Value of CFs: $1,291,600	# of CFs: 37 Value of CFs: $17,827,228	# of CFs: 118 + 120 road miles Value of CFs: $675,160,028	# of homes: 2,482 Value: $1,160,143,886
Dam Failure	-	-	-	-	# road miles: 1 # of bridges: 2 # of culverts: 1 Value of CFs: $31,000,000	# of CFs: 27 Value of CFs: $27,000,000	-	-	-	# of CFs: 30 + 1 road mile Value of CFs: $58,000,000	# of homes: 27 Value: $12,620,421
Flooding	-	-	-	-	# road miles: 2 # of bridges: 7 # of culverts: 2 Value of CFs: $107,000,000	# of CFs: 9 Value of CFs: $9,000,000	-	-	-	# of CFs: 18 + 2 road miles Value of CFs: $116,000,000	# of homes: 94 Value: $43,937,762
Tropical & Extratropical Storms	# of CFs: 2 Value of CFs: $1,482,900	# of CFs: 6 Value of CFs: $2,156,100	# of CFs: 4 Value of CFs: $22,467,900	# of CFs: 13 Value of CFs: $284,021,400	# road miles: 120 # of bridges: 17 # of culverts: 4 Value of CFs: $317,000,000	# of CFs: 27 Value of CFs: $27,000,000	# of CFs: 7 Value of CFs: $1,912,900	# of CFs: 1 Value of CFs: $1,291,600	# of CFs: 37 Value of CFs: $17,827,228	# of CFs: 118 + 120 road miles Value of CFs: $675,160,028	# of homes: 2,482 Value: $1,160,143,886
Brushfire	# of CFs: 2 Value of CFs: $1,482,900	# of CFs: 6 Value of CFs: $2,156,100	# of CFs: 4 Value of CFs: $22,467,900	# of CFs: 13 Value of CFs: $284,021,400	# road miles: 120 # of bridges: 17 # of culverts: 4 Value of CFs: $317,000,000	# of CFs: 27 Value of CFs: $27,000,000	# of CFs: 7 Value of CFs: $1,912,900	# of CFs: 1 Value of CFs: $1,291,600	# of CFs: 37 Value of CFs: $17,827,228	# of CFs: 118 + 120 road miles Value of CFs: $675,160,028	# of homes: 2,482 Value: $1,160,143,886
Drought	# of CFs: 2 Value of CFs: $1,482,900	# of CFs: 6 Value of CFs: $2,156,100	# of CFs: 4 Value of CFs: $22,467,900	# of CFs: 13 Value of CFs: $284,021,400	# road miles: 120 # of bridges: 17 # of culverts: 4 Value of CFs: $317,000,000	# of CFs: 27 Value of CFs: $27,000,000	# of CFs: 7 Value of CFs: $1,912,900	# of CFs: 1 Value of CFs: $1,291,600	# of CFs: 37 Value of CFs: $17,827,228	# of CFs: 118 + 120 road miles Value of CFs: $675,160,028	# of homes: 2,482 Value: $1,160,143,886
Extreme Temperatures	# of CFs: 2 Value of CFs: $1,482,900	# of CFs: 6 Value of CFs: $2,156,100	# of CFs: 4 Value of CFs: $22,467,900	# of CFs: 13 Value of CFs: $284,021,400	# road miles: 120 # of bridges: 17 # of culverts: 4 Value of CFs: $317,000,000	# of CFs: 27 Value of CFs: $27,000,000	# of CFs: 7 Value of CFs: $1,912,900	# of CFs: 1 Value of CFs: $1,291,600	# of CFs: 37 Value of CFs: $17,827,228	# of CFs: 118 + 120 road miles Value of CFs: $675,160,028	# of homes: 2,482 Value: $1,160,143,886
Tornadoes	# of CFs: 2 Value of CFs: $1,482,900	# of CFs: 6 Value of CFs: $2,156,100	# of CFs: 4 Value of CFs: $22,467,900	# of CFs: 13 Value of CFs: $284,021,400	# road miles: 120 # of bridges: 17 # of culverts: 4 Value of CFs: $317,000,000	# of CFs: 27 Value of CFs: $27,000,000	# of CFs: 7 Value of CFs: $1,912,900	# of CFs: 1 Value of CFs: $1,291,600	# of CFs: 37 Value of CFs: $17,827,228	# of CFs: 118 + 120 road miles Value of CFs: $675,160,028	# of homes: 2,482 Value: $1,160,143,886
Earthquake	# of CFs: 2 Value of CFs: $1,482,900	# of CFs: 6 Value of CFs: $2,156,100	# of CFs: 4 Value of CFs: $22,467,900	# of CFs: 13 Value of CFs: $284,021,400	# road miles: 120 # of bridges: 17 # of culverts: 4 Value of CFs: $317,000,000	# of CFs: 27 Value of CFs: $27,000,000	# of CFs: 7 Value of CFs: $1,912,900	# of CFs: 1 Value of CFs: $1,291,600	# of CFs: 37 Value of CFs: $17,827,228	# of CFs: 118 + 120 road miles Value of CFs: $675,160,028	# of homes: 2,482 Value: $1,160,143,886

Table 65- Critical Infrastructure Vulnerability Exposure Analysis- West Greenwich

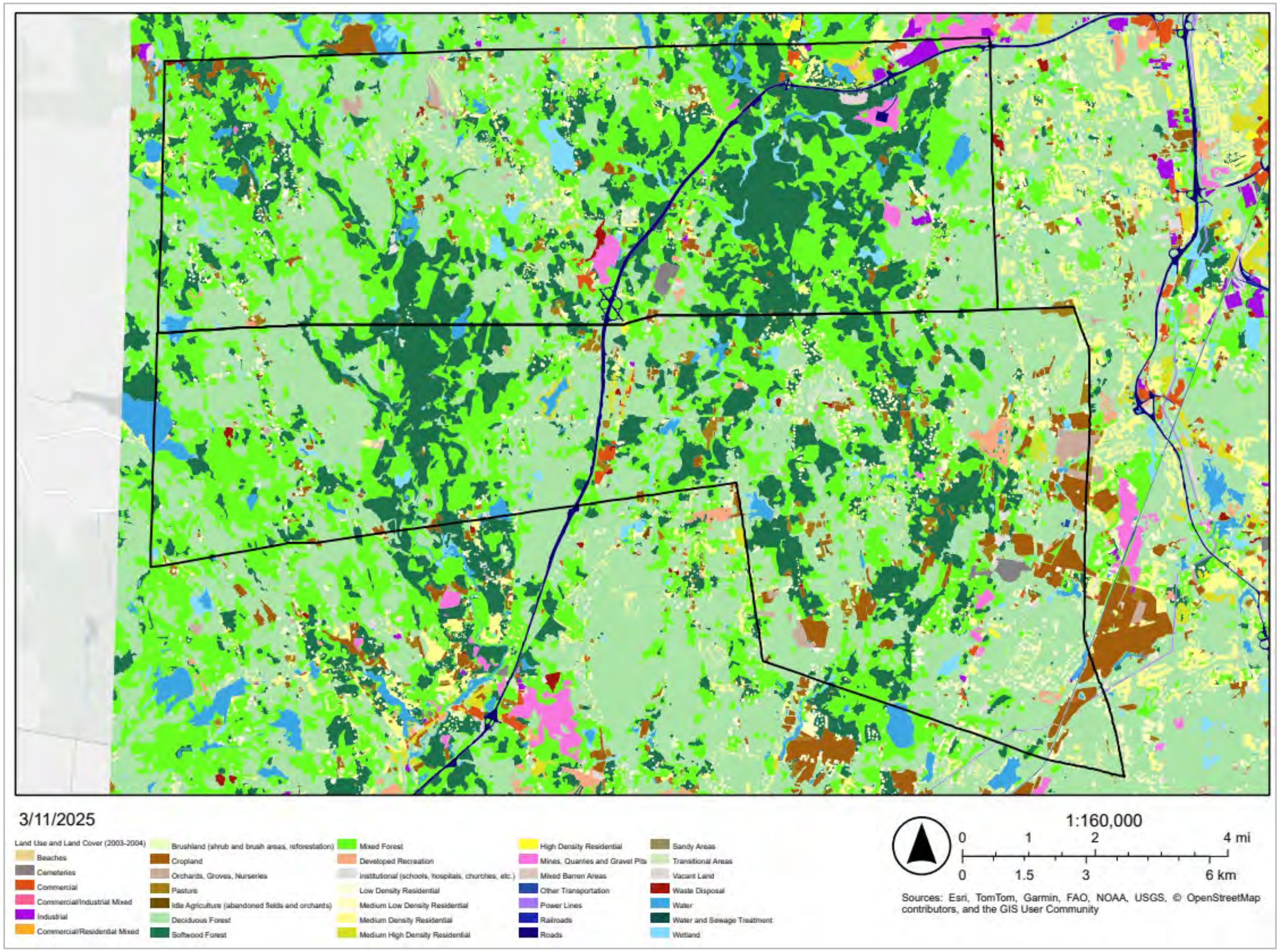
	Government	Emergency Services	Education	Utility	Roads, Bridges, Culverts	Dams	Community	Transportation	Vulnerable Populations	Total Potential Losses of Critical Facilities (excluding residences)	Residential Parcels
Hazardous Materials Incident	# of CFs: 2 Value of CFs: $1,482,900	# of CFs: 4 Value of CFs: $1,498,600	# of CFs: 2 Value of CFs: $16,960,500	# of CFs: 7 Value of CFs: $201,521,400	# road miles: 28 # of bridges: 9 # of culverts: 2 Value of CFs: $150,000,000	# of CFs: 4 Value of CFs: $4,000,000	# of CFs: 2 Value of CFs: $1,522,800	# of CFs: 1 Value of CFs: $1,291,600	# of CFs: 14 Value of CFs: $7,076,499	# of CFs: 47 + 28 road miles Value of CFs: $385,354,299	# of homes: 45 Value: $21,034,035
Water Quality (PFAS, Cyanobacteria)	PFAS and Cyanobacteria in drinking water is a public health concern, but impacts are not anticipated to cause infrastructure damage.									-	-
Cybersecurity	# of CFs: 2 Value of CFs: $1,482,900	# of CFs: 6 Value of CFs: $2,156,100	# of CFs: 4 Value of CFs: $22,467,900	# of CFs: 13 Value of CFs: $284,021,400	# road miles: 120 # of bridges: 17 # of culverts: 4 Value of CFs: $317,000,000	# of CFs: 27 Value of CFs: $27,000,000	# of CFs: 7 Value of CFs: $1,912,900	# of CFs: 1 Value of CFs: $1,291,600	# of CFs: 37 Value of CFs: $17,827,228	# of CFs: 118 + 120 road miles Value of CFs: $675,160,028	# of homes: 2,482 Value: $1,160,143,886

3.4.7 Land Use Patterns

Figure 68 shows historical (2003-2004) land use in Exeter and West Greenwich, Figure 69 shows the current land use in Exeter and West Greenwich in 20254, Figure 71 shows state and local conservation areas in Exeter and West Greenwich, and Figure 72 shows wetlands in Exeter and West Greenwich.

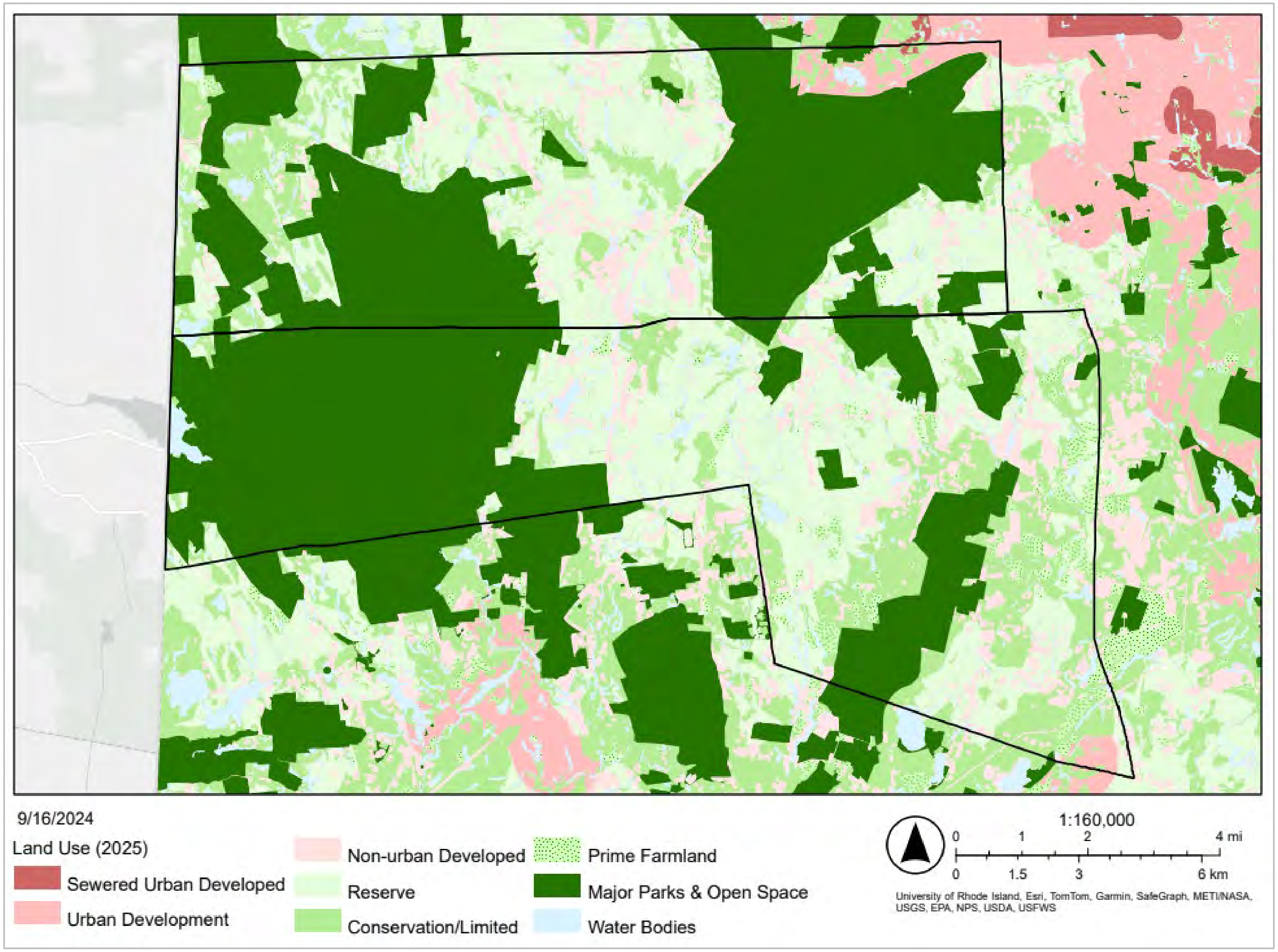
Currently, urban development is located in the eastern portion of the Towns- east of the I-95 corridor. There are large portions of the Towns that are categorized as conservation lands, reserve, and major parks and open space. There are several large waterbodies throughout the Towns.

Section 3.4.7.1 discusses future land use in Exeter and West Greenwich.



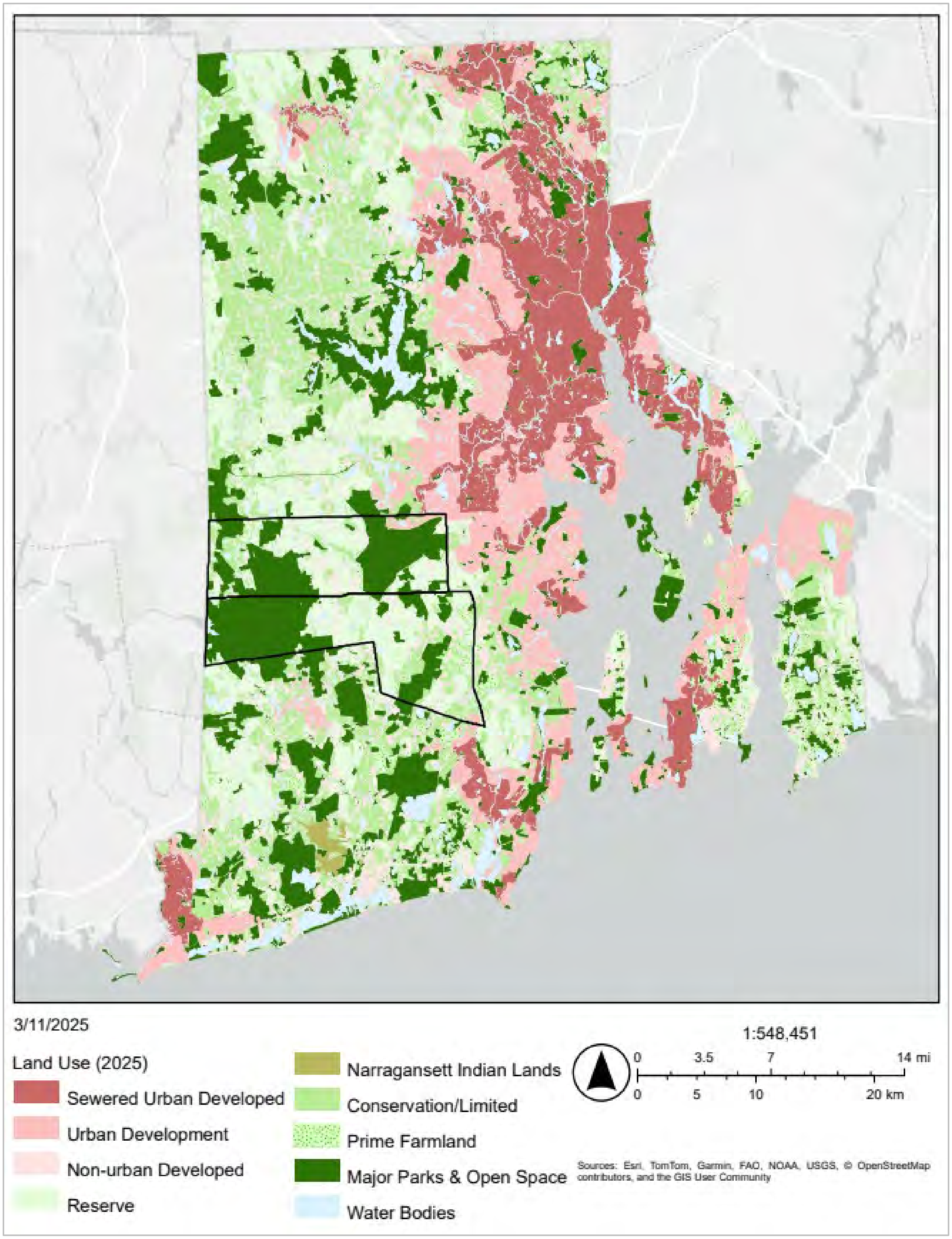
Source: RIGIS 2025- Land Use and Land Cover (2003-2004)

Figure 68- Historical Land Use in Exeter and West Greenwich (2003-2004)



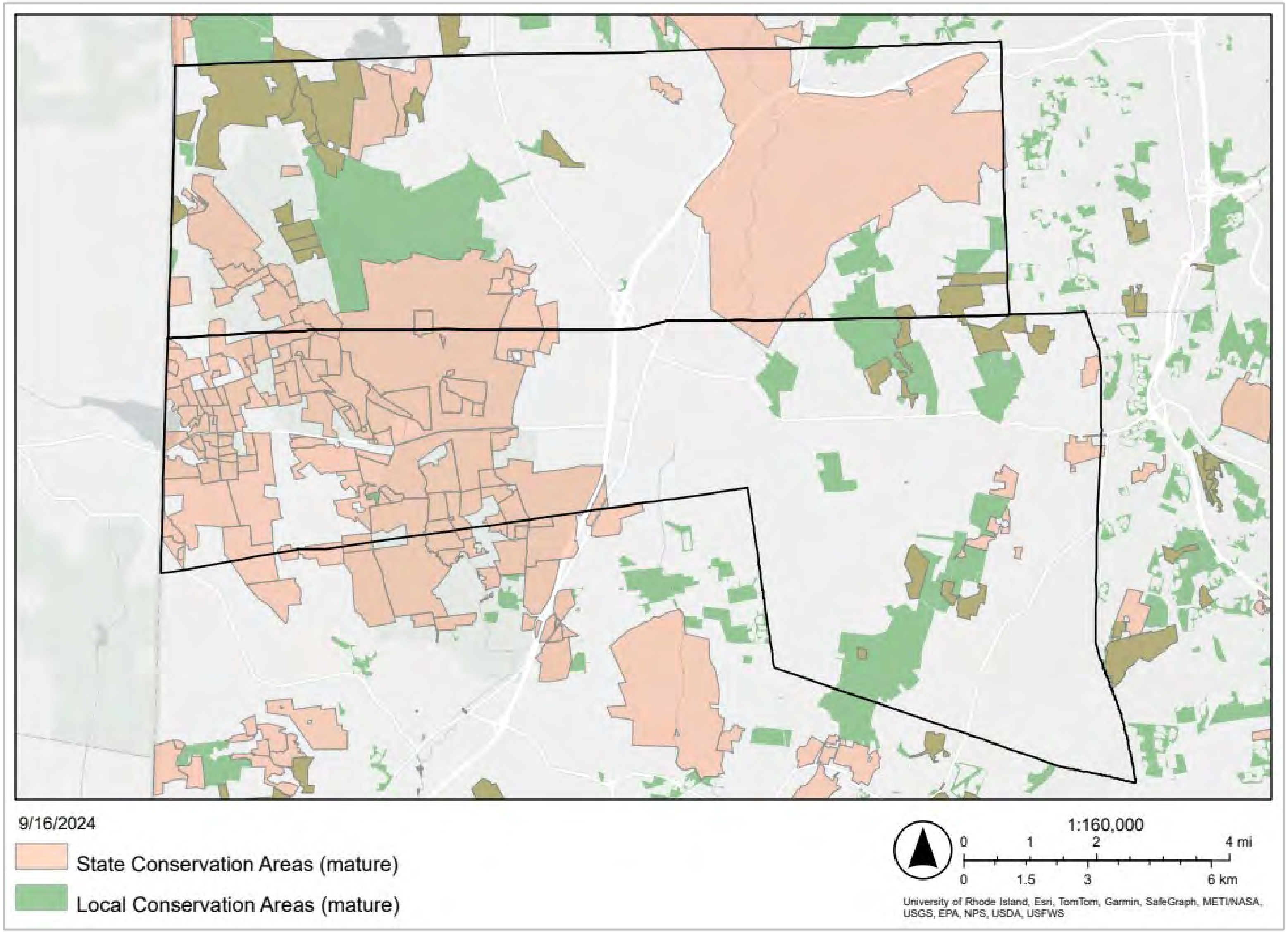
Source: RIGIS 2024- Land Use (2024), updated 4/11/2024

Figure 69- Current Land Use in Exeter and West Greenwich (2025)



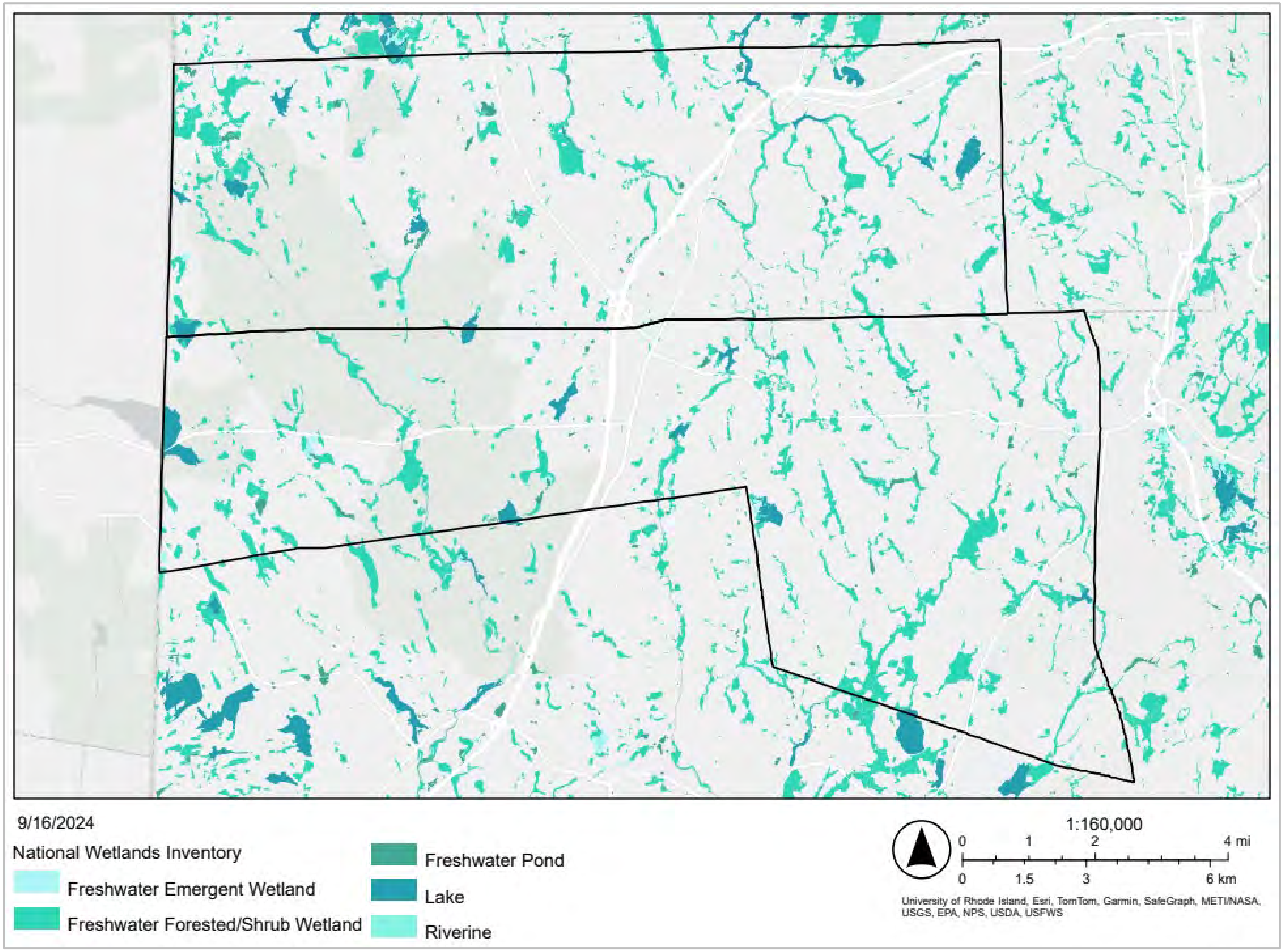
Source: RIGIS 2024- Land Use (2024), updated 4/11/2024

Figure 70- Current Land Use in Rhode Island (2025)



Source: RIGIS 2024- State and Local Conservation Areas, updated 4/18/2024

Figure 71- Conservation Areas in Exeter and West Greenwich



Source: RIGIS 2024- USFWS National Wetlands Inventory, updated 1/19/2024

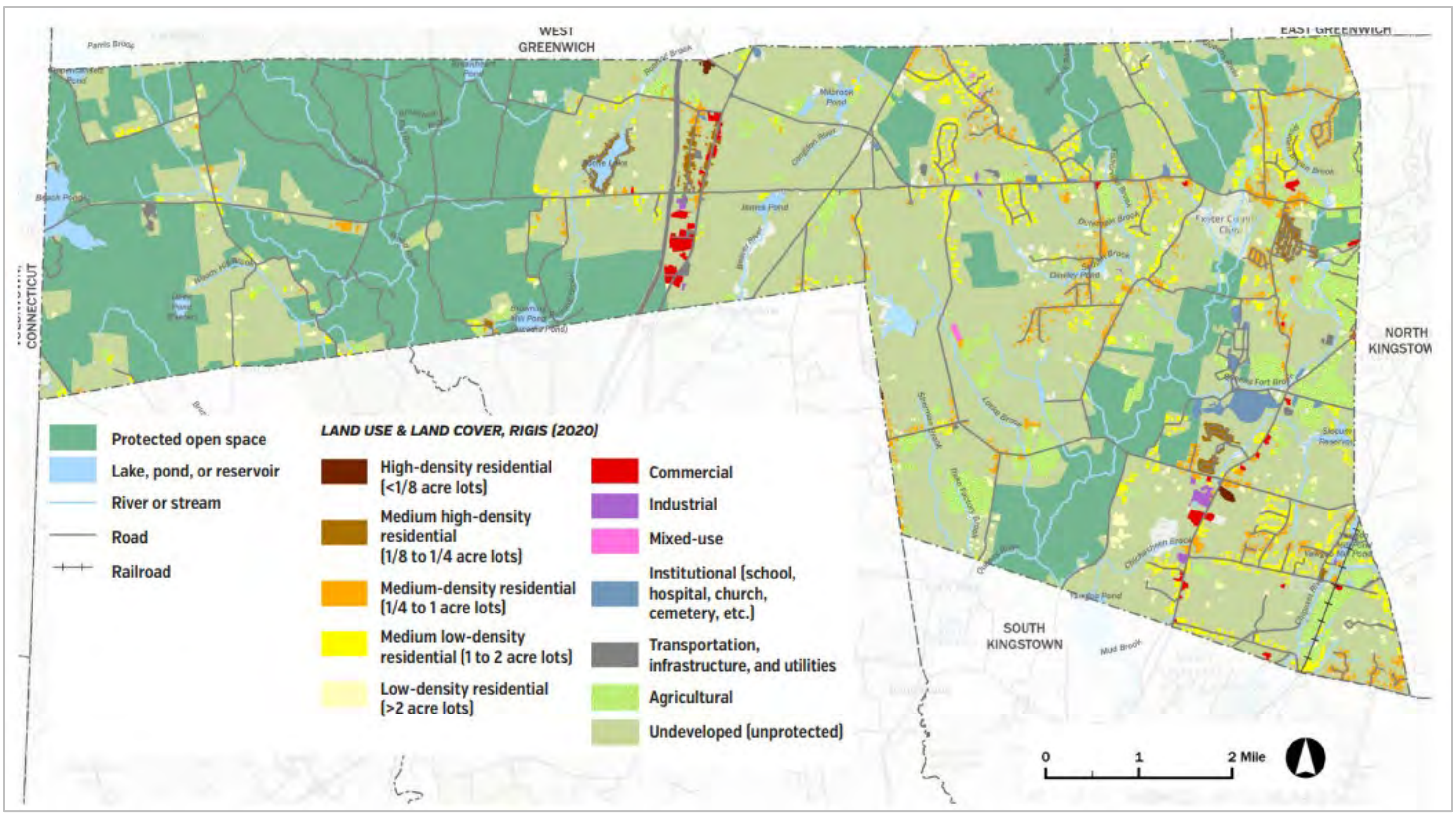
Figure 72- Wetlands in Exeter and West Greenwich

3.4.7.1 Future Land Use

<u>Exeter</u>

The 2024-2044 Exeter Comprehensive Plan outlines future land use goals for Exeter in the next 20 years:

1. Continue the existing general distribution of land use types.
2. Use land-use regulations to protect water quality, prevent flooding, maintain farms and forests, and preserve environmentally sensitive lands in connected networks.
3. Allow accessory uses that support the economic viability of agriculture and forestry and the preservation of rural character.
4. Encourage growth in village districts that can support more density to provide balanced housing, economic development, and community services.
5. Revise, reorganize, and amend categories in the zoning ordinance in conjunction with Area Master Plans for areas such as the Ladd Center and Routes 3 and 2 corridors.
6. Rewrite the zoning ordinance to create a modern, functional, and user-friendly zoning ordinance.



Source: Exeter 2024-2044 Comprehensive Plan

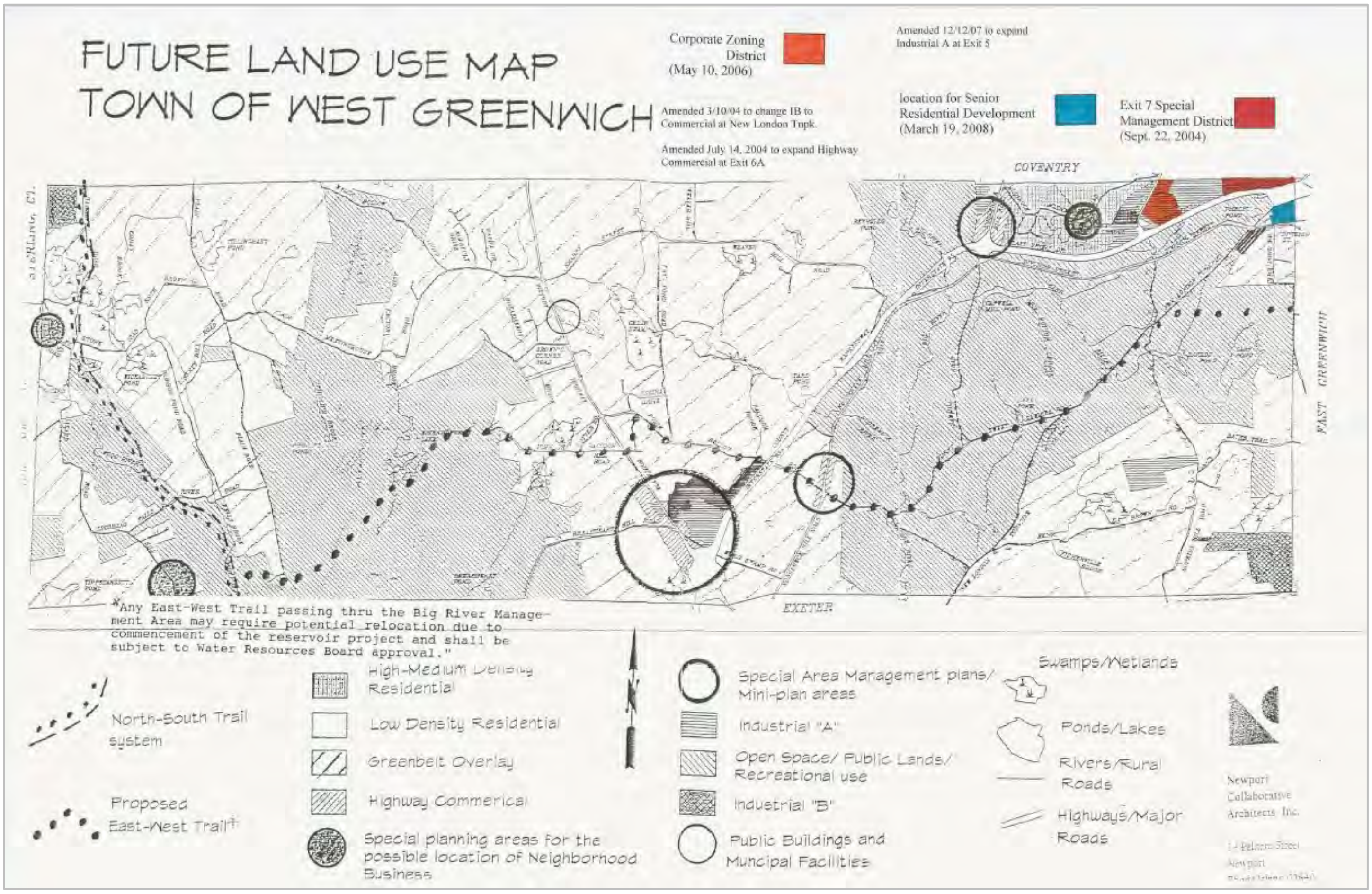
Figure 73- Future Land Use in Exeter (2024-2044)

<u>West Greenwich</u>

The 1995 Town of West Greenwich Comprehensive Plan states:

"The overall approach to future land use is growth management. A critical component of growth management is the ability of the Town to manage the timing of growth and its location such that services and facilities are available at a reasonable cost and in synchronization with development. The growth rate management component also proposes considering a growth rate timing strategy based upon a rate of growth West Greenwich can sustain in terms of providing services and facilities and protecting the environmental character of the town. In this approach, growth management has two facets as expressed in the Action & Implementation Program in Section IV. The first deals with where growth occurs and what it looks like (Location/Design Regulations) and the second concerns how fast growth happens and how the Town meets its legal obligation to provide facilities and services for growth (Growth Rate Regulations)."

The Town of West Greenwich's future land use map from the 2004 Comprehensive Plan is shown in Figure 74. The Comprehensive Plan is currently being updated (2025) and the next iteration of this HM&FMP Update will include updated future land use maps.



Source: 1995 West Greenwich Comprehensive Plan, 2004 Amendment

Figure 74- Future Land Use in West Greenwich (2004)

4. PROGRAMMATIC CAPABILITIES

This section addresses a portion of Element C of the Local Mitigation Plans regulation checklist.

Regulation Checklist- 44 CFR § 201.6 Local Mitigation Plans
ELEMENT B. Risk Assessment
B2-c. Does the plan address NFIP-insured structures within each jurisdiction that have been repetitively damaged by floods?
Source: FEMA 2025 (Local)

Regulation Checklist- 44 CFR § 201.6 Local Mitigation Plans
ELEMENT C. Mitigation Strategy
C1. Does the plan document each participant's existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs? (Requirement 44 CFR § 201.6(c)(3)) C1-a. Does the plan describe how the existing capabilities of each participant are available to support the mitigation strategy? Does this include a discussion of the existing building codes and land use and development ordinances or regulations? C1-b. Does the plan describe each participant's ability to expand and improve the identified capabilities to achieve mitigation? C2. Does the plan address each jurisdiction's participation in the NFIP and continued compliance with NFIP requirements, as appropriate? (Requirement 44 CFR § 201.6(c)(3)(ii)) C2-a. Does the plan contain a narrative description or a table/list of their participation activities?
Source: FEMA 2025 (Local)

4.1 Towns of Exeter and West Greenwich Capabilities

This capability assessment examines the existing studies, plans, programs, and policies that have incorporated hazard mitigation and other proactive tools in the Towns. The purpose of the capability assessment is to highlight successes, identify shortcomings, and to lay the groundwork for possible improvement.

Table 66- Capability Assessment- Towns of Exeter and West Greenwich

Capability/Tool	Exeter	West Greenwich
Plans		
Capital Improvements Plan	Yes	No
Climate Change Adaptation Plan	No	No
Community Wildfire Protection Plan	No	No
Comprehensive/Master Plan	Yes. Updated in 2024	Yes- Being updated in 2025
Continuity of Operations Plan	No	No
Economic Development Plan	No	No
Land Use Plan	Yes. Element of Comprehensive Plan	Yes. Element of Comprehensive Plan
Local Emergency Operations Plan	No	No
Stormwater Management Plan	Exeter Code of Ordinances, Chapter 23. Soil Erosion and Sediment Control	No
Transportation Plan	No	No

Capability/Tool	Exeter	West Greenwich
Land Use Planning and Ordinances		
Acquisition of land for open space and public recreation use	No	Yes- Section 400-22: Zoning, Open Space and Public Land (OSPL)
Building code	Yes- Follows State of RI Code	Yes- Follows State of RI Code
Flood insurance rate maps	Yes	Yes
Floodplain ordinance	Exeter Code of Ordinances, Article IV	Yes
Substantial Damage Plan	No	No
Natural hazard specific ordinance (stormwater, steep slope, brushfire)	Yes- IV 22 – SFHA, 23 Soil erosion and sediment control, 24 stormwater management, 25 post construction stormwater control	Yes- 214 SFHAs, 305 Soil erosion and sediment control, 313 stormwater management
Subdivision ordinance	Yes- Land Development and Subdivision Regulations	Yes- Chapter 450: Land Development and Subdivision Regulations
Zoning ordinance	Yes- zoning regulations	Yes- Chapter 400 Zoning
Administrative		
Chief Building Official	Yes	Yes
Civil Engineer	No- Utilizes contractors	Yes- Town Planner
Community Planner	Yes	Yes
Emergency Manager	Yes	Yes
Floodplain Administrator	Yes	Yes- Town Planner
GIS Coordinator	Yes	Yes
Planning Commission	Yes	Yes
Technical		
Grant writing	Individual directors, planners, etc (not a dedicated grant writer)	Not a dedicated staff member. Individual departments write their own grant applications
Hazard data and information	Yes- this HMP	Yes
GIS analysis	Yes	Yes
Mutual aid agreements	Yes- Statewide mutual aid, fire/EMS MOUs	Yes- Statewide mutual aid, fire/EMS MOUs
Funding Resources		
Capital improvements project funding	Yes	No- utilize bonds
Community Development Block Grant	Yes	Can, have not yet
Federal funding programs (non-FEMA)	Yes- EPA	Yes
Fees for water, sewer, gas, or electric services	No	No
Impact fees for new development	Yes	Yes

Capability/Tool	Exeter	West Greenwich
State funding programs	RIDEM, Open space grants; Rhode Island Infrastructure Bank	RIDEM, Open space grants; Rhode Island Infrastructure Bank
Stormwater utility fee	No	No
Community Programs/Organizations		
Community newsletters	Yes	Yes
Hazard awareness campaigns (such as Firewise, Storm Ready, Severe Weather Awareness Week, school programs, public events)	Yes	Yes
Local news	No- relies on statewide news outlets	No- relies on statewide news outlets
Organizations that represent/ advocate for/interact with underserved and vulnerable communities/populations	Yes	Yes
Social media	Yes- not Town official pages/groups	Yes- the Town and departments have official Facebook pages

4.1.1 Ability to Expand and Improve Resources

The Towns of Exeter and West Greenwich are continuously improving and expanding their technical and human resources through participation in this MJHM&FMP; training; and hiring subject matter expertise as needed. Specific areas that the HMPCs have identified to expand and improve resources include:

- Pursue participation in CRS program
- Develop/provide educational material to increase Town staff and resident knowledge of the NFIP/CRS and the benefits/importance of having flood insurance
- Work with dam owners to pass their next inspection with the goal to achieve Satisfactory condition ratings
- Develop a Town EOP/COOP
- Conduct school programs to raise student awareness of hazards, safety, preparedness and prevention. Explore establishing the school emergency notification system as the primary methodology for all emergency notification procedures and build in the contact information accordingly.

4.2 State Programs

4.2.1 Rhode Island State Building Code

All municipalities within the State of Rhode Island share a single building code (RIGL 23-27.3-100 et. al.). The Rhode Island State Building Code (which incorporates the International Building Code) and provides comprehensive construction requirements designed to mitigate the impacts from natural hazards, such as high wind events. The Code is enforced by the Exeter and West Greenwich Building Department and provides an additional layer of regulatory control over those discussed above.

4.2.2 Rhode Island State Fire Code Regulations

All municipalities within the State of Rhode Island share a single fire code (RIGL 23-29.01 et. al.). The Rhode Island Fire Code (which incorporates the NFPA 1, Fire Code and 101, Life Safety Code) and provides comprehensive requirements to safeguard life and property from the hazards of fire and explosives. The Code is enforced by the Exeter Fire District and West Greenwich Municipal Government.

4.2.3 Rhode Island State Dam Safety Program

Regulation Checklist- 44 CFR § 201.6 Local Mitigation Plans
ELEMENT G. High Hazard Potential Dams (HHPD) (Optional)
HHPD1. Did the plan describe the incorporation of existing plans, studies, reports and technical information for HHPDs? HHPD1-a. Does the plan describe how the local government worked with local dam owners and/or the state dam safety agency? HHPD1-b. Does the plan incorporate information shared by the state and/or local dam owners? HHPD2. Did the plan address HHPDs in the risk assessment? HHPD2-b. Does the plan document the limitations and describe how to address deficiencies?
Source: FEMA 2025 (Local)

Table 5 lists the documents that were used in the development of this HMP, including those used for the HHPD section.

The Towns of Exeter and West Greenwich participate in the Rhode Island State Dam Safety Program. The State Dam Safety Program was created to facilitate the enforcement of the primary dam inspection law (RIGL 46-19, Inspection of Dams and Reservoirs). RIGL 46-19 states that dam owners are responsible for the safe operation, maintenance, repair, and rehabilitation of a dam, which are the essential elements in preventing dam failure; furthermore, dam owners are liable for the consequences of accidents or failures of their dams.

According to the State of Rhode Island 2023 Dam Safety Program Report (RIDEM 2024a), the following have been identified as program limitations/challenges:

- Unclear ownership of dams
- Funding for annual inspections needs to be increased. As of 2023, the available funding for dam inspections covers less than half of the dams requiring annual inspections in Rhode Island.
- Construction of buildings within inundation areas below dams
- Lack of funding to repair or remove privately owned dams
- Inadequate spillway capacities and engineering analyses
- Lack of Emergency Action Plans across the state
- Inadequate staffing
- Intense rainstorms
- Low hazard dams that require reclassification

How the Towns of Exeter and West Greenwich work with local dam owners and/or the state dam safety agency: The Towns work with RIDEM for the Town-owned dams in conjunction with Rhode Island General Laws. Specifically, § 46-19-9: Emergency Action Plans. The Towns coordinate with RIDEM to update EAPs for Town-owned dams. The Towns also work closely with RIDEM during dam inspections and to address any dam safety deficiencies to Town-owned dams in a timely manner. There are no High or Significant Hazard dams in West Greenwich, but there are 27 Low Hazard dams. Exeter has a total of 36 dams (4 High Hazard, 2 Significant hazard, and 30 Low hazard. Dam failure is not a high priority to West Greenwich at this time, but the Town is committed to addressing safety concerns as they arise.

Limitations and how the Towns of Exeter and West Greenwich are attempting to address deficiencies: One limitation to dam safety in Exeter is that the Town does not own any of the High Hazard or Significant

Hazard dams in the Town. As the Town is not the owner, they are unable to directly resolve the compliance and safety issues. The Town has offered resources to the dam owners to address deficiencies, but the Town is unable to directly resolve them. The Town is committed to continuing to work with RIDEM and dam owners in Exeter to ensure the safety of residents. Additional issues are: cascading dam failures from dams located above in the watershed; orphan dams; and high hazard dams that if breeched would impact adjacent jurisdictions.

Another limitation is that there has never been a significant dam failure in Exeter and West Greenwich, which may give a false representation of the Towns' risk of a dam failure. This could also be a reason the dam owners may not have the urgency to address the safety concerns. Through this plan and additional outreach efforts, the Towns are dedicated to sharing the Towns' risk to potential dam failure.

4.2.4 Rhode Island DEM Wetland Regulations

The Rhode Island Department of Environmental Management (RIDEM) is responsible for regulating alterations of the freshwater wetlands throughout the State. Since many floodplains are also wetlands, appropriately managing these resources help maintain proper floodplain function. These regulations ensure that actions in this plan which will alter the physical landscape will not do so at the expense of wetlands. RIDEM promulgated new rules comprising the Freshwater Wetlands Act which took effect on July 1, 2022.

4.2.5 Rhode Island Infrastructure Bank- Municipal Resilience Program (MRP)

Resilient Rhody, Rhode Island's first comprehensive climate resilience action strategy was released in July 2018. The strategy identifies priority actions the State can take to build statewide resilience. Common throughout Resilient Rhody is the need to work collaboratively with and in support of municipalities statewide.

The Municipal Resilience Program (MRP) provides direct support to cities and towns to complete a municipal-driven workshop process that brings together future climate conditions information and local knowledge to identify top hazards, current challenges, and community strengths. This process identifies priority projects and strategies to improve the municipality's resilience to all natural and climate-related hazards.

Upon successful completion of the MRP workshop, municipalities are designated as "Resilient Rhody Municipalities" which enables municipalities to apply for dedicated MRP Action Grants to implement identified projects.

The Towns of Exeter and West Greenwich both participate in the MRP. The Towns of Exeter and West Greenwich will continue working with the Rhode Island Infrastructure Bank and RIEMA to pursue MRP funding for the actions identified in the Summary of Findings and this plan's Mitigation Action Plan.

4.3 National Flood Insurance Program (NFIP) and Repetitive Loss

The function of the National Flood Insurance Program (NFIP) is to provide flood insurance at a reasonable cost to homes and businesses located in floodplains. In trade, the participating community regulates new development and substantial improvement to existing structures in the floodplain or requires developers to build safely above flood heights to reduce future damage to new construction. The program is based upon mapping areas of flood risk and requiring local implementation to reduce flood damage primarily through requiring the elevation of structures above the base (100-year or 1% chance) flood elevations.

The Towns of Exeter and West Greenwich have been an active and compliant member of the National Flood Insurance Program since 1982 (Exeter) and 1986 (West Greenwich). As such, Exeter and West

Greenwich residents are able to purchase flood insurance to protect their property against flood losses. The Towns of Exeter and West Greenwich have adopted the most recent Flood Insurance Rate Maps (FIRM) and Flood Insurance Study (FIS): 7/19/23 (Exeter) and 7/9/2023 (West Greenwich).

Specific NFIP participation activities include:

- Regular Community Assistance Visits. The most recent CAV was in May 2021 (Exeter) and June 2023 (West Greenwich).
- Continuing to prohibit new development in Special Flood Hazard Areas.
- Mitigation actions, including investigating buying out/elevating/relocating properties in the SFHAs.
- Permitting required if proposing to build in SFHAs.
- Continuing to work with FEMA to update the FIRMs.
- The Towns have Letter of Map Changes (LOMC) Revalidation (REVAL) documents on file.
- The Towns follow all State/FEMA permitting requirements.
- Regularly working to address compliance issues if they arise.

NFIP Topic	Exeter	West Greenwich
Staff Resources		
Who is responsible for floodplain management in your community? Do they serve any roles other than Community Floodplain Administrator (FPA)?	Ron DeFrancesco, Building Official, NFIP Coordinator, Floodplain Manager	David Provonsil, Town Planner. Zoning, Community Development, Engineering, NFIP Coordinator, Floodplain Manager.
Is the Community FPA or NFIP Coordinator a Certified Floodplain Manager?	No	No
Is floodplain management an auxiliary function?	Yes	Yes
Explain NFIP administration services (e.g., permit review, GIS, inspections, engineering capability).	Planning Department and Building Official coordinate reviews based on single lot and subdivision development that includes reviewing engineered drawings and inspections	Floodplain coordinator is a Professional Engineer and reviews permits, engineering, and coordinates inspections as needed
What are the barriers to running an effective NFIP program in the community, if any?	Improvements to review process between Planner and Building Official	None
Insurance Summary		
How many NFIP policies are in the community? What is the total premium and coverage?	# of policies: 8 Total premium: $4,987 Total coverage: $2,313,000	# of policies: 9 Total premium: $5,020 Total coverage: $3,341,000
How many claims have been paid out in the community? What is the total amount of paid claims? How many of the claims were for substantial damage?	# of paid out claims: 7 $ of paid claims: $45,408 # of substantial damage claims: 0	# of paid out claims: 2 $ of paid claims: $10,427 # of substantial damage claims: 0
How many structures (residential and non-residential) are exposed to flood risk within the community?	Residential: 596* Non-Residential: 37	Residential: 94* Non-Residential: 18
	*Based on available data and methodology used to determine structures at risk, the number of residential structures listed may be overestimated as this number is indicative of total number of parcels with SFHAs overlapping them.	
Are there any repetitive or severe repetitive loss structures in the community?	No RL or SRL structures	No RL or SRL structures

NFIP Topic	Exeter	West Greenwich
Describe any areas of flood risk with limited NFIP policy coverage.	Due to privacy laws, the Town is unable to disclose this information. The Towns have an opportunity to enter into an ISAA (Information Sharing Access Agreement) with FEMA to obtain information on NFIP policies and coverage.	
How does the community teach property owners or other stakeholders about the importance of flood insurance?	Currently no organized efforts	Town Website, Town Billboards
What digital sources (like the FEMA Map Service Center, National Flood Hazard Layer) or non-regulatory tools does the community use?	MapGeo- the Town's GIS FEMA panel layer	Town Website, FEMA Map Service Center
Compliance History		
Is the community currently suspended from the NFIP?	No	No
Are there any outstanding compliance issues? (i.e., current violations)?	No	No
How does the community identify substantially damaged/improved structures? What is the process to make sure these structures are brought into compliance?	Building officials and others conduct windshield survey after hazard event or responds to calls from public to inspect. Official notices that the building is not suitable for occupancy. Once the repairs have been made, the building official is requested to conduct an inspection (or uses 3rd party inspectors) and recertify that the building is suitable for occupancy.	Building officials and others conduct windshield survey after hazard event or responds to calls from public to inspect. Official notices that the building is not suitable for occupancy. Once the repairs have been made, the building official is requested to conduct an inspection (or uses 3rd party inspectors) and recertify that the building is suitable for occupancy.
When was the most recent Community Assistance Visit (CAV or Community Assistance Contact (CAC)?	5/20/2021	6/20/2023
Is a CAV or CAC scheduled or needed?	No	No
Regulation		
When did the community enter the NFIP?	3/1/1982	1/3/1986
Are the FIRMs digital or paper?	Digital- FEMA FMSC	Digital- FEMA FMSC
How does the community enforce local floodplain regulations and monitor compliance?	Building officials and others conduct windshield survey after hazard event or responds to calls from public to inspect. Official notices that the building is not suitable for occupancy. Once the repairs have been made, the building official is requested to conduct an inspection (or uses 3rd party inspectors) and recertify that the building is suitable for occupancy.	Zoning ordinance; Town Code Chapter 214
Do floodplain development regulations meet or exceed FEMA or state minimum requirements? If so, in what ways?	Exceed FEMA requirements. Exeter floodplain overlay district exceeds FEMA requirements and ties closely to Exeter's Comprehensive Plan.	Meets. Code 214.1 requires conformance to NVIP – Title 44
How are Letters of Map Change (LOMCs) tracked and compiled?	Map GEO is used. Historic LOMCs and permits are included in physical jackets of the building development.	Building department tracks and keeps LOMCs on file

NFIP Topic	Exeter	West Greenwich
Explain the permitting process.	Two processes for land development. File subdivision permit application through the planning department. Once it is approved by planning, it is forwarded for review by the building department to determine if structure would be approved (setbacks, electrical, plumbing). Inspections would come during development before certificate of occupancy is issued. Single lot goes through building department similar to above without planning department review. Zoning official will review for single development and will review subdivision for conformity review. Rely on engineering and surveyor, 3rd party reviews.	Follows RI State Building Code
Community Rating System (CRS)		
Does the community participate in CRS? If so, what is the community's CRS Class Ranking?	Not at this time- Exeter is pursuing participation in CRS through this HM&FMP.	Not at this time- West Greenwich is pursuing participation in CRS through this HM&FMP.
What categories and activities provide CRS points, and how can the class be improved?	N/A	N/A
Does the plan include CRS planning requirements?	Yes- Activity 510	Yes- Activity 510

Repetitive Loss areas in Exeter and West Greenwich: There are no repetitive loss properties in either Exeter or West Greenwich.

4.4 Post-Disaster Mitigation Policies and Procedures

After severe events or a disaster, Exeter and West Greenwich EMA and building officials conduct windshield surveys to identify damages. They perform rapid assessments and placard the property, based on damage. If a building is determined substantially damaged, the building official deems it severely damaged or otherwise, and once improved, inspects and authorizes it for occupancy, bringing it back into compliance. RIEMA is launching a new Crisis Track program that West Greenwich EMA intends to use for documenting substantially damaged buildings and infrastructure with already preloaded statistics.

5. MITIGATION STRATEGY

This section outlines the process for preparing a mitigation strategy. The mitigation strategy provides the blueprint for the implementation of desired activities which will enable the Town to continue to save lives and preserve infrastructure by systematically reducing hazard impacts, damages, and community disruption.

This section addresses the remaining portions of Element C and Element G of the Local Mitigation Plans regulation checklist.

Regulation Checklist- 44 CFR § 201.6 Local Mitigation Plans
ELEMENT C. Mitigation Strategy
C3. Does the plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards? (Requirement 44 CFR § 201.6(c)(3)(i)) C3-a. Does the plan include goals to reduce the risk from the hazards identified in the plan? C4. Does the plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? (Requirement 44 CFR § 201.6(c)(3)(ii)) C4-a. Does the plan include an analysis of a comprehensive range of actions/projects that each jurisdiction considered to reduce the impacts of hazards identified in the risk assessment? C4-b. Does the plan include one or more action(s) per jurisdiction for each of the hazards as identified within the plan's risk assessment? C5. Does the plan contain an action plan that describes how the actions identified will be prioritized (including a cost-benefit review), implemented, and administered by each jurisdiction? (Requirement 44 CFR § 201.6(c)(3)(iv)); (Requirement §201.6(c)(3)(iii)) C5-a. Does the plan describe the criteria used for prioritizing actions? C5-b. Does the plan provide the position, office, department or agency responsible for implementing/ administrating the identified mitigation actions, as well as potential funding sources and expected time frame?
ELEMENT G. High Hazard Potential Dams (HHPD) (Optional)
HHPD3. Did the plan include mitigation goals to reduce long-term vulnerabilities from HHPDs? HHPD3-a. Does the plan address how to reduce vulnerabilities to and from HHPDs as part of its own goals or with other long-term strategies? HHPD3-b. Does the plan link proposed actions to reducing long-term vulnerabilities that are consistent with its goals? HHPD4. Did the plan include actions that address HHPDs and prioritize mitigation actions to reduce vulnerabilities from HHPDs? HHPD4-a. Does the plan describe specific actions to address HHPDs? HHPD4-b. Does the plan describe the criteria used to prioritize actions related to HHPDs? HHPD4-c. Does the plan identify the position, office, department, or agency responsible for implementing and administering the action to mitigate hazards to or from HHPDs?
Source: FEMA 2025 (Local)

CRS Activity 510 Planning Process- Credit Checklist
Step 6. Set Goals (2 credits)
6. Set goals (Required) (2 credits)
Step 7. Review Possible Activities (Max 35 credits)

CRS Activity 510 Planning Process- Credit Checklist
7a. Preventive activities (5 credits) 7b. Floodplain Management Regulatory/current & future conditions (5 credits) 7c. Property protection activities (5 credits) 7d. Natural resource protection activities (5 credits) 7e. Emergency services activities (5 credits) 7f. Structural projects (5 credits) 7g . Public information activities (5 credits)
Step 8. Draft an Action Plan (Max 60 credits)
8a. Actions must be prioritized (required) 1. Recommendations for activities from two of the six categories (10 credits) 2. Recommendations for activities from three of the six categories (20 credits) 3. Recommendations for activities from four of the six categories (30 credits) 4. Recommendations for activities from five of the six categories (45 credits) 8b. Post-disaster mitigation policies and procedures (10 credits) 8c. Action items for mitigation of other hazards (5 credits)
Source: FEMA NFIP CRS Coordinator's Manual (2017), 2021 Addendum

5.1 Mitigation Goals

The HMPCs developed mitigation goals and potential mitigation actions to address current and future potential hazard impacts for the residents of Exeter and West Greenwich and its critical facilities and infrastructure.

Mitigation goals are general guidelines that describe what a community wants to achieve in terms of hazard mitigation and loss prevention from future events. Community-wide visions are made into goal statements, which are typically long-range statements. The results from the Risk Assessment were used as a basis for updating the mitigation goals and actions.

Table 67 lists the Towns of Exeter and West Greenwich's strategic mitigation goals which form the foundation for the following processes and culminate within the Mitigation Action Plan- **Error! Reference source not found.**.

Table 67- Mitigation Goals

	Goal Description
Exeter	1. Implement actions which protect the lives and property of Exeter's residents 2. Implement actions which protect Exeter's critical facilities and infrastructure 3. Implement actions which protect Exeter's cultural, historical, natural and economic resources 4. Implement actions to achieve effective emergency communications 5. Implement public outreach/educational actions to increase awareness of hazards and promote overall preparedness
West Greenwich	1. Protection of life and property 2. Protection from social and economic hardship 3. Protection of critical infrastructure and public safety 4. Promote public outreach/educational actions to increase awareness of hazards and promote overall preparedness
Dam Failure	Reduce dam failure (DF) damage and loss possibilities by: DF1: Increase public awareness of dam failure hazards in the Town and notify potentially affected

	Goal Description
	residents living in an inundation area (workshops, training, flyers, etc.). DF2: Increase resiliency of critical infrastructure/facilities to prevent future dam failure-related damages DF3: Continue to work with RIEMA, RIDEM, and dam owners to address dam safety deficiencies, compliance issues, and updating their EAPs. DF4: Reduce potential impacts from a dam failure through structural mitigation projects (such as structure relocation, regular maintenance, dam removal, etc.) or pre-disaster monitoring equipment, studies, and policies DF5: Increase Town capabilities to be able to prepare for and respond to dam failure emergencies
Flood	Reduce flooding (FL) damage and loss possibilities by: FL1: Educate the public on the importance of flood insurance/NFIP/CRS and other flood related information FL2: Increase resiliency of critical infrastructure/facilities to prevent future flood-related damages FL3: Reduce the likelihood of damages/loss possibilities due to less frequent flooding types (dam failure) FL4: Implement pre-disaster monitoring equipment, studies, and policies FL5: Increase Town capabilities to be able to prepare for and respond to flooding emergencies

5.2 Mitigation Actions

The HMPCs reviewed the mitigation actions proposed in the 2005 HMPs and provided status updates for each. The HMPCs defined the existing mitigation projects status as: "Completed", "Ongoing", "Deferred" or "Deleted".

- **Completed**- projects that have been completed since the 2005 HMP.
- **Ongoing/In Progress**- projects that have been started but not completed since the 2005 HMP or occur annually.
- **Deferred**- projects that have not been started since the 2005 HMP, but the HMPC aims to complete in the next 5 years with this HMP Update.
- **Deleted**- projects that have not been started since the 2005 HMP, and the HMPC no longer wants to pursue.

Status updates from existing projects from the 2005 HMPs are below (Table 68 and Table 69).

Table 68- Status of Mitigation Actions from the 2005 HMP- Exeter

Mitigation Projects from the 2005 Exeter HMP	Status
Aggressively trim trees to an adequate distance from all utility lines serving the Communications Center/Alternate EOC.	**Deleted-** This previously identified action has been started and will not be incorporated into the MAP as Rhode Island Energy is responsible for this action.
Retrofit and renovate the Communications Center to withstand high winds.	**Complete**- the Town is in the process of relocating and renovating the Communications Center/ EOC and withstanding high winds was taken into consideration during the design phase.
Evaluate the communication and computer equipment as well as the backup generator at the Communications	**Complete**- the Town is in progress of relocating and renovating the Communications Center/ EOC has

Mitigation Projects from the 2005 Exeter HMP	Status
Center with RIEMA and upgrade any equipment as necessary.	upgraded the equipment and purchased a backup generator.
Complete the wiring and controls of the back-up electrical generator and include auto start capability at the EOC.	**Completed**- the Town is in progress of relocating and renovating the Communications Center/ EOC and withstanding high winds was taken into consideration during the design phase.
Evaluate the EOC communications/computer systems with RIEMA and upgrade the equipment as necessary.	**Completed**- the Town is in progress of relocating and renovating the Communications Center/ EOC has upgraded the equipment.
Aggressively trim trees to an adequate distance from all utility lines serving the EOC.	**Deleted-** This previously identified action has been started and will not be incorporated into the MAP as Rhode Island Energy is responsible for this action.
Acquire a SUV or crew cab pickup for emergency responders to access disaster sites, blocked areas, response sites needing action, and stranded residents.	**Deferred**- This previously identified action has not been started and will be incorporated into the MAP.
Develop and implement public education and outreach programs addressing preparedness, prevention and emergency response for wildland/urban interface fires.	**Ongoing**- This previously identified action has been started and will be incorporated into the MAP.
Expand the annual tree trimming program, beyond Narragansett Electric's level, to more aggressively clear utility lines serving business and heavily populated areas.	**Deleted-** This previously identified action has been started and will not be incorporated into the MAP as Rhode Island Energy is responsible for this action.
Replace unusable/inadequate road clearing equipment.	**Ongoing**- This previously identified action has been started and will be incorporated into the MAP.
Increase the towns' ability to execute the debris management plan by acquiring a back hoe, portable generator and brush hog.	**Deleted**- This previously identified action has not been started and will not be incorporated into the MAP. Exeter does not have a Debris Management Plan. Any equipment needed is addressed in the MAP.
Create a town-wide education program to ensure that all properties are visibly numbered.	**Deferred**- This previously identified action has not been started and will be incorporated into the MAP.
Equip key government and essential service facilities with back-up generators	**Ongoing**- This previously identified action has been started and will be incorporated into the MAP.
Coordinate with DEM to explore effective measures to prevent and suppress fires in forested State Management areas. Evaluate water sources, storage, access routes and education. Explore state programs for dry hydrants, controlled burning and the cutting of fire trails.	**Ongoing**- This previously identified action has been started and will be incorporated into the MAP.

Mitigation Projects from the 2005 Exeter HMP	Status
Install a culvert and a dry hydrant on Yawgoo Valley Road.	**Partially Completed/Deleted**- DPW has installed the culvert on Yawgoo Valley Road. The Fire Chief states that a dry hydrant is not needed at this location.
Review the town's comprehensive plan along with State and Federal stormwater management requirements. Ensure that the construction and maintenance program for storm drains minimizes flooding from storm water run-off.	**Completed**- This consideration is included in the recently updated 2024-2044 Exeter Comprehensive Plan.
Protect aquifers, wetlands, marshes and other fragile environmental areas along rivers and streams by enforcing critical environmental criteria for building and land use, cleaning up areas as necessary, and restoring wetlands where needed to minimize flood risk and ensure water quality.	**Completed**- This consideration is included in the policies and objectives of the recently updated 2024-2044 Exeter Comprehensive Plan.
Update Exeter's flood zone maps. The current flood zone maps date back to 1982, making them the second oldest in the state. Work with RIEMA and FEMA to update the maps to reflect new developments.	**Completed**- Exeter's FIRMs were updated in 2023. The Town will continue to work with RIEMA/FEMA on updating and adopting the new maps as needed.

Table 69- Status of Mitigation Actions from the 2005 HMP- W. Greenwich

Mitigation Projects from the 2005 West Greenwich HMP	Status
Identification of dam owners to ensure proper maintenance and structural integrity.	**Ongoing**- This previously identified action has been started and will be incorporated into the MAP.
Inspection/evaluation of dams after identification of owners; prioritize by likelihood of failure and potential damage caused.	**Ongoing**- This previously identified action has been started and will be incorporated into the MAP.
Review comprehensive plan to ensure adequacy of design standards to meet drainage requirements. Propose revisions to meet drainage requirements. Implement consistent maintenance program for storm drains in order to minimize flooding from storm water run-off.	**Ongoing**- This previously identified action has been started and will be incorporated into the MAP.
Evaluate the feasibility of replacing current undersized culverts with larger or properly sized culverts.	**Ongoing**- This previously identified action has been started and will be incorporated into the MAP.
Develop a Debris Management Plan	**Deferred**- This previously identified action has not been started and will be incorporated into the MAP.
Establish a tree trimming program to trim trees adjacent to utility lines to avoid power outages and loss of	**Deleted-** This previously identified action has not been started and will not be incorporated into the

Mitigation Projects from the 2005 West Greenwich HMP	Status
communication systems during and after hurricanes, thunderstorms, ice storms and windstorms.	MAP as Rhode Island Energy is responsible for this action.
Develop a Master Fire Plan	**Deferred**- This previously identified action has not been started and will be incorporated into the MAP.
Create firebreaks, fire lanes, and install cisterns/ dry hydrants	**Ongoing**- This previously identified action has been started and will be incorporated into the MAP.
In the event of forest fires, access to the fire is essential in order to protect property and lives. To increase access and response time for emergency vehicles, it is imperative to coordinate efforts with the RIDEM to ensure access to large forested state owned property as well.	**Ongoing**- This previously identified action has been started and will be incorporated into the MAP.
Distribute and make material available concerning evacuation routes and emergency shelters as well as how residents can prepare for each natural hazard that affects West Greenwich.	**Ongoing**- This previously identified action has been started and will be incorporated into the MAP.
Organize and conduct training programs for town officials, employees, boards and commissions regarding hazard mitigation; including flood mitigation and actions/responsibilities during a natural disaster.	**Ongoing**- This previously identified action has been started and will be incorporated into the MAP.

The following table provides a breakdown of categories for CRS flood hazard mitigation activities.

Table 70- CRS Categories of Flood Hazard Mitigation Activities

1. **Preventive** activities keep flood problems from getting worse. The use and development of flood prone areas is limited through planning, land acquisition, or regulation. They are usually administered by building, zoning, planning, and/or code enforcement offices.	
• Floodplain mapping and data	• Planning and zoning
• Open space preservation	• Stormwater management
• Floodplain regulations	• Drainage system maintenance
• Erosion setbacks	• Building codes
2. **Property protection** activities are usually undertaken by property owners on a building-by-building or parcel basis.	
• Relocation	• Retrofitting
• Acquisition	• Sewer backup protection
• Building elevation	• Insurance
3. **Natural resource protection** activities preserve or restore natural areas or the natural functions of floodplain and watershed areas. They are implemented by a variety of agencies, primarily parks, recreation, or conservation agencies or organizations.	

• Wetlands protection • Erosion and sediment control • Natural area preservation • Natural area restoration	• Water quality improvement • Coastal barrier protection • Environmental corridors • Natural functions protection
4. **Emergency services** measures are taken during an emergency to minimize its impact. These measures are usually the responsibility of city or county emergency management staff and the owners or operators of major or critical facilities.	
• Hazard threat recognition • Hazard warning • Hazard response operations	• Critical facilities protection • Health and safety maintenance • Post-disaster mitigation actions
5. **Structural projects** keep flood waters away from an area with a levee, reservoir, or other flood control measure. They are usually designed by engineers and managed or maintained by public works staff.	
• Reservoirs • Levees/floodwalls • Diversions	• Channel modifications • Storm drain improvements
6. **Public information** activities advise property owners, potential property owners, and visitors about the hazards, ways to protect people and property from the hazards, and the natural and beneficial functions of local floodplains. They are usually implemented by a public information office.	
• Map information • Outreach projects • Real estate disclosure	• Library • Technical assistance • Environmental education

The HMPCs then considered, reviewed, and selected new projects from a comprehensive list of potential actions identified during this MJHM&FMP update process for each hazard type. The HMPCs decided if they wanted to "Select" or "Consider [and remove]" each new project that they reviewed. The HMPCs selected those actions that they intend to and are capable of implementing during the MJHM&FMP's five-year lifecycle within the MAP.

These actions were recommended to the HMPCs for review based on the following:

- Relevant actions proposed by the public via the public survey
- Relevant actions discussed in the 2023/2024 MRP Community Resilience Building Workshop. Not all actions that were discussed during these workshops are related to hazard mitigation.
- Findings of the Risk Assessment and discussions with the HMPCs. Once the RA was complete, mitigation actions to address specific concerns were brought to the HMPCs. Not all of these actions were selected, based on the reasons below, but these actions created dialogue among the HMPCs and in some cases, new projects were suggested to address the concern/risk.

Table 71- Mitigation Actions Considered but Not Selected for the 2025 MAP

Actions considered, but not selected for inclusion in the MAP	Jurisdiction that did not select action	Reason for not selecting action
Review current ordinances and regulations pertaining to heavy construction and development as it relates to transportation on roads as well as stormwater management, and low impact development (LID).	Exeter West Greenwich	The Towns have covered these topics in existing ordinances besides transportation weight limits. RIDOT regulates weight limits on roads.
Install Storm Shutters on critical facilities to protect from airborne debris in the event of a storm.	Exeter West Greenwich	Neither Town experiences large amounts of airborne debris during storms. Other projects have a higher priority to the Town.
Conduct LiDAR mapping to map ground elevation.	Exeter West Greenwich	The University of Rhode Island and USGS have publicly available LiDAR data.
Update local building codes to require reinforced construction, renovation, and mobile home fastening capable of withstanding hurricane force winds.	Exeter West Greenwich	This provision is already included in the State Building Code, which both Towns follow.
Conduct a commodity flow study to determine the nature and amount of all hazardous materials transported within and through the community to help identify high vulnerability areas and long-term projects to reduce vulnerability.	Exeter West Greenwich	This is an action identified in the 2024 State of Rhode Island HMP. The Towns will wait until the State has completed this study and use relevant information to identify vulnerability and projects and use this information in an updated version of this HM&FMP.
Create a voluntary program which allows landowners and the Town to assess the water quality of private drinking wells.	Exeter West Greenwich	RIDEM has a similar program that regularly tests for PFAS. The Town did not select this action to reduce duplication of efforts.
Strengthen and enforce existing regulations to protect surface groundwater quality, including adopting and implementing the Onsite Wastewater Management Plan.	Exeter West Greenwich	Other projects have a higher priority to the Town.
Develop an Onsite Wastewater Management Plan.	Exeter West Greenwich	Other projects have a higher priority to the Town.
Join the RIIB Community Septic System Loan Program (CSSLP) to provide financing options to residents for the repair and replacement of substandard or failing septic systems and cesspools that could impact community water quality.	Exeter West Greenwich	An Onsite Wastewater Management Plan is a prerequisite for joining this program. As the Town did not wish to pursue developing this Plan, this action was not selected.
Adopt and implement the Onsite Wastewater Management District.	Exeter West Greenwich	An Onsite Wastewater Management Plan is a prerequisite to developing a District. As the Town did not wish to pursue developing this Plan, this action was not selected.
Create a database of onsite systems in the Town.	Exeter West Greenwich	Onsite Systems are not a priority to the HMPC at this time.
Work with State agencies, NGOs, and/or universities to regularly test fish tissue from recreational fishing areas to examine potential	Exeter West Greenwich	The State, NGOs, and Universities are already implementing this action. The Town did not select this action to reduce duplication of efforts.

Actions considered, but not selected for inclusion in the MAP	Jurisdiction that did not select action	Reason for not selecting action
PFAS and other contamination of the fish as a food source for community members.		
Acquire a SUV or crew cab pickup for emergency responders to access disaster sites, blocked areas, response sites needing action, and stranded residents.	West Greenwich	West Greenwich did not select this action as the Town has an adequate number of Town vehicles to respond to an emergency.
Replace unusable/inadequate road clearing equipment and purchase new equipment as necessary to assist in debris cleanup and other disaster response operations.	West Greenwich	West Greenwich did not select this action as the Town has an adequate amount of road clearing equipment for disaster response and debris cleanup operations.
Create a town-wide education program to ensure that all properties are visibly numbered.	West Greenwich	West Greenwich did not select this action as homes in West Greenwich are visibly numbered.
Continue to work with RIDEM on identifying dam owners for unknown/orphan dams. If the Town is identified as an owner, work to ensure proper maintenance and structural integrity.	Exeter	Exeter did not select this action as the dams in Exeter have known owners.
Implement consistent maintenance program for storm drains in order to minimize flooding from storm water run-off.	Exeter	Exeter did not select this action as the Town has an adequate maintenance program for storm drains.
Develop a Master Fire/Strategic Plan with the 3 volunteer fire departments in West Greenwich	Exeter	Exeter did not select this action as the fire departments in Exeter coordinate efforts and share resources well.
Develop a volunteer team capable of staffing the EOC when needed.	West Greenwich	West Greenwich did not select this action as the Town's EOC is well staffed.
Build a town public safety complex and community hub that will house the town hall, police, EMS, primary shelter and supplies. The facility will be able to be utilized as a heating and cooling center.	Exeter	Exeter did not select this action as this is not a vision for the Town.
Encourage utility companies to bury existing powerlines to reduce power outages caused by downed power lines and require buried power lines in new developments. Pursue potential ordinance to require buried powerlines for commercial developments.	West Greenwich	West Greenwich did not select this action as past efforts of requesting the utility company to bury powerlines have been unsuccessful. New subdivision development is not common in the Town and creating an ordinance for future development is not a priority at this time.
After acquiring a generator, install solar panels on the public library so that it may continue to serve as a community critical facility in emergency situations.	West Greenwich	West Greenwich did not select this action as the Town has implemented a moratorium on future solar power development.
Improve municipal environmental review and oversight of development-related permitting.	West Greenwich	West Greenwich did not select this action as the Town is up to date on permitting and feels that existing regulations are adequate.
Conduct fluvial geomorphic assessments of un-assessed rivers to identify and prioritize river corridor protection and restoration opportunities.	West Greenwich	West Greenwich did not select this action as this action would likely be implemented by the Wood-Pawcatuck Watershed Association. The Town will participate as needed, but does not want to be responsible for implementing this study.

Actions considered, but not selected for inclusion in the MAP	Jurisdiction that did not select action	Reason for not selecting action
Hire a volunteer coordinator to manage organized and spontaneous volunteers during emergency operations.	West Greenwich	West Greenwich did not select this action as a Town employee already has this role.
Obtain funding for and implement dam removal projects, where determined technically feasible.	West Greenwich	West Greenwich did not select this action as the Town only has low-hazard dams. Projects associated with dams are not a high priority for the Town at this time.
Install monitoring equipment on dams/rivers/ lakes to remotely monitor water levels during heavy rain and other hazard events.	West Greenwich	West Greenwich did not select this action as USGS already has this equipment in the Town.
Assess critical facilities for snow load capacity. Retrofit any facility that does not meet recommended snow load of 30 pounds/sq foot	West Greenwich	West Greenwich did not select this action as roof collapse due to heavy snow has not been an issue in the Town.
Install cameras and warning signs where illegal dumping occurs frequently to act as deterrence for future dumping or spills.	West Greenwich	West Greenwich did not select this action as current problem areas in the Town are owned by the State and the State would be responsible for installing cameras on their properties.
Conduct a GIS assessment of gravel roads, topography, and wetlands/waterbodies to determine the best location for interventions to improve the safety of and minimize runoff from gravel roads.	West Greenwich	West Greenwich did not select this action as there are very few gravel roads in the Town and runoff is not an issue on those roads.
Repair gravel roads to reduce erosion and runoff during major storm events.	West Greenwich	West Greenwich did not select this action as there are very few gravel roads in the Town and erosion/runoff is not an issue on those roads.
Investigate finding a new tool to replace the OnSolve CodeRed system for emergency notifications	West Greenwich	West Greenwich did not select this action as they are satisfied with the CodeRed notification system
Create an Emergency Management Resource Corner at the Public Library and have literature on the RI Special Needs Registry (RISNER), preparedness literature, etc.	West Greenwich	This was an Exeter-specific action
Add a storage room at the Public Library to store emergency supplies to aid in the event of an emergency (food, water, generator, medical supplies, etc.)	West Greenwich	This was an Exeter-specific action
Hire a new DPW staff member to file RIDEM permits to fix culverts and to integrate new stormwater measures (BMPs)	West Greenwich	West Greenwich did not select this action as they have adequate staffing at DPW
Review Town ordinance/code regarding post disaster procedures. Ensure that code is being properly enforced after a disaster	West Greenwich	West Greenwich did not select this action as they have clear enforcement procedures
Retrofit historic structures (residential and non-residential) with dry floodproofing	West Greenwich	West Greenwich did not select this action as they have higher priority projects at this time
Encourage drought-tolerant landscape design by incorporating drought tolerant practices into landscaping, or using permeable driveways and	West Greenwich	West Greenwich did not select this action as they have higher priority projects at this time

Actions considered, but not selected for inclusion in the MAP	Jurisdiction that did not select action	Reason for not selecting action
surface to reduce runoff and promote groundwater recharge.		
Partner with the University of Rhode Island to deploy RI-CHAMP advance storm modeling.	West Greenwich	West Greenwich did not select this action as they have higher priority projects at this time
Pursue funding to upgrade of the Town website. Hire a PIO/social media manager/website manager to disseminate public information.	West Greenwich	West Greenwich did not select this action as they have adequate staffing at for PIO and social media.
Coordinate with the State of R.I., through their quasi-governmental agency QDC, to determine the feasibility of extending the Ladd School property water lines up to Rt. 2 and extend over to South Rd. up to Rt. 2.	West Greenwich	This was an Exeter-specific action
Enhance Planning and Building Official processes for land use development through use of 3rd party inspectors/professional services.	West Greenwich	This was an Exeter-specific action
Enhance online permitting system through supplier provided training.	West Greenwich	This was an Exeter-specific action
Include LOMCs and development files to online permitting system to create efficiencies and reduce waste in permitting processes and documentation of historic files.	West Greenwich	This was an Exeter-specific action

The HMPCs evaluated, selected, and prioritized actions that were developed through suggestions from the public survey, MRP Workshop, as a result of the findings of the Risk Assessment, and suggestions from the HMPCs.

Newly “Selected” projects and carried forward “Ongoing” or “Deferred” actions from the 2005 HMPs were incorporated into the 2025 MAP. “Deleted” or “Considered” actions were not incorporated into the 2025 MAP.

5.3 Evaluating and Prioritizing Mitigation Actions

To determine which actions would be included in the MAP, the HMPCs evaluated and prioritized each selected mitigation action. The MAP represents the mitigation projects and programs to be implemented through the cooperation of multiple departments within the Towns of Exeter and West Greenwich.

To consider the opportunities and constraints of implementing each mitigation action, the HMPCs reviewed the simplified Social, Technical, Administrative, Political, Legal, Economic, and Environmental (STAPLEE) (Table 72). A qualitative statement is provided regarding the benefits and costs and, where available, the technical feasibility for each action considered for implementation.

For each selected mitigation action, the HMPCs rated each STAPLEE category on a scale of 1 (least favorable)-5 (most favorable). This then populated a total score of 5-35 (35-24: High priority, 23-12: Medium priority, 11-7: Low priority). The HMPCs were able to override the STAPLEE score if their priorities were different than the STAPLEE result.

Table 72- STAPLEE Evaluation Criteria for Mitigation Actions

Evaluation Category	Discussion "It is important to consider…"	Considerations
Social	The public support for the overall mitigation strategy and specific mitigation actions.	Community acceptance Adversely affects population
Technical	If the mitigation action is technically feasible and if it is the whole or partial solution.	Technical feasibility Long-term solutions Secondary impacts
Administrative	If the community has the personnel and administrative capabilities necessary to implement the action or whether outside help will be necessary.	Staffing Funding allocation Maintenance/operations
Political	What the community and its members feel about issues related to the environment, economic development, safety, and emergency management.	Political support Local champion Public support
Legal	Whether the community has the legal authority to implement the action, or whether the community must pass new regulations.	Local, state, and federal authority Potential legal challenge
Economic	If the action can be funded with current or future internal and external sources, if the costs seem reasonable for the size of the project, and if enough information is available to complete a FEMA Benefit-Cost Analysis.	Benefit/cost of action Contributes to other economic goals Outside funding required FEMA Benefit-Cost Analysis
Environmental	The impact on the environment because of public desire for a sustainable and environmentally healthy community.	Effect on local flora and fauna Consistent with community environmental goals Consistent with local, state, and federal laws

On January 21, 2025, the HMPCs reviewed, selected, and prioritized hazard mitigation actions that were selected to be included in the Mitigation Action Plan (MAP).

The HMPCs defined their project rating categories as high, medium, or low priority:

- **High priority:** STAPLEE score: 35-24 OR actions associated with projects that have the greatest beneficial impact on the Town(s) OR low cost actions that could be implemented easily
- **Medium priority:** STAPLEE score: 23-12 OR actions associated with projects that are important to the Town(s), but other actions may need to be completed first
- **Low priority:** STAPLEE score: 11-7 OR actions associated with projects that have less of an impact on safety and property in the Town(s)

As a multi-jurisdictional plan, one Town's selections or priority of a project had no influence on the other Town's selection or priority given to a project.

Prioritizing the mitigation actions within the MAP was completed to provide the Towns with an implementation approach for completing the actions in the five-year lifecycle of this MJHM&FMP.

5.4 Mitigation Action Plan (MAP)

The Towns of Exeter and West Greenwich's MAP depicts how each mitigation action will be implemented and administered by the HMPCs. The MAP details each selected mitigation action, its priority, the department responsible, the anticipated implementation timeline, and provides a brief explanation as to how the overall benefit/costs and technical feasibility were taken into consideration.

Table 73- Mitigation Action Plan

Action ID	Action Description	Priority (H, M L): Exeter	Priority (H, M L): West Greenwich	Goals: Exeter	Goals: West Greenwich	Goals: Dam failure goal	Goals: Flood goal	CRS Category for Flood Actions	Responsible Department	Timeframe	Potential Funding	Benefit	Potential Cost	Technical Feasibility/ Considerations	Hazards: Severe Thunderstorm	Hazards: Dam Failure	Hazards: Flooding	Hazards: Hurricane/Nor'easter	Hazards: Severe Winter Weather	Hazards: Brushfire/Wildfire	Hazards: Drought	Hazards: Extreme Temps	Hazards: Tornado	Hazards: Earthquake	Hazards: HAZMAT Incident	Hazards: Water Quality	Hazards: Cybersecurity
1	Acquire a SUV or crew cab pickup for emergency responders to access disaster sites, blocked areas, response sites needing action, and stranded residents.	M	Did not select/ jurisdiction specific project	1, 4	-	DF5	FL5	Emergency Services	DPW	Short (1-2)	Town budget	This project enhances emergency responders' ability to quickly access disaster sites, navigate blocked areas, and assist stranded residents, improving response efficiency and saving lives during natural hazard disasters.	Med (30-99k)	This project is technically feasible as the Town has already a fleet of vehicles, but is in need of additional equipment.	x	x	x	x	x	x	x	x	x	x	x		
2	Replace unusable/inadequate road clearing equipment and purchase new equipment as necessary to assist in debris cleanup and other disaster response operations.	H	Did not select/ jurisdiction specific project	1, 4	-	DF5	FL5	Emergency Services	DPW	Short (1-2)	Town budget, FEMA HMGP, HUD CDBG, DOT ERP	This project ensures more efficient and timely disaster response by replacing outdated road clearing equipment and acquiring new tools to enhance debris cleanup efforts.	High (100k+)	This project is technically feasible with proper funding. Considerations for safe storage of new equipment should be considered	x	x	x	x	x	x	x	x	x	x	x		
3	Create a town-wide education program to ensure that all properties are visibly numbered.	H	Did not select/ jurisdiction specific project	1, 4	-	DF4	FL4	Emergency Services	EMA, Fire Dept	Short (1-2)	Town budget, FEMA HMGP, HUD CDBG, RIEMA CDBG, RIEMA HSGP	Visibly numbered houses enable emergency responders to quickly locate and assist residents during/after a natural disaster, saving time and potentially lives.	Low (0-29k)	The Towns have robust GIS data/mapping to implement this project. Other considerations include: ensuring scalability for future growth and community support; public outreach to educate residents about the importance of visible numbering. Additionally, the project would require enforcement mechanisms to ensure that residents comply with the new system, which might involve inspections or providing assistance in placing the numbers.	x	x	x	x	x	x	x	x	x	x	x		
4	Continue to work with RIDEM on identifying dam owners for unknown/orphan dams. If the Town is identified as an owner, work to ensure proper maintenance and structural integrity.	Did not select/ jurisdiction specific project	M	-	1, 2, 3	DF3	-	-	DPW	Med (3-4)	Town budget, FEMA Dam Safety Program, FEMA HMGP, FEMA FMA, RIDEM BWRF, USDA NCRS CIG, SNEP Watershed Implementation Grant, IIJA Dam Removal Fund, USACE WRDA, RIIB Stormwater Accelerator Project	Many dams in Rhode Island do not have identified owners. Establishing ownership ensures that regular inspections and maintenance are occurring to ensure the dam is safe which reduces overall potential of failure	Low (0-29k)	Coordination with RIDEM. Potential Town support of taking ownership of an orphan dam		x											
5	Implement consistent maintenance program for storm drains in order to minimize flooding from storm water run-off.	Did not select/ jurisdiction specific project	M	-	1, 2, 3	-	FL4	Preventive	Planning	Annually	Town budget, RI LTAP, RIIB Stormwater Accelerator Project	This project would help ensure that storm drains remain clear and functional, reducing the risk of flooding caused by stormwater runoff. This proactive approach protects property, infrastructure, and public safety by improving drainage	Low (0-29k)	Ensure maintenance complies with State design criteria and stormwater BMPs			x										

Table 73- Mitigation Action Plan

		Priority (H, M L)		Goals											Hazards												
Action ID	**Action Description**	Exeter	West Greenwich	Exeter	West Greenwich	Dam failure goal	Flood goal	CRS Category for Flood Actions	Responsible Department	Timeframe	Potential Funding	Benefit	Potential Cost	Technical Feasibility/ Considerations	Severe Thunderstorm	Dam Failure	Flooding	Hurricane/Nor'easter	Severe Winter Weather	Brushfire/Wildfire	Drought	Extreme Temps	Tornado	Earthquake	HAZMAT Incident	Water Quality	Cybersecurity
												efficiency during heavy rainfall/flooding events.															
6	Develop a Master Fire/Strategic Plan with the 3 volunteer fire departments in West Greenwich	Did not select/ jurisdiction specific project	M	-	1, 2, 3	-	-	-	Fire Dept	Short (1-2)	Town budget, FEMA FP&S, FEMA AFG, FEMA FP&S, FEMA EMPG, USFS CWDG, USFS CFRP, FMAGP	This plan aims at reducing duplication of efforts and resources among the 3 volunteer fire departments for a more efficient and timely response to future fire emergencies in West Greenwich	Med (30-99k)	This project is technically feasible with proper funding, but may require an outside contractor to develop the plan						x							
7	Continue to coordinate with RIDEM on fire lanes and access to the Big River Management Area and other state land within Town boundaries to allow fire trucks and personnel to easily access the area. Coordinate with RIDEM to explore effective measures to prevent and suppress fires in forested State Management areas. Evaluate water sources, storage, access routes and education. Explore state programs for dry hydrants, controlled burning and the cutting of fire trails.	H	H	1, 2, 3, 4	1, 2, 3	-	-	-	Fire Dept	Annually	Town budget, FEMA HMGP, USFS CFRP, BLM Fire Management Program, USDA NRCS EQIP, RIDEM Forest Stewardship Program, RIRRC, RIIB MRP, RIIB Green Economy Fund	In the event of forest fires, access to the fire is essential in order to protect property and lives. To increase access and response time for emergency vehicles, it is imperative to coordinate efforts with the RI DEM to ensure access to large forested state owned property as well.	Low (0-29k)	As the State owns the land, the Town has little authority to manage fire lanes. West Greenwich is currently developing a MOU with RIDEM for this action for the Big River Management Area.						x							
8	Organize and conduct training programs for town officials, employees, boards and commissions regarding hazard mitigation and actions/responsibilities during a disaster.	M	M	5	4	DF5	FL5	Emergency Services	EMA	Annually	Town budget	Organizing and conducting training programs ensures that all parties are well-informed about hazard mitigation strategies and their roles during a natural disaster. This enhances the community's preparedness, coordination, and response effectiveness, ultimately minimizing the impact of disasters on residents and infrastructure.	Low (0-29k)	Coordination among multiple departments. Multiple trainings may be necessary to ensure all parties receive the training	x	x	x	x	x	x	x	x	x	x	x	x	x
9	Develop an Emergency Operations/Continuity of Operations Plan.	H	H	4	2, 3	DF5	FL5	Emergency Services	EMA	Short (1-2)	Town budget, FEMA EMGP, FEMA HSGP, SLHSGP	Developing an EOP/COOP ensures that the Town can effectively respond to disasters and maintain essential functions during emergencies. These plans enhance preparedness, minimize downtime, and promote coordinated recovery efforts, ultimately safeguarding public safety and critical infrastructure.	Low (0-29k)	The Towns will need a dedicated planning team and potentially an outside contractor to facilitate the plan development. Developing a joint or multi-jurisdictional EOP/COOP may provide efficiencies, similar to this MJHM&FMP.	x	x	x	x	x	x	x	x	x	x	x	x	x
10	Develop a volunteer team capable of staffing the EOC when needed.	H	Did not select/ jurisdiction specific project	4	-	DF5	FL5	Emergency Services	EMA	Annually	Town budget	Developing a volunteer team capable of staffing the EOC ensures that the EOC is adequately staffed during emergencies, improving coordination and response efficiency. This team provides a flexible resource to support emergency management operations, enhancing overall preparedness and resilience.	Low (0-29k)	A volunteer coordinator may be necessary to alleviate the emergency manager of this responsibility	x	x	x	x	x	x	x	x	x	x	x	x	

Table 73- Mitigation Action Plan

Action ID	Action Description	Priority (H, M L)		Goals				CRS Category for Flood Actions	Responsible Department	Timeframe	Potential Funding	Benefit	Potential Cost	Technical Feasibility/ Considerations	Hazards												
		Exeter	West Greenwich	Exeter	West Greenwich	Dam failure goal	Flood goal								Severe Thunderstorm	Dam Failure	Flooding	Hurricane/Nor'easter	Severe Winter Weather	Brushfire/Wildfire	Drought	Extreme Temps	Tornado	Earthquake	HAZMAT Incident	Water Quality	Cybersecurity
11	Fix or replace the current dispatch system at the EOC.	H	H	4	2, 3	DF5	FL5	Emergency Services	EMA	Med (3-4)	Town budget, FEMA EOC Grant Program, FEMA HSGP, FEMA First Responder Grants, FEMA BRIC	Fixing or replacing the current dispatch system at the Emergency Operations Center (EOC) ensures more reliable and efficient communication during critical situations, improving response times. It enhances coordination among agencies, leading to better resource allocation and quicker decision-making during emergencies.	Med (30-99k)	Assessing the compatibility of new technology with existing infrastructure and ensuring minimal disruption during the transition. Additionally, budget constraints and the need for staff training on the new system must be carefully evaluated to ensure smooth implementation and long-term effectiveness.	x	x	x	x	x	x	x	x	x	x	x	x	
12	Hire a grant writer/grant manager to enable the Town to effectively apply for grants to implement the mitigation strategy. The Exeter Public Library would also benefit from a grant writer/grant manager	H	H	1, 2, 3, 4	1, 2, 3	DF5	FL5	Public Information	EMA	Short (1-2)	Town budget	Hiring a grant writer ensures a professional, well-crafted application that increases the chances of securing funding to implement the Town's mitigation strategy	Med (30-99k)	This project is technically feasible as the Towns have a staff member that serves as a grant writer but that is not their primary job role	x	x	x	x	x	x	x	x	x	x	x	x	x
13	Build a town public safety complex and community hub that will house the town hall, police, EMS, primary shelter and supplies. The facility will be able to be utilized as a heating and cooling center.	Did not select/ jurisdiction specific project	H	-	1, 2, 3	DF5	FL5	Emergency Services	EMA, DPW	Long (5+)	Town budget, FEMA HMGP, HUD CDBG, DOJ COPS	Building a town public safety complex and community hub enhances the town's ability to respond to emergencies by consolidating essential services like police, EMS, and shelters in one centralized location. This project improves coordination, increases response efficiency, and provides a safe, accessible space for the community during disasters or other critical situations.	High (100k+)	This project will require outside contractors to build the facility and purchase proper equipment. The Town already owns the land (40+ acres) for the complex.	x	x	x	x	x	x	x	x	x	x	x	x	
14	Install back-up generators at all critical facilities.	H	H	2, 4	2, 3	DF2	FL2	Emergency Services	EMA, DPW	Med (3-4)	Town budget, FEMA HMGP, FEMA EMPG, IIJA EECBG	This project ensures uninterrupted operation of critical facilities during power outages, enhancing community resilience and emergency response capabilities.	Med (30-99k)	Evaluating the power requirements of each facility, ensuring proper installation of generators with adequate fuel supply, and integrating the generators into existing infrastructure for seamless operation during outages.	x	x	x	x	x	x	x	x	x	x	x	x	
15	Create a photo and condition inventory of all critical facilities to document current (pre-disaster) conditions and contents to aid in facility repair after a disaster event. Update the condition inventory annually and after a natural hazard event that causes damage.	H	H	4	2, 3	DF4	FL4	Emergency Services	EMA, DPW	Short (1-2)	Town budget, FEMA EMPG, FEMA CISA, NIST, EDA B2S, EDA RIS, EDA EDI	This project would aid in documentation of pre-existing conditions in the event of a disaster to streamline FEMA applications and damage assessments.	Med (30-99k)	This project is technically feasible as the Town has existing photos of facilities in their GIS database. Another useful tool to implement this project would be the Orion Mobile Damage Assessment tool from Futurity IT, RIEMA's new Crisis Track program, or similar.	x	x	x	x	x	x	x	x	x	x	x	x	x
16	Encourage utility companies to bury existing powerlines to reduce power outages caused by downed power lines and required buried power lines in new developments. Pursue	L	Did not select/ jurisdiction specific project	1, 2, 4	-	-	-	-	Planning	Annually	Town budget	Buried power lines reduce the likelihood of a power outage due to high winds, falling trees, heavy snow/ice, etc.	Low (0-29k)	As the utility companies own the powerlines, they may not be willing to spend the money to bury them. Adopting an	x			x	x			x	x				

Table 73- Mitigation Action Plan

Action ID	Action Description	Priority (H, M L): Exeter	Priority (H, M L): West Greenwich	Goals: Exeter	Goals: West Greenwich	Goals: Dam failure goal	Goals: Flood goal	CRS Category for Flood Actions	Responsible Department	Timeframe	Potential Funding	Benefit	Potential Cost	Technical Feasibility/ Considerations	Hazards: Severe Thunderstorm	Hazards: Dam Failure	Hazards: Flooding	Hazards: Hurricane/Nor'easter	Hazards: Severe Winter Weather	Hazards: Brushfire/Wildfire	Hazards: Drought	Hazards: Extreme Temps	Hazards: Tornado	Hazards: Earthquake	Hazards: HAZMAT Incident	Hazards: Water Quality	Hazards: Cybersecurity
	potential ordinance to require buried powerlines for commercial developments.													ordinance will require Town and public support, and may not be feasible.													
17	Work with RIDOT to rebuild substandard bridges to safely accommodate the weight of a firetruck, permitting the first responders to reach the entire community. West Greenwich has concerns on the Camp Huntee bridge and its ability to accommodate emergency response equipment. Exeter has concerns on the Mt. Tom Bridge in Exeter and its associated drainage system. The bridge is in need of guardrail repair.	H	H	1, 2, 4	1, 2, 3	DF2	FL2	Emergency Services	DPW	Long (5+)	Town budget, FEMA HMGP, USDOT HSIP, USDOT Bridge Investment Program, RIDOT TIP, RIIB MRP, RIIB MRBRF	This project aims to ensure that first responders can reach all areas of the community during emergencies, improving response times and overall safety. This project enhances public safety by providing reliable access for emergency services, reducing the risk of damage or loss of life during critical situations.	High (100k+)	This project is technically feasible with proper funding and coordination with RIDOT	x	x	x	x	x	x	x	x	x	x			
18	Encourage residents registered with the state special needs registry for vulnerable populations to regularly update their contact and needs information.	L	L	5	4	DF1	FL1	Public Information	EMA	Annually	Town budget	Encouraging residents to regularly update their contact and needs information on the state special needs registry ensures that emergency responders can provide timely and tailored assistance during disasters, improving safety for vulnerable populations.	Low (0-29k)	This project is technically feasible through existing contact methods such as CodeRed, a notification in a tax bill, as well as educational opportunities at Town events and on the Town's website	x	x	x	x	x	x	x	x	x	x	x	x	
19	Conduct school programs to raise student awareness of hazards, safety, preparedness and prevention.	M	M	5	4	DF1	FL1	Public Information	EMA	Annually	Town budget, RIEF ECP	This project empowers students with essential knowledge about hazards, safety, and preparedness, helping them make informed decisions and respond effectively in emergencies. By raising awareness, it fosters a safer school environment and promotes a culture of prevention within the community.	Low (0-29k)	This project is technically feasible with educational material and coordinating with the schools in the Town	x	x	x	x	x	x	x	x	x	x	x	x	x
20	Add a hazard information tab to the Town website where residents can find all information related to emergency preparedness and communication. Key information to include: - Final FEMA-approved HMP - GIS hazard maps, including current FEMA FIRMs layer - Emergency resource guide for residents that explains appropriate responses at the household scale and provides contact information to help ensure residents receive the care and services required before, during, and after major events - Provide information to residents and recreators regarding the hazards of cyanobacteria and PFAS. - Communicate results of RIDEM	L	L	5	4	DF1	FL1	Public Information	EMA, IT	Short (1-2)	Town budget	This low-cost project provides the residents a central location to find information related to hazard mitigation, emergency preparedness, and a link to the final HM&FMP for reference.	Low (0-29k)	This project is technically feasible with existing Town IT resources, and widely available public educational documents/information. Some information/hazard information may need to be tailored to the community.	x	x	x	x	x	x	x	x	x	x	x	x	x

Table 73- Mitigation Action Plan

		Priority (H, M L)		Goals											Hazards												
Action ID	**Action Description**	Exeter	West Greenwich	Exeter	West Greenwich	Dam failure goal	Flood goal	CRS Category for Flood Actions	Responsible Department	Timeframe	Potential Funding	Benefit	Potential Cost	Technical Feasibility/ Considerations	Severe Thunderstorm	Dam Failure	Flooding	Hurricane/Nor'easter	Severe Winter Weather	Brushfire/Wildfire	Drought	Extreme Temps	Tornado	Earthquake	HAZMAT Incident	Water Quality	Cybersecurity
	testing to public on cyanobacteria blooms. - Municipal and personal mitigation actions for PFAS contamination in drinking water - Establish a self-reporting mechanism to better understand how often and where private drinking water wells are drying. - Provide information to residents for how to report hazard-related incidents and conditions to Town officials. This will include the development of a process to receive and disseminate the information to the designated Town officials. - Evacuation routes and emergency shelters - Distribute information about the need for and items included in a go-bag - Secure and disseminate information about pest and pathogen damage on tree species coupled with information on how to best control and manage the results of outbreaks. - Increase public awareness of NFIP and CRS and benefits of purchasing flood insurance by adding relevant information to the proposed hazard tab on the Town's website.																										
21	In partnership with environmental organizations, establish educational opportunities for residents and students covering natural hazards, natural resource management, environmental stewardship, and mitigation.	L	L	5	4	DF1	FL1	Public Information	Planning	Short (1-2)	Town budget, American Red Cross, RIEMA, RIEF ECP, HSPTAP EPA EJSG	Establishing educational opportunities in partnership with environmental organizations empowers residents and students to better understand natural hazards, resource management, and the importance of environmental stewardship. This knowledge fosters a more resilient community, encouraging proactive participation in hazard mitigation and sustainable practices for long-term environmental protection.	Low (0-29k)	This project is technically feasible with existing Town resources/staff	x	x	x	x	x	x	x	x	x	x	x	x	x
22	Examine Community Resilience Building Summary of Findings from neighboring municipalities to find areas of common interest, shared value, and capacity/ availability to begin creating regional partnerships and networks to collaboratively pursue mitigation projects that cross municipal boundaries.	L	L	2, 3	2, 3	DF5	FL5	Public Information	Planning, EMA	Short (1-2)	Town budget, RIFCG	This project will identify shared priorities and resources among neighboring municipalities, fostering stronger regional collaboration on mitigation efforts. By building partnerships across jurisdictions, it enhances community resilience through coordinated strategies, resource sharing, and more effective mitigation projects.	Low (0-29k)	This project is technically feasible as the CRB Summary of Findings are publicly available on the RIIB MRP website	x	x	x	x	x	x	x	x	x	x	x	x	x

Table 73- Mitigation Action Plan

		Priority (H, M L)		Goals											Hazards												
Action ID	Action Description	Exeter	West Greenwich	Exeter	West Greenwich	Dam failure goal	Flood goal	CRS Category for Flood Actions	Responsible Department	Timeframe	Potential Funding	Benefit	Potential Cost	Technical Feasibility/ Considerations	Severe Thunderstorm	Dam Failure	Flooding	Hurricane/Nor'easter	Severe Winter Weather	Brushfire/Wildfire	Drought	Extreme Temps	Tornado	Earthquake	HAZMAT Incident	Water Quality	Cybersecurity
23	After acquiring a generator, install solar panels on the public library so that it may continue to serve as a community critical facility in emergency situations.	H	Did not select/ jurisdiction specific project	2, 4	-	DF2	FL2	Emergency Services	DPW	Short (1-2)	Town budget, FEMA HMGP, DOE SETO, DOE EECBG, DOE SEP, Rhode Island Commerce REF, RIIB EBF	Installing solar panels on the public library ensures a reliable, sustainable power source, allowing it to remain operational as a critical community facility during emergencies. This initiative enhances resilience by reducing dependence on the grid, ensuring continued access to services and resources when most needed.	Med (30-99k)	This project is technically feasible with funding for a generator and the solar panels. Solar panels are common in Rhode Island and there are many experience contractors to correctly install them	x	x	x	x	x	x	x	x	x	x	x	x	
24	Improve municipal environmental review and oversight of development-related permitting.	H	Did not select/ jurisdiction specific project	2, 3	-	DF5	FL5	Preventive	Planning	Annually	Town budget	Improving municipal environmental review and oversight of development-related permitting ensures that construction is directed away from known hazard-prone areas, such as flood zones. This helps reduce future risks to both people and property while promoting safer development practices in identified hazard locations. This may also increase engineering requirements on the facility, further reducing potential impacts from hazard events.	Low (0-29k)	Town official and public support would likely be needed to improve this review process. An ordinance may need to be enacted	x	x	x	x	x	x	x	x	x	x	x	x	
25	Identify, map, and prioritize key conservation gaps in areas with high ecological connectivity, such as stream corridors and contiguous forest blocks. These areas reduce flood impacts, extreme heat, protect water quality, and preserve essential plant and animal habitat. Implement stream and floodplain restoration projects to improve flood resilience, water quality and sediment load, ecosystem health, and aquatic habitat.	H	M	3	2, 3	-	FL4	Preventive	Planning	Med (3-4)	Town budget, EPA Section 319 Nonpoint Source Pollution Program, USDA NCRS RCPP, RIDEM Water Quality Protection Grant Program, RIIB MRP, RIIB Green Economy Fund, RICRMC Coastal and Estuary Habitat Restoration Program and Trust Fund, WSCG	This project would allow for targeted interventions that enhance natural resources, improving flood resilience and water quality. By focusing on stream corridors and contiguous forest blocks, the project helps protect critical habitats for plant and animal species, while also mitigating the effects of extreme heat and flooding. Implementing stream and floodplain restoration projects further strengthens ecosystem health, reduces sediment load, and improves aquatic habitats, benefiting both the environment and the Town.	Med (30-99k)	This project is technically feasible with proper funding, but will require coordination among multiple stakeholders, and potential challenges in acquiring land or access rights for restoration and conservation activities.			x					x				x	
26	Conduct fluvial geomorphic assessments of un-assessed rivers to identify and prioritize river corridor protection and restoration opportunities.	L	Did not select/ jurisdiction specific project	3	-	-	FL4	Preventive	Planning	Long (5+)	Town budget, EPA Section 319 Nonpoint Source Program, USDA NRCS EQIP, RIDEM CWSRF, RIDEM NPS, RIIB Resilient Rhode Island Fund	This project will provide critical data to identify and prioritize areas of river corridors that are most vulnerable or in need of restoration, enhancing ecological health and resilience. By conducting fluvial geomorphic assessments, communities can better target protection efforts, ensuring more sustainable management of river ecosystems and flood risk reduction.	Med (30-99k)	This project will likely require an outside contractor/engineer to complete the assessment(s)			x										
27	Adopt or review conservation development ordinances to prioritize construction outside of hazard zones while also maintaining contiguous green space or wildlife habitat within a property.	H	H	3	2, 3	DF4	FL4	Preventive	Planning	Annually	Town budget, ServeRI Americorps State "Formula" Grants	This ordinance(s) aims to ensure that construction is directed away from hazard zones, reducing the risk to properties and residents in the event of natural disasters. At the same time, it preserves contiguous green spaces and wildlife habitats, promoting environmental sustainability and biodiversity.	Low (0-29k)	Town official and public support would be needed to adopt the ordinance	x	x	x	x	x	x	x	x	x	x	x	x	

Table 73- Mitigation Action Plan

		Priority (H, M L)		Goals											Hazards												
Action ID	Action Description	Exeter	West Greenwich	Exeter	West Greenwich	Dam failure goal	Flood goal	CRS Category for Flood Actions	Responsible Department	Timeframe	Potential Funding	Benefit	Potential Cost	Technical Feasibility/ Considerations	Severe Thunderstorm	Dam Failure	Flooding	Hurricane/Nor'easter	Severe Winter Weather	Brushfire/Wildfire	Drought	Extreme Temps	Tornado	Earthquake	HAZMAT Incident	Water Quality	Cybersecurity
28	Explore the need for profiling space weather (solar flares) in the 2030 HMP update.	L	L	2	3	-	-	-	EMA	Med (3-4)	Town budget	Solar flares are intense bursts of energy and radiation released from the Sun's surface and outer atmosphere and can affect space weather, potentially impacting satellite communications, navigation systems, and power grids on Earth. Solar flares are not yet a significant concern for Exeter and West Greenwich, but the Planning Team will reevaluate for the 2030 HMP Update.	Low (0-29k)	Documented impacts/increased frequency of events should be considered before determining if solar flares pose a threat to the Planning Area													
29	Ensure all emergency response staff have recommended FEMA ICS and EOC training.	H	H	4	2, 3	DF5	FL5	Emergency Services	EMA	Short (1-2)	Town budget	Ensuring all emergency response staff have recommended FEMA ICS and EOC training enhances coordination, improves response efficiency, and strengthens overall disaster management effectiveness.	Low (0-29k)	This project is technically feasible with the purchase of the training and staff dedicated to learning the material. Regular scenario training should be implement	x	x	x	x	x	x	x	x	x	x	x	x	x
30	Hire a volunteer coordinator(s) for Exeter EMA and Social Services to manage organized and spontaneous volunteers during emergency operations.	H	Did not select/ jurisdiction specific project	4	-	DF5	FL5	Emergency Services	EMA	Short (1-2)	Town budget	Hiring a volunteer coordinator will relieve the emergency manager of the responsibility of managing volunteers, allowing them to focus on other critical tasks during emergency operations. This ensures that both organized and spontaneous volunteers are effectively coordinated, improving response efficiency and maximizing the impact of volunteer efforts.	Low (0-29k)	If this is a new position, a salary may need to be added to the Town budget	x	x	x	x	x	x	x	x	x	x	x	x	x
31	Draft an evacuation and shelter plan. Include information on procedures for livestock and pets.	H	H	4	2, 3	DF5	FL5	Emergency Services	EMA, Planning	Short (1-2)	Town budget, FEMA EMPG, FEMA HSGP	Drafting an evacuation and shelter plan ensures that the Town is well-prepared to respond effectively during emergencies, minimizing risk to life and property. It also helps streamline coordination among local agencies, ensuring a faster and more efficient evacuation process during disasters.	Low (0-29k)	This project may require an outside contractor to facilitate the plan development	x	x	x	x	x	x	x	x	x	x	x		
32	Draft a debris management plan.	H	M	4	2, 3	DF5	FL5	Emergency Services	EMA, Planning	Short (1-2)	Town budget, FEMA/RIEMA HMGP, BRIC	Debris management plans are an essential disaster management tool. Focused and coordinated planning enables effective damage abatement and ensures proper attention is assigned to reduce losses, damage, and materials management. The Town does not have an existing plan. The plan will ensure that costs are controlled in the event of a disaster requiring debris management.	Med (30-99k)	This action is feasible with limited fund expenditures but may require a contractor to update the plan.	x	x	x	x	x	x	x	x	x	x	x		
33	Conduct a comprehensive inventory and condition assessment of all roads, bridges, and culverts	H	M	2	2, 3	DF2	FL2	Structural Projects	DPW	Med (3-4)	Town budget	This project would create an updated action list for specific roads, bridges, and culverts are in need of repair/replacement. Grant applications can be focused on those in need on immediate repair. Repairing roads, bridges, and culverts allows safe and timely emergency response and reduces	Low (0-29k)	This project is technically feasible with existing town resources but may need an outside contractor to assist in the inspections. Regularly updating the inventory would be necessary	x	x	x	x	x	x	x	x	x	x	x		

Table 73- Mitigation Action Plan

		Priority (H, M L)		Goals											Hazards												
Action ID	**Action Description**	Exeter	West Greenwich	Exeter	West Greenwich	Dam failure goal	Flood goal	CRS Category for Flood Actions	Responsible Department	Timeframe	Potential Funding	Benefit	Potential Cost	Technical Feasibility/ Considerations	Severe Thunderstorm	Dam Failure	Flooding	Hurricane/Nor'easter	Severe Winter Weather	Brushfire/Wildfire	Drought	Extreme Temps	Tornado	Earthquake	HAZMAT Incident	Water Quality	Cybersecurity
												potential of resultant road/bridge/culvert failure due to a hazard event															
34	Work with dam owners to pass their next inspection with the goal to achieve Satisfactory condition ratings.	H	L	1, 2, 3	1, 2, 3	DF3	FL3	Preventive	EMA, Planning	Med (3-4)	Town budget	Satisfactory condition ratings means that no existing or potential dam safety deficiencies are recognized. As no deficiencies are recognized, the potential of a dam failure due to poor maintenance is reduced.	Low (0-29k)	While the Town does not have authority over dams they do no own, offering support to dam owners who do not meet the Satisfactory condition rating may assist them with necessary repairs to achieve that rating during their next inspection. This project does not aim to take the responsibility from the dam owner, but offers support to the dam owner		x	x										
35	Obtain funding for and implement dam removal projects, where determined technically feasible.	H	Did not select/ jurisdiction specific project	1, 2, 3	-	DF4	FL3	Structural Projects	EMA, Planning	Long (5+)	Town budget, FEMA Dam Safety Program, FEMA HMGP, FEMA FMA, RIDEM BWRF, USDA NCRS CIG, SNEP Watershed Implementation Grant, IIJA Dam Removal Fund, USACE WRDA, RICRMC Coastal and Estuary Habitat Restoration Program and Trust Fund, FEMA Ecosystem Restoration	By removing obsolete or unsafe dams, this project enhances natural water flow, improves ecosystem health, and mitigates long-term hazards associated with aging infrastructure. Removing an obsolete dam eliminates future potential dam failure and resultant impacts	High (100k+)	This project may be technically feasible but will require feasibility studies/engineering to determine the feasibility of removing a dam		x	x										
36	Notify property owners that they are located in an inundation area and provide resources on the Town website for notification if a dam were to fail.	H	M	1, 5	1, 2, 3, 4	DF1	FL1	Public Information	EMA	Short (1-2)	Town budget	Notifying property owners in inundation areas and providing resources on the Town website ensures residents are aware of potential flood risks and can take appropriate action in the event of a dam failure. This proactive communication enhances public safety, preparedness, and timely response to protect lives and property.	Low (0-29k)	This project is technically feasible with known inundation areas, properties affected, and public outreach activities. Ensuring regular notification should be considered.		x	x										
37	Buyout homes that are in SFHAs or dam inundation areas, with focus on repetitive loss properties.	L	L	1	1, 2, 3	DF2	FL2	Property Protection	EMA, Planning	Long (5+)	Town budget, FEMA HMGP, FEMA FMA, HUD CDBG, RIEMA CDBG	Buying out homes in a flood area reduces future risk to residents by relocating them to less hazard prone areas, while also helping to restore and preserve the floodplain for natural mitigation. Ensuring that the bought-out land is converted to	High (100k+)	This project is technically feasible with proper funding but would ultimately require community support and homeowners willingness		x	x										

Table 73- Mitigation Action Plan

		Priority (H, M L)		Goals											Hazards												
Action ID	Action Description	Exeter	West Greenwich	Exeter	West Greenwich	Dam failure goal	Flood goal	CRS Category for Flood Actions	Responsible Department	Timeframe	Potential Funding	Benefit	Potential Cost	Technical Feasibility/ Considerations	Severe Thunderstorm	Dam Failure	Flooding	Hurricane/Nor'easter	Severe Winter Weather	Brushfire/Wildfire	Drought	Extreme Temps	Tornado	Earthquake	HAZMAT Incident	Water Quality	Cybersecurity
												perpetual green/open space ensures that no future development is allowed in a flood area		to be bought out/relocated. In Exeter, some identified properties are abandoned and were not purchased at tax auction. The Town must address outstanding back taxes and potential court fees before these properties can be acquired as open space.													
38	Upgrade existing culverts and install larger culverts in areas of frequent flooding. When retrofitting, repairing, or replacing culverts, ensure that they are designed in accordance with best management practices that allow for wildlife and fish passage, where applicable. In areas of high impermeability, integrate stormwater BMPs to reduce localized flooding Exeter: Stony Lane and Bates School House Road culverts West Greenwich: Hazard Mill Road, Falls River Road, Plain Meeting House Road culverts	H	H	1, 2, 3	1, 2, 3	-	FL2	Preventive	DPW	Med (3-4)	Town budget, FEMA HMGP, DOT ER, USFWS National Fish Passage Program, RIIB MRBRF, RIIB MRP, RIDEM BWRF, RIDEM National Culvert Removal, Replacement, and Restoration Grant Program, RIDEM Culvert Replacement Municipal Assistance Grant Program, FEMA Small Flood Control	Upgrading and installing culverts increasing the capacity of water during heavy rain/flood events. Increasing size also reducing the potential of the culvert clogging due to debris and overtopping nearby roads, leading to washout, erosion, and travel disruptions	High (100k+)	This project is ongoing, demonstrating its feasibility			x										
39	Investigate the benefits of the USDA NRCS operations flood mitigation program (PL 566 Program) to model watersheds for flood protection.	H	L	1, 2, 3	1, 2, 3	-	FL4	Preventive	EMA, Planning	Annually	Town budget	Joining the USDA NRCS Operations Flood Mitigation Program (PL 566 Program) allows communities to receive funding and technical assistance to implement flood control measures that reduce the risk of flooding and protect infrastructure. The program helps model watersheds for flood protection, providing valuable data to better understand flood patterns, improve resilience, and plan for long-term mitigation strategies.	Low (0-29k)	If the Town decides to participate in the program, an application/proposal is required through the USDA NRCS			x										
40	Install additional storm drains/catch basins in areas that frequently flood and pool water, leading to street flooding and erosion	H	H	1, 2, 3	1, 2, 3	-	FL2	Structural Projects	DPW	Med (3-4)	Town budget, FEMA HMGP, RIDOT, STIP, RIDEM Ocean State Climate Adaptation and Resilience Fund	Additional storm drains/catch basins allow for rain/flood waters to collect in designated areas and avoids overtopping of the road and eventual erosion.	High (100k+)	This project is technically feasible with proper funding.			x										
41	Work with RIDEM to review and update high-water flood assessments of bridges with an	H	H	2	2, 3	-	FL4	Preventive	DPW	Long (5+)	Town budget, HUD CDBG, RIIB MRBRF	This project aims to ensure that the most vulnerable structures are accurately identified and prioritized for mitigation measures. This proactive approach helps	High (100k+)	Coordination with RIDEM			x										

Table 73- Mitigation Action Plan

		Priority (H, M L)		Goals											Hazards												
Action ID	Action Description	Exeter	West Greenwich	Exeter	West Greenwich	Dam failure goal	Flood goal	CRS Category for Flood Actions	Responsible Department	Timeframe	Potential Funding	Benefit	Potential Cost	Technical Feasibility/ Considerations	Severe Thunderstorm	Dam Failure	Flooding	Hurricane/Nor'easter	Severe Winter Weather	Brushfire/Wildfire	Drought	Extreme Temps	Tornado	Earthquake	HAZMAT Incident	Water Quality	Cybersecurity
	emphasis on structures at highest risk of impacts from flood waters.											protect critical infrastructure from flood damage, reducing the potential of travel disruptions and increases emergency response capabilities.															
42	Investigate Town and public interest in participating in the CRS program. If interested, coordinate with the State Floodplain Coordinator to apply.	H	L	1	1, 2, 3	-	FL4	Preventive	EMA, Planning	Short (1-2)	Town budget	The CRS program can lead to reduced flood insurance premiums for property owners within the community by earning credit for implementing floodplain management practices. Additionally, it enhances community resilience by encouraging proactive measures that reduce flood risk and improve overall preparedness.	Low (0-29k)	The Town will likely need to strengthen floodplain/development regulations, which the Town and or public may not be supportive of			x										
43	Install monitoring equipment on dams/rivers/lakes to remotely monitor water levels during heavy rain and other hazard events.	H	Did not select/ jurisdiction specific project	1, 2, 3	-	DF4	FL4	Preventive	DPW	Med (3-4)	Town budget, FEMA HMGP, FEMA FMA, EPA WIFIA, NOAA NWQMN, NOAA NIDIS, USACE FPMS, USGS WRRA, USGS NAWQA	Installing monitoring equipment on dams, rivers, and lakes to remotely track water levels enhances flood preparedness, enables timely response during hazardous events, and improves overall community resilience. The equipment may be able to remotely notify a Town official of an event to allow the Town to promptly notify residents and take action to prevent damages	Med (30-99k)	This project is technically feasible with proper funding and equipment. USGS has existing equipment in West Greenwich.		x	x										
44	Assess critical facilities for snow load capacity. Retrofit any facility that does not meet recommended snow load of 30 pounds/sq foot	M	Did not select/ jurisdiction specific project	2	-	-	-	-	DPW	Short (1-2)	Town budget, FEMA HMGP, HUD CDBG, RIEMA CDBG	Assessing and retrofitting any critical facility that does not meet recommend snow load capacity reduces the potential of roof failure/collapse and resultant damages and potential loss of life	Med (30-99k)	This project will likely require an outside contractor/engineer to complete the assessment and install new roofs				x	x								
45	Explore benefits of joining the Firewise program.	H	H	1, 2, 3, 5	1, 2, 3, 4	-	-	-	EMA	Short (1-2)	Town budget	Joining the Firewise program helps communities reduce wildfire risk through education, improved preparedness, and collaborative efforts to create safer, fire-resistant environments.	Low (0-29k)	Firewise USA has a multi-step path for a community to be a Firewise USA Site. The Towns will need to create a board/committee of volunteers and identify a leader. The board/committee will collaborate with a local wildfire expert to complete a community wildfire risk assessment and complete annual education activities.						x							
46	Identify vegetation/fuel types, previous burn areas, areas to mitigate, grant funding specifically to reduce/remove fuels in high wildfire/brushfire areas	H	H	1, 2, 3	1, 2, 3	-	-	-	Planning	Short (1-2)	Town budget, BLM and NFP Wildland Fire Management Program, RIDEM Forest Stewardship Program, RIIB MRP, RIIB Green Economy Fund, RIRRC Fire Support Grants	The Town knows the areas of high fire potential, but a more comprehensive study of vegetation types and fuel availability has not been completed. This project aims to close those data gaps to strategically target high fire risk areas.	Low (0-29k)	This project is technically feasible, but will likely require an contractor and stakeholder support						x							

Table 73- Mitigation Action Plan

		Priority (H, M L)		Goals											Hazards												
Action ID	**Action Description**	Exeter	West Greenwich	Exeter	West Greenwich	Dam failure goal	Flood goal	CRS Category for Flood Actions	Responsible Department	Timeframe	Potential Funding	Benefit	Potential Cost	Technical Feasibility/ Considerations	Severe Thunderstorm	Dam Failure	Flooding	Hurricane/Nor'easter	Severe Winter Weather	Brushfire/Wildfire	Drought	Extreme Temps	Tornado	Earthquake	HAZMAT Incident	Water Quality	Cybersecurity
47	Convene a forum of large property owners (including the State of Rhode Island, land trusts, NGOs, and private land owners) to discuss ongoing fire mitigation operations as well as best preventative fire management practices.	H	H	1, 2, 3	1, 2, 3	-	-	-	Fire Dept	Short (1-2)	Town budget, USFS CWDGP	This project aims to foster collaboration and knowledge-sharing between diverse stakeholders, enhancing the effectiveness of fire mitigation efforts across the region. This collective dialogue promotes the adoption of best preventative fire management practices, leading to more coordinated and comprehensive fire risk reduction strategies.	Low (0-29k)	Coordination among stakeholders will be necessary for this project to be effective						x							
48	Train staff and regularly test equipment involved in warning systems. Develop an exercise program focused on fire response.	H	H	4	1, 2, 3	-	-	-	EMA, Fire Dept	Annually	Town budget, FEMA AFG	Regularly training staff and warning systems ensures that staff know the procedures and are comfortable with them when needed and ensures that the warning system is function for when there is actually an emergency. As fire is a large concern for the Town, regularly practicing emergency protocol will aid in future disaster response- ultimately saving time, money, and lives	Low (0-29k)	This project is technically feasible with dedication from Town staff to participate in the trainings.						x							
49	Develop and implement a Forestry Management Plan.	H	H	1, 2, 3	1, 2, 3	-	-	-	EMA, Fire Dept	Short (1-2)	Town budget, USFS CFAP, USDA NCRS	A Forestry Management Plan aims to proactively manage local forests, reduce fire hazards, enhance biodiversity, and protect natural resources while ensuring long-term environmental and economic sustainability.	Med (30-99k)	This project will require an outside contractor to develop the plan and coordination with local universities and non-profits						x							
50	Purchase cameras and a software with Artificial Intelligence (AI) capability to detect fires in forested areas.	H	H	1, 2, 3	1, 2, 3	-	-	-	EMA, Fire Dept	Short (1-2)	Town budget, FEMA HMGP, USFS Research and Development Grants, EPA Environment tall Technology Program, FEMA AFG, FEMA FPSP	AI cameras for wildfires use artificial intelligence (AI) to detect smoke and other signs of fires. These cameras can help fire departments respond to wildfires more quickly and effectively.	High (100k+)	The cameras, similar to security cameras, could be potentially installed on existing infrastructure (radio towers, etc.). A third party software is able to detect anomalies, such as smoke, to alert firefighters of a potential fire. This technology is already created and used by other municipalities across the country.						x							
51	Identify and prepare alternate well locations/well tie-ins to support the community in times of emergency and low water availability.	H	H	1, 2, 3	1, 2, 3	DF2	FL2	Property Protection	DPW	Med (3-4)	Town budget, FEMA HMGP, FEMA EMPG	West Greenwich has a well at their Town Hall that supplies water for several nearby houses. The Town has additional wells in the woods on their 40 acre property. Creating a tie-in system to the main well will create redundancy for water supply. This project aims to ensure the community has reliable access to water during emergencies or periods of low availability. This proactive planning helps maintain public health and safety by ensuring a continuous water supply in critical situations.	Med (30-99k)	This project will likely require an outside contractor	x	x	x	x	x	x	x	x	x	x	x	x	

Table 73- Mitigation Action Plan

		Priority (H, M L)		Goals											Hazards												
Action ID	**Action Description**	Exeter	West Greenwich	Exeter	West Greenwich	Dam failure goal	Flood goal	CRS Category for Flood Actions	Responsible Department	Timeframe	Potential Funding	Benefit	Potential Cost	Technical Feasibility/ Considerations	Severe Thunderstorm	Dam Failure	Flooding	Hurricane/Nor'easter	Severe Winter Weather	Brushfire/Wildfire	Drought	Extreme Temps	Tornado	Earthquake	HAZMAT Incident	Water Quality	Cybersecurity
52	Manage tree canopies, especially in areas with large amounts of pavement and other impervious surfaces, to increase shade cover over surfaces which absorb and radiate heat.	L	L	1, 2, 3	1, 2, 3	-	-	-	DPW	Annually	Town budget, USFS Urban and Community Forestry Program, EPA UHI, DOT TAP, RIDEM Urban and Community Forestry Program, RIIB Rhode Island Green Economy Fund, RIIB MRP, RIDEM Tree Equity RI Grant Program	Managing tree canopies in areas with extensive pavement and impervious surfaces helps reduce the urban heat island effect by increasing shade and lowering temperatures. This not only improves comfort and public health but also reduces energy consumption by decreasing the demand for air conditioning in nearby buildings.	Med (30-99k)	Managing tree canopies, especially in urban environments, requires an ongoing commitment to irrigation, pruning, and pest management, particularly in areas where natural rainfall may be insufficient. Ensuring reliable water sources and the resources to maintain the trees is necessary for the project's success.								x					
53	Establish community heating and cooling centers to provide relief for those who do not have access to heating or cooling on their own.	H	H	1, 2, 3	1, 2, 3	-	-	-	EMA	Med (3-4)	Town budget, DHHS LIHEAP, ACF CSBG, FEMA HMGP, RIIB MRP, HUD CDBG/CPF	Heating and cooling centers provide essential relief during extreme weather conditions, ensuring public safety and well-being by offering a safe environment for individuals to stay comfortable and avoid health risks.	High (100k+)	Ensuring that the cooling or heating centers are easily accessible to vulnerable populations, such as the elderly or those with disabilities, may be challenging if suitable locations are not available or if transportation options are inadequate; existing buildings may lack the necessary electrical capacity, ventilation, or HVAC systems to support the high energy demand and ensure effective cooling or heating for large groups of people during extreme weather events.								x					
54	Ensure all public buildings clearly display signs leading to tornado shelters or the safest part of the building in the event of a tornado.	H	M	1, 4, 5	1, 2, 3, 4	-	-	-	DPW	Short (1-2)	Town budget, FEMA HMGP, FEMA EMPG, HUD CDBG	While tornadoes are not too common in Rhode Island, historical events have occurred and residents are not likely familiar with procedures in the event of a tornado. This low cost project increases community awareness of tornado hazards and overall preparedness in the event of a tornado	Low (0-29k)	This project is technically feasible with the purchase of the signs. Some additional assistance may be required to determine the safest part of each building									x				
55	Work with school district to plan regular tornado drills.	M	M	1, 5	1, 2, 3, 4	-	-	-	EMA	Annually	Town budget	Planning regular tornado drills with the school district helps ensure that students and staff are well-prepared to respond quickly and safely in the event of a tornado emergency.	Low (0-29k)	This project is technically feasible with existing Town resources									x				
56	Install non-structural restraints for large furniture such as bookcases, filing cabinets, heavy televisions, and appliances in critical facilities to prevent toppling damage and resultant injuries to small children, elderly, and pets.	L	L	1, 2	1, 2, 3	-	-	-	DPW	Short (1-2)	Town budget, HUD CDBG, Earthquake Engineering Research Institute Grant Programs	Non-structural seismic restraints, or earthquake straps, are a low-cost and effective mitigation tool to prevent heavy/large furniture from toppling during an earthquake/high winds/tornado. A similar product may already be in place in facilities with children (schools, libraries, etc.) due to safety concerns.	Low (0-29k)	Ensuring that the restraints are secured to a stud or other support increases their effectiveness					x				x	x			

Table 73- Mitigation Action Plan

		Priority (H, M L)		Goals												Hazards											
Action ID	**Action Description**	Exeter	West Greenwich	Exeter	West Greenwich	Dam failure goal	Flood goal	CRS Category for Flood Actions	Responsible Department	Timeframe	Potential Funding	Benefit	Potential Cost	Technical Feasibility/ Considerations	Severe Thunderstorm	Dam Failure	Flooding	Hurricane/Nor'easter	Severe Winter Weather	Brushfire/Wildfire	Drought	Extreme Temps	Tornado	Earthquake	HAZMAT Incident	Water Quality	Cybersecurity
57	Advertise and coordinate household hazardous waste drop-off days.	H	H	3, 5	1, 2, 3, 4	-	FL4	Natural Resource Protection	EMA, DPW	Annually	Town budget	Advertising and coordinating household hazardous waste drop-off days helps ensure safe disposal of dangerous materials, reducing environmental hazards and promoting public health.	Low (0-29k)	This project is technically feasible with existing resources, such as the State of Rhode Island's Eco Depot program			x								x		
58	Install cameras and warning signs where illegal dumping occurs frequently to act as deterrence for future dumping or spills.	H	Did not select/ jurisdiction specific project	3	-	-	FL4	Natural Resource Protection	DPW	Short (1-2)	Town budget, EPA Environmental Justice Grant Program, EPA Brownfields Cleanup Grants, DOJ COPS, Keep America Beautiful Foundation, RIDEM Clean and Green Program, RIIB MRP, RIRRC RI Recycling Grant Program, RIRRC Waste Management and Disposal Programs	Installing cameras and warning signs at frequent illegal dumping sites helps deter future violations by increasing the likelihood of identification and enforcement, while also promoting cleaner, safer environments.	Low (0-29k)	This project is technically feasible with proper funding and enforcement of illegal dumping/spills. The State of Rhode Island is in the process of installing cameras at frequent problem spots that are owned by the State			x								x		
59	Conduct a GIS assessment of gravel roads, topography, and wetlands/waterbodies to determine the best location for interventions to improve the safety of and minimize runoff from gravel roads.	H	Did not select/ jurisdiction specific project	3	-	-	FL4	Natural Resource Protection	Planning	Med (3-4)	Town budget, USDA NRCS Conservation Technical Assistance Program, FHA STBG, EPA CWSRF, RIDEM CWSRF, RIIB MRP, RIDOT TIP	This GIS assessment would help to identify the most effective locations for interventions that improve road safety and reduce environmental impact. This targeted approach ensures that interventions are implemented where they will have the greatest benefit in minimizing runoff and protecting sensitive areas.	Med (30-99k)	An outside contractor may be necessary for this assessment			x									x	
60	Encourage vegetative buffers from all surface water bodies and wetlands to protect water quality and wildlife habitat.	L	L	3	1, 2, 3	-	FL4	Natural Resource Protection	Planning	Annually	Town budget, USDA CRP, USDA EQIP, USDA WHIP, RIIB MRP, RIDEM BWRF, SNEP Watershed Implementation Grants, NFWF Northeast Forests and Rivers Fund	Encouraging vegetative buffers around surface water bodies and wetlands helps improve water quality by filtering pollutants and reducing erosion. These buffers also provide critical wildlife habitat, supporting biodiversity and promoting ecosystem resilience.	Low (0-29k)	Assessing the suitability of land for planting and maintaining vegetative buffers, as well as ensuring proper species selection to optimize water filtration and support local wildlife.			x									x	
61	Repair gravel roads to reduce erosion and runoff during major storm events.	H	Did not select/ jurisdiction specific project	2, 3	-	-	FL2	Natural Resource Protection	DPW	Annually	Town budget, FEMA HMGP, HUD CDBG, EWP NCRS, DOT SS4A, FHA STBG, SHA HSIP, RIDEM	This project helps to stabilize gravel roads, minimizing erosion and reducing harmful runoff during heavy storms. As a result, it protects surrounding ecosystems, improves road longevity, and reduces potential travel disruptions due to washout.	High (100k+)	The Town has this feasibility as DPW regularly maintains gravel roads in Exeter			x									x	
62	Align local IT and Cybersecurity policies and operations with best practices such as the CISA Cybersecurity Performance Goals and the Cyber Essentials Toolkit as	H	H	2	1, 2, 3	-	-	-	IT	Short (1-2)	Town budget, SLCGP	This project strengthens the Town's resilience against cyber threats and ensures the protection of critical infrastructure and sensitive data.	Low (0-29k)	This project is technically feasible with existing Town IT staff. Additional equipment/technology may need to be purchased													x

Table 73- Mitigation Action Plan

Action ID	Action Description	Priority (H, M L) Exeter	Priority (H, M L) West Greenwich	Goals Exeter	Goals West Greenwich	Dam failure goal	Flood goal	CRS Category for Flood Actions	Responsible Department	Timeframe	Potential Funding	Benefit	Potential Cost	Technical Feasibility/ Considerations	Severe Thunderstorm	Dam Failure	Flooding	Hurricane/Nor'easter	Severe Winter Weather	Brushfire/Wildfire	Drought	Extreme Temps	Tornado	Earthquake	HAZMAT Incident	Water Quality	Cybersecurity
	well as the NIST Cybersecurity Framework.													to align polices with the identified best practices													
63	Implement cybersecurity training for all municipal employees and elected officials.	H	H	2, 5	1, 2, 3, 4	-	-	-	IT	Annually	Town budget, FEMA Cybersecurity Grant Program, DHS CISA, SLCGP, NCTE	Implementing cybersecurity training for all municipal employees and elected officials enhances the town's ability to prevent, detect, and respond to cyber threats, ensuring the security of critical systems and sensitive data.	Low (0-29k)	This project would require training materials, regular drills, and dedication from Town staff to complete the training(s). This has already been implemented by the West Greenwich Police Department.													x
64	Perform regular backups of municipal data and store this data in a format that can be recovered in the instance of a cyber attack or other event.	H	H	2	2, 3	-	-	-	IT	Weekly/Monthly	Town budget	Having regular backups of municipal data reduces the potential of a total loss due to a cyberattack or system failure, reducing the need to pay cyberattacks for the data	Low (0-29k)	This project is technically feasible as it is ongoing by the Town.													x
65	Purchase Tesla Powerwall(s) for backup power supply at key Town facilities	H	H	2, 4	2, 3	DF2	FL2	Emergency Services	DPW	Short (1-2)	Town budget, FEMA HMGP, DOE WAP, HUD CDBG, USDA REAP	Installing a Tesla Powerwall(s) enhances disaster preparedness by providing a reliable backup power source during outages caused by natural hazards, ensuring critical systems remain operational. This energy independence reduces dependency on the grid, accelerates recovery efforts, and improves overall community resilience in the face of emergencies.	Med (30-99k)	Ensuring the Tesla Powerwall is appropriately sized to meet the energy demands of the specific facility, factoring in peak loads and the duration of expected power outages, is crucial for optimal performance; proper integration with existing electrical systems, including the need for compatible inverters and circuit breakers, must be considered to ensure seamless switching between grid and battery power during an outage.	x	x	x	x	x	x	x	x	x	x	x		
66	Investigate finding a new tool to replace the OnSolve CodeRed system for emergency notifications	H	Did not select/ jurisdiction specific project	1, 4, 5	-	DF5	FL5	Emergency Services	EMA	Short (1-2)	Town budget, FEMA NGWSGP, FEMA Emergency Notification Systems Grant Program	OnSolve CodeRED is an emergency notification system that enables organizations to send critical alerts and updates to individuals via phone, email, text, and other communication channels. The Town is interested in finding new tool to replace the existing system.	Med (30-99k)	Ensuring the system is user friendly, both for the resident and emergency management staff. Regularly testing notifications to ensure the system is operational before a true emergency.	x	x	x	x	x	x	x	x	x	x	x	x	x
67	Create an Emergency Management Resource Corner at the Public Library and have literature on the RI Special Needs Registry (RISNER), preparedness literature, etc.	H	Did not select/ jurisdiction specific project	4, 5	-	DF1	FL1	Public Information	EMA, Library	Short (1-2)	Town budget, American Red Cross, RIEMA, Champlin Foundation, HUD CDBG	This project aims to improve public education/outreach by offering accessible literature on hazards and emergency preparedness. This initiative helps raise awareness, educate the community on safety protocols, and ensures individuals are better informed and prepared for emergencies. This project would benefit the less technology-inclined members of the community to frequently utilize the Library's resources.	Low (0-29k)	This project is technically feasible with funding for materials and creating the Resource Corner. Ensuring the materials are easy/fun to read will further promote the mission of this project	x	x	x	x	x	x	x	x	x	x	x	x	x

Table 73- Mitigation Action Plan

Action ID	Action Description	Priority (H, M L): Exeter	Priority (H, M L): West Greenwich	Goals: Exeter	Goals: West Greenwich	Goals: Dam failure goal	Goals: Flood goal	CRS Category for Flood Actions	Responsible Department	Timeframe	Potential Funding	Benefit	Potential Cost	Technical Feasibility/ Considerations	Hazards: Severe Thunderstorm	Hazards: Dam Failure	Hazards: Flooding	Hazards: Hurricane/Nor'easter	Hazards: Severe Winter Weather	Hazards: Brushfire/Wildfire	Hazards: Drought	Hazards: Extreme Temps	Hazards: Tornado	Hazards: Earthquake	Hazards: HAZMAT Incident	Hazards: Water Quality	Hazards: Cybersecurity
68	Add a storage room at the Public Library to store emergency supplies to aid in the event of an emergency (food, water, generator, medical supplies, etc.)	H	Did not select/ jurisdiction specific project	1	-	DF2	FL2	Emergency Services	EMA, Library	Short (1-2)	Town budget, FEMA HMGP, HUD CDBG, RI Statewide Planning's Emergency Preparedness Fund	The Public Library may serve as an emergency shelter, heating/cooling center, and community gathering place during an emergency. Having backup supplies ensures that the Library can serve the community during times of need.	Low (0-29k)	Ensuring that supplies are regularly rotated/tested	x	x	x	x	x	x	x	x	x	x	x	x	
69	Add an information kiosk (at the park in Exeter) next to the Public Library (at WG Public Library) with information on hazard areas, emergency preparedness, etc.	H	M	1, 5	1, 2, 3, 4	DF1	FL1	Public Information	EMA, Library	Short (1-2)	Town budget, RIIB MRP, American Red Cross, RIEMA, HUD CDBG	Adding an information kiosk provides the community with easy access to vital emergency preparedness information, enhancing public awareness and safety. It serves as a constant, visible reminder of local hazard risks and preparedness steps, encouraging proactive action in times of need.	Low (0-29k)	This project is technically feasible with proper funding for the kiosk. Regular maintenance may be needed	x	x	x	x	x	x	x	x	x	x	x	x	x
70	Purchase drones to find the sources of flooding problems and train operators to support response and recovery efforts.	H	H	1, 2, 3, 4	1, 2, 3	-	FL5	Emergency Services	DPW	Short (1-2)	Town budget, FEMA HMGP, FEMA FMA, DHS HSGP	Purchasing drones allows for efficient, real-time data collection of flood-prone areas, helping identify the specific sources of flooding. This technology enhances flood management efforts and enables quicker, more targeted mitigation strategies to prevent future damage.	Low (0-29k)	The drone operator will need to complete training to become a certified drone pilot			x										
71	Pursue funding for an engineering study to identify stormwater problem areas	H	M	1, 2, 3	1, 2, 3	-	FL4	Preventive	Planning	Long (5+)	Town budget, FEMA HMGP, FEMA FMA, EPA CWSRF, USDA NRCS RCPP, RIIB Clean Water State Revolving Fund, RIDEM Stormwater Management Grants	Securing funding for an engineering study allows for the identification of key stormwater issues in the community, facilitating more effective solutions. This proactive approach ensures that infrastructure improvements can be made before stormwater problems worsen or lead to flooding.	Med (30-99k)	This project will require an outside engineering contractor			x										
72	Hire a new DPW staff member to file RIDEM permits to fix culverts and to integrate new stormwater measures (BMPs)	H	Did not select/ jurisdiction specific project	2	-	DF5	FL5	Preventive	DPW	Short (1-2)	Town budget	Adding a staff member ensures that necessary permits for stormwater infrastructure improvements, like fixing culverts, are filed in a timely manner. This would increase the number of permits/applications submitted and hopefully increase the number of awarded permits.	Med (30-99k)	Budget for additional Town staff		x	x										
73	Review Town ordinance/code regarding post disaster procedures. Ensure that code is being properly enforced after a disaster	H	Did not select/ jurisdiction specific project	1, 2	-	DF4	FL4	Preventive	Planning	Short (1-2)	Town budget, FEMA EDADR	This project aims to ensure a more organized and compliant recovery process. This would help the Town to rebuild efficiently and safely while addressing any code violations that may pose a risk to public safety during reconstruction.	Low (0-29k)	This project may require updating a Town ordinance, which will require Town and public support	x	x	x	x	x	x	x	x	x	x	x		
74	Prepare an "after the storm" permitting plan for rebuilding after a disaster	H	M	1, 2	1, 2, 3	DF5	FL5	Emergency Services	EMA, Planning	Short (1-2)	Town budget, FEMA HMGP, RIEMA BRIC, HUD CDBG-DR, RIIB Resilience and	Developing an "after the storm" permitting plan ensures the Town can quickly and efficiently rebuild, reducing delays during recovery.	Low (0-29k)	This project may require an outside contractor to facilitate the plan development. Ensuring regular updates after a	x	x	x	x	x	x	x	x	x	x	x		

Table 73- Mitigation Action Plan

		Priority (H, M L)		Goals											Hazards												
Action ID	Action Description	Exeter	West Greenwich	Exeter	West Greenwich	Dam failure goal	Flood goal	CRS Category for Flood Actions	Responsible Department	Timeframe	Potential Funding	Benefit	Potential Cost	Technical Feasibility/ Considerations	Severe Thunderstorm	Dam Failure	Flooding	Hurricane/Nor'easter	Severe Winter Weather	Brushfire/Wildfire	Drought	Extreme Temps	Tornado	Earthquake	HAZMAT Incident	Water Quality	Cybersecurity
											Adaptation Program			disaster to include "lessons learned"													
75	Retrofit historic structures (residential and non-residential) with dry floodproofing	H	Did not select/ jurisdiction specific project	1, 2, 3	-	-	FL2	Property Protection	DPW	Med (3-4)	Town budget, FEMA HMGP, FEMA FMA, HUD CDBG, NPS Historic Preservation Fund, RIIB MRP, RIHPHC	Dry floodproofing is a method of sealing a building to prevent floodwater from entering. Dry floodproofing includes measures that make a structure watertight below the level that needs flood protection to prevent floodwaters from entering. This type of floodproofing is often used to protect non-residential structures, water supplies, and sewage systems. Retrofitting historic structures with dry floodproofing preserves cultural heritage while protecting them from flood damage.	Med (30-99k)	This project is technically feasible with proper funding for the floodproofing. Facility owner support of the project would be needed.			x										
76	Encourage drought-tolerant landscape design by incorporating drought tolerant practices into landscaping, or using permeable driveways and surface to reduce runoff and promote groundwater recharge.	H	Did not select/ jurisdiction specific project	1, 2, 3	-	-	-	-	Planning	Annually	Town budget, USDA CIG, RIIB MRP	Drought-tolerant landscape designs and permeable surfaces reduce water consumption and enhance stormwater management. These practices conserve water, reduce runoff, and help recharge groundwater, improving overall environmental sustainability.	Low (0-29k)	This project may require updating a Town ordinance, which will require Town and public support							x						
77	During periods of drought/low water availability, encourage residents to implement water-saving measures such as installing low flow showerheads and toilets, turning off water while brushing teeth or while doing other cleaning chores. Running the dishwasher and clothes washer only when full	H	L	1, 2, 3	1, 2, 3	-	-	-	EMA	Annually	Town budget, USDA CIG, RIIB MRP	This project aims to help the Town maintain a sustainable water supply, alleviating the strain on local water systems during drought periods.	Low (0-29k)	Public outreach information. Ensure all residents have access to the information (social media, paper copies at key community locations)							x						
78	Encourage farmers to implement soil and water conservation practices that foster soil health and improve soil quality to help increase resiliency and mitigate the impacts of drought	H	L	1, 2, 3	1, 2, 3	-	-	-	Planning	Annually	Town budget, USDA EQIP, USDA CSP, USDA RCPP	Promoting soil and water conservation practices increases soil health, improving the land's ability to retain moisture and withstand drought. This enhances agricultural resilience, helps maintain crop yields during dry periods, and mitigates environmental damage from droughts.	Low (0-29k)	This project may require updating a Town ordinance, which will require Town and public support							x						
79	Regulate development in wildfire hazard areas through land use planning. Develop regulations for safer construction and incorporate mitigation considerations into the permitting process. Encourage fire resistant construction or require it through local regulations.	H	H	1, 2, 3	1, 2, 3	-	-	-	Planning	Med (3-4)	Town budget, EPA OSC Smart Growth Support	This project aims to minimize the risk and impact of wildfires on the Town. These measures improve safety, reduce property damage, and ensure that new developments are better prepared for wildfire risks.	Low (0-29k)	This project may require an ordinance or updating the Town's land use ordinances						x							
80	Partner with the University of Rhode Island to deploy RI-CHAMP advance storm modeling.	H	Did not select/ jurisdiction specific project	1, 2, 3	-	-	-	-	EMA	Med (3-4)	Town budget, Rhode Island Sea Grant	Partnering with the University of Rhode Island to deploy RI-CHAMP enhances the ability to predict and prepare for extreme weather events. The RI-CHAMP project advances storm model capabilities and develops a real-time hazard and impact prediction system for hurricanes and	Med (30-99k)	This project is technically feasible with coordination with URI				x									

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		Priority (H, M L)		Goals											Hazards												
Action ID	Action Description	Exeter	West Greenwich	Exeter	West Greenwich	Dam failure goal	Flood goal	CRS Category for Flood Actions	Responsible Department	Timeframe	Potential Funding	Benefit	Potential Cost	Technical Feasibility/ Considerations	Severe Thunderstorm	Dam Failure	Flooding	Hurricane/Nor'easter	Severe Winter Weather	Brushfire/Wildfire	Drought	Extreme Temps	Tornado	Earthquake	HAZMAT Incident	Water Quality	Cybersecurity
												nor'easters in Southern New England. The system includes cascading consequences of extreme weather impacting critical infrastructure.															
81	Pursue funding to upgrade of the Town website. Hire a PIO/social media manager/website manager to disseminate public information.	H	Did not select/ jurisdiction specific project	1, 4, 5	-	DF1	FL1	Public Information	IT	Short (1-2)	Town budget	To enhance effective communication, it is imperative to undertake a comprehensive overhaul of the Exeter Town website. This upgrade should focus on optimizing the platform for rapid and consistent dissemination of emergency information, ensuring that residents can access critical updates without delay.	Low (0-29k)	This project may require an outside contractor/web designer and will require regular updates.	x	x	x	x	x	x	x	x	x	x	x	x	x
82	Coordinate with the State of R.I., through their quasi-governmental agency QDC, to determine the feasibility of extending the Ladd School property water lines up to Rt. 2 and extend over to South Rd. up to Rt. 2.	H	Did not select/ jurisdiction specific project	2	-	DF2	FL2	Natural Resource Protection	Fire Dept	Med (3-4)	Town budget, HUD CDBG, RIIB MRP	Extending water lines improves access to essential water services, promoting community development and infrastructure resilience. This expansion would also provide a reliable water source to replenish tanker trucks, including those from Mutual Aid responders, during fires, enhancing firefighting capabilities and reducing response times.	Low (0-29k)	This project will require coordination with the State of Rhode Island. A feasibility study may be required before determining if this project can be implemented	x	x	x	x	x	x	x	x	x	x	x	x	
83	Pursue funding for physical security enhancements for nonprofit and faith-based organizations	H	L	1, 2, 3	1, 3	DF2	FL2	Natural Resource Protection	EMA	Med (3-4)	Town budget, FEMA HSGP, FEMA NSGP, RI HSGP, DHS TVTP, HUD CDBG, RIDEM Nonprofit Environmental Grants	This project aims to reduce vulnerability to these organizations from natural and man-made hazards. By implementing these enhancements, these organizations can better protect their assets, ensure continuity of operations, and safeguard the communities in times of crisis.	Med (30-99k)	Assessing the structural integrity of the existing facility to ensure that upgrades, such as reinforced doors or surveillance systems, can be integrated without compromising safety or functionality. Ensuring the vision of the organization is kept in mind during the security upgrade process.	x	x	x	x	x	x	x	x	x	x	x	x	x
84	Pursue participation in the NWS StormReady program	H	L	1, 2, 3, 4, 5	1, 2, 3, 4	-	FL5	Preventive	EMA	Short (1-2)	Town budget	StormReady is a National Weather Service program designed to recognize communities that have reached a high level of severe weather preparedness. Participating in the program would enhance safety and reduce risks during storms.	Low (0-29k)	To become a StormReady community, the community must 1. Connect with your local Warning Coordination Meteorologist (WCM) or StormReady Focal Point 2. Complete the application 3. Arrange a verification visit 4. Receive recognition 5. Continue your StormReady journey To be officially StormReady, a community must: - Establish a 24-hour warning point and	x		x	x	x	x	x	x	x				

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Action ID	Action Description	Priority (H, M L): Exeter	Priority (H, M L): West Greenwich	Goals: Exeter	Goals: West Greenwich	Goals: Dam failure goal	Goals: Flood goal	CRS Category for Flood Actions	Responsible Department	Timeframe	Potential Funding	Benefit	Potential Cost	Technical Feasibility/ Considerations	Hazards: Severe Thunderstorm	Hazards: Dam Failure	Hazards: Flooding	Hazards: Hurricane/Nor'easter	Hazards: Severe Winter Weather	Hazards: Brushfire/Wildfire	Hazards: Drought	Hazards: Extreme Temps	Hazards: Tornado	Hazards: Earthquake	Hazards: HAZMAT Incident	Hazards: Water Quality	Hazards: Cybersecurity
														emergency operations center - Have more than one way to receive severe weather warnings and forecasts and to alert the public - Create a system that monitors weather conditions locally - Promote the importance of public readiness through community seminars - Develop a formal hazardous weather plan, which includes training severe weather spotters and holding emergency exercises.													
85	Enhance Planning and Building Official processes for land use development through use of 3rd party inspectors/professional services.	H	Did not select/ jurisdiction specific project	1, 2	-	DF5	FL5	Preventive	Planning, Building Official	Short (1-2)	Town budget	This project is aimed at strengthening the Town's inspection process in relation to development projects and Town construction projects through post-construction 3rd party inspections to ensure that the contractor(s) built to the approved designs/engineering. This project would reduce the potential of damage during hazard events if a building is built to withstand high winds, etc.	Low (0-29k)	This project may require outside technical support to assist the Town in updating ordinances or other documents.	x	x	x	x	x				x	x			
86	Enhance online permitting system through supplier provided training.	H	Did not select/ jurisdiction specific project	4	-	DF5	FL5	Preventive	Planning, Building Official	Short (1-2)	Town budget	The Town has an online permitting system and employees would benefit from a training on the program and its benefits for ease of use	Low (0-29k)	This project is technically feasible with training materials and employee willingness to attend the training	x	x	x	x	x	x	x	x	x	x	x	x	
87	Establish a finished floor elevation database or add to online permitting system.	H	M	4	3	-	FL5	Preventive	Planning, Building Official	Med (3-4)	Town budget, FEMA FMA	A finished floor elevation database ensures accurate, consistent data for construction planning, reducing errors and improving compliance with zoning and floodplain regulations. This project will streamline construction planning and permit approval processes by creating or enhancing a comprehensive finished floor elevation database accessible through an online permitting system.	Med (30-99k)	If BFEs are available, Town staff, or a contractor, would be needed to input the data into a database. If BFEs are not available, a contractor may be needed to collect this information. Including a requirement in future RFPs for contractors to provide this information will ensure all necessary information is provided to the Town for new construction.			x										
88	Include LOMCs and development files to online permitting system to create efficiencies and reduce waste in permitting processes and documentation of historic files.	H	Did not select/ jurisdiction specific project	4	-	-	FL5	Preventive	Planning, Building Official	Annually	Town budget	This project aims to enhance hazard mitigation efforts by ensuring timely access to critical data, helping to better assess risks and make informed decisions.	Low (0-29k)	This project is technically feasible with Town staff, but depending on amount of paperwork, additional staff may be needed.			x										

Table 73- Mitigation Action Plan

		Priority (H, M L)		Goals										Hazards												
Action ID	**Action Description**	Exeter	West Greenwich	Exeter	West Greenwich	Dam failure goal	Flood goal	CRS Category for Flood Actions	Responsible Department	Timeframe	Potential Funding	Benefit	Potential Cost	Technical Feasibility/ Considerations	Severe Thunderstorm	Dam Failure	Flooding	Hurricane/Nor'easter	Severe Winter Weather	Brushfire/Wildfire	Drought	Extreme Temps	Tornado	Earthquake	HAZMAT Incident	Water Quality	Cybersecurity
89	Explore land use development regulation or ordinance to create fire access trails for hard to reach and water access areas.	H	H	1, 2, 3, 4	1, 2, 3	-	-	-	Planning, Fire Dept	Short (1-2)	Town budget, RICSRP, CPAW	Creating fire access trails ensures safer, more efficient routes for emergency response teams to reach hard-to-access or water-locked areas during fires. This project improves public safety and enhances firefighting capabilities, ultimately reducing the potential impact of wildfires.	Low (0-29k)	This project is technically feasible with the adoption of a Town ordinance, which will require Town and public support. Coordination with RIDOT may be required where trails are accessed by state roads.						x							
90	Pursue Certified Floodplain Manager credentials for the Town floodplain administrator	H	H	1, 2, 3, 4	1, 3	-	FL5	Preventive	Floodplain Coordinator	Short (1-2)	Town budget, FEMA FMA	Becoming a Certified Floodplain Manager (CFM) enables the local Floodplain Manager to gain additional knowledge and training to increase their understanding of NFIP, floodplain management, and flood hazard mitigation. This training and certificate will benefit the Floodplain Manager as well as the entire Town.	Low (0-29k)	The Town Floodplain Official will need to be dedicated to learning that material and studying for the exam. The cost of the application and digital exam is approximately $600 plus a biennial renewal fee of $500.			x										
91	Replace culverts with a bridge at 120 E Shore Dr, Exeter, RI 02822	H	Did not select/ jurisdiction specific project	1, 2	-	DF2	FL2	Structural	DPW	Med (3-4)	Town budget, FEMA HMGP, RIIB MRBRF, RIIB MRP	Replacing culverts with a bridge in flood-prone areas improves water flow, reducing the risk of upstream flooding and infrastructure damage. It also enhances long-term resilience by accommodating larger storm events and minimizing maintenance needs.	High (100k+)	Bridges need periodic inspections for structural integrity, which may require specialized equipment and trained personnel; planning for safe and efficient access is crucial to ensure ongoing regulatory compliance and safety.		x	x										

6. PLAN MAINTENANCE

This section describes the formal Plan maintenance process to ensure that the HM&FMP remains an active and applicable document.

This section addresses Element D of the Local Mitigation Plans regulation checklist and Element H-Additional State Requirements.

Regulation Checklist- 44 CFR § 201.6 Local Mitigation Plans
ELEMENT D. Plan Maintenance
D1. Is there discussion of how each community will continue public participation in the plan maintenance process? (Requirement 44 CFR § 201.6(c)(4)(iii)) D1-a. Does the plan describe how communities will continue to seek future public participation after the plan has been approved? D2. Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a five-year cycle)? (Requirement 44 CFR § 201.6(c)(4)(i)) D2-a. Does the plan describe the process that will be followed to track the progress/status of the mitigation actions identified within the Mitigation Strategy, along with when this process will occur and who will be responsible for the process? D2-b. Does the plan describe the process that will be followed to evaluate the plan for effectiveness? This process must identify the criteria that will be used to evaluate the information in the plan, along with when this process will occur and who will be responsible. D2-c. Does the plan describe the process that will be followed to update the plan, along with when this process will occur and who will be responsible for the process? D3. Does the plan describe a process by which each community will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate? (Requirement 44 CFR § 201.6(c)(4)(ii)) D3-a. Does the plan describe the process the community will follow to integrate the ideas, information and strategy of the mitigation plan into other planning mechanisms? D3-b. Does the plan identify the planning mechanisms for each plan participant into which the ideas, information and strategy from the mitigation plan may be integrated? D3-c. For multi-jurisdictional plans, does the plan describe each participant's individual process for integrating information from the mitigation strategy into their identified planning mechanisms?
Source: FEMA 2025 (Local)

Element H: Additional State Requirements
Provide 1 month out of the year that you hold a Hazard Mitigation meeting per the requirements below (2 times per year is preferred, but a minimum of 1 is required). 1. Hold 1 meeting per year to discuss mitigation goal progress (twice per year is preferred) 2. Invitation to the meeting(s) sent to RIEMA (RIEMA will attend if schedule permits). 3. Meeting minutes are sent to RIEMA within 30 days of meeting being held outlining progress of goals 4. The following stakeholders should attend: (if applicable to your city/town): • Mayor or Town Administrator (or designee) • Emergency Manager • Director of DPW • Fire Chief • Police Chief • Planning Department • Finance Department • Floodplain Manager

Element H: Additional State Requirements
• Building Official 5. The meeting should be open to the public and posted in several places for their awareness.

CRS Activity 510 Planning Process- Credit Checklist
Step 10. Implement, Evaluate, and Revise (Max 26 credits)
10a. Procedures to monitor and recommend revisions (required) (2 credits) 10b. Same planning committee or successor committee that qualifies under Section 511.a.2 (a) does the evaluation (24 credits)
Source: FEMA NFIP CRS Coordinator's Manual (2017), 2021 Addendum

6.1 Continued Public Involvement

The Towns of Exeter and West Greenwich are dedicated to continued public involvement to update this HM&FMP. An electronic copy of the 2025 HM&FMP Update will be available on the Towns' website with a hard copy available at the Town Halls (or other Town facility). The Towns will include contact information to direct public comments or suggestions.

The Towns of Exeter and West Greenwich will continue public involvement within the next 5 years by opening up annual reviews to the public and requesting their input via an online survey, similar to the one used in this HM&FMP, prior to the public meeting and after a disaster or significant hazard event. The survey will specifically request information on hazards within the last year and ideas for mitigation projects to consider in the 2030 HM&FMP Plan Update.

The HMPCs recognize that a large portion of Exeter and West Greenwich's residents are older and may not be technologically inclined. To ensure that everyone has the chance to participate, printed surveys will be made available at the Town Halls and Libraries.

6.2 Implementing, Monitoring, Evaluating, and Updating the HM&FMP

This section describes the formal Plan maintenance process to ensure that the HM&FMP remains an active and applicable document. This section includes an explanation of how the Towns' Planning Team intends to organize their efforts to ensure that improvements and revisions to the HM&FMP occur in an efficient, well-managed, and coordinated manner.

6.2.1 Implementing the Plan

The Towns of Exeter and West Greenwich HMPCs realize that successful hazard mitigation is an ongoing process that requires implementation, evaluation, and updates to this Plan. The Towns also understand the importance of integrating appropriate sections of the Plan into other applicable Town planning documents and policies/regulations. It is intended that this Plan and the ongoing efforts of the HMPCs will preserve and enhance the quality of life, property, and resources for the Towns of Exeter and West Greenwich.

Adoption of this mitigation strategy increases Towns of Exeter and West Greenwich's eligibility for federal hazard mitigation grants. These grants originate from FEMA's Hazard Mitigation Assistance (HMA) grants. More information on available funding resources can be found in Appendix G- Funding Resources for Mitigation Projects.

6.2.2 Monitoring the Plan

The HMPCs, under the leadership of the EMA Directors, will meet annually (or more frequently if necessary), to monitor and evaluate the actions identified in this Plan. This annual review will take place in JANUARY each year for Exeter and West Greenwich and will be open to the public and posted in several key Town locations and the Town website. RIEMA, along with the following collaborators, will be invited to the meeting.

- Mayor or Town Administrator (or designee)
- Emergency Manager
- Director of DPW
- Fire Chief
- Police Chief
- Planning Department
- Finance Department
- Floodplain Manager
- Building Official

At each meeting, the committee members will discuss the actions assigned to them to ensure continual progress with mitigation efforts. The status of each mitigation action will be documented, and minutes recorded for the record. Meeting minutes will be sent to RIEMA within 30 days of the meeting.

The HMPCs will also continue to re-evaluate membership on the committee to ensure effective engagement of the appropriate parties. New members may be invited to serve on the HMPC as priorities shift and to address turnover within the Town(s).

6.2.3 Evaluating the Plan

The Town EMA Director will be responsible for ensuring the HM&FMP is annually evaluated for effectiveness.

At the annual meetings, the HMPC will evaluate both the actions and the planning process. The Planning Team will base its evaluation on whether or not the actions have met the following criteria: increased public awareness/education, reduction in hazard damage, actions being implemented in the designated time frames, and actions staying within the cost estimate. The HMPC will document and report its findings to the Town Council and RIEMA each February (Exeter and West Greenwich). The HMPC will involve the public in the action evaluation process by holding an annual advertised public meeting in order to review the evaluation and solicit input.

6.2.4 Updating the Plan

Recognizing that this is a living document, the HMPC, under the direction of the EMA Director, will make changes to it after each annual revision or a disaster, as conditions warrant. These revisions will also reflect changes to priorities and funding strategies that may have been implemented.

A full update of the Plan will commence a year in advance of the current Plan expiration date in order to ensure the Towns always have an approved Plan and are eligible for federal funding. The update will be completed every five years and will incorporate a formalized process for prioritizing actions and weighing the cost/benefit of such actions.

All updates or revisions to the Plan will be submitted to RIEMA and then to FEMA for final approval. The HMPCs will involve the public in the plan revision process by holding an annual advertised public meeting to present recommended revisions and solicit input. Revised Plans will also be sent to the neighboring communities for comment.

All future meetings will again be open to the public and it is the hope of the HMPCs that once the public education and outreach actions begin, public involvement in the Plan will increase and will be reflected in future updates. The HMPCs will involve the public in the annual meeting by posting it on the website, in the local library/key community locations, and on local media to encourage involvement.

Figure 75 provides a visual of the annual HM&FMP activities per year.

Note: The Towns must update the background information and the recommendations in their floodplain management plans and repetitive loss area analyses at least every five years and in their natural floodplain functions plan(s) every 10 years.

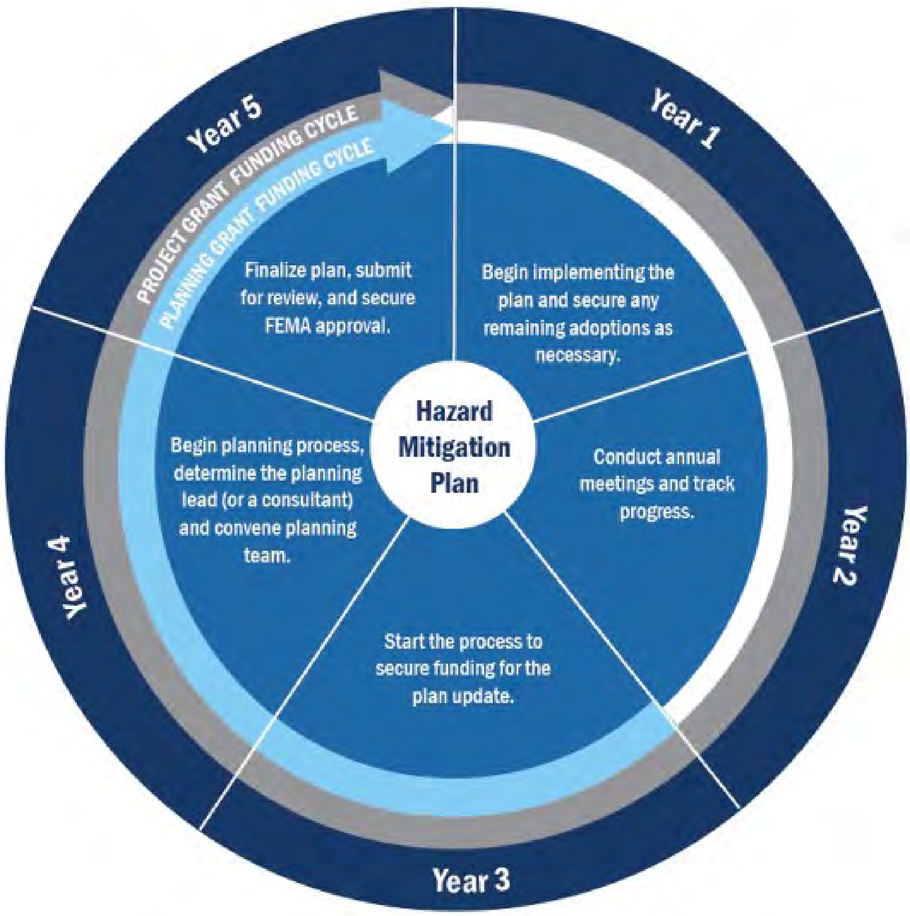


Figure 75- HM&FMP Update Schedule

6.2.5 Annual HMP Review Checklist/Progress Report

The HMPCs will review the Annual Checklist to document the plan monitoring, evaluating, and updating procedures. The HMPCs will review the checklist to determine if the MJHM&FMP is providing useful information for the update; progress on mitigation actions; identification of new "wish list" actions; and if the plan is working as intended.

Appendix E- HMP Annual Progress Report contains an annual review checklist to monitor successes and lessons-learned of the HM&FMP.

During the annual evaluation process, the 2025 MJHM&FMP will be promoted online, in the local library, and at Town Hall for public review. Comments and suggestions can be sent directly to the EMA Director (or designee) or discussed at the advertised public meeting.

To meet CRS annual review criteria, every year, the Towns will evaluate their progress toward implementing the projects and programs in the plan, area analysis, or natural floodplain functions plan, and submit a report of that evaluation with its annual CRS recertification.

6.2.6 Annual CRS Progress Report and Recertification

A recertification is a yearly check-in to confirm that the CRS community is performing the annual requirements pursuant to the current CRS Coordinator's Manual. This normally includes annual outreach requirements, publicizing and tracking services, preparing progress reports for plans, and records showing proper maintenance of your drainage system. Recertifications take place every year except for the year of your cycle verification visit.

Annual CRS activities include:

- <u>Annual recertification</u>: Communities must recertify annually except during their cycle year, where a full recertification takes place. Communities will receive an email from their CRS Resource Specialist 45 days before their annual Recertification due date to let them know whether they are recertifying or submitting Annual Construction Certificates. A CRS annual progress report template is provided in Appendix F- CRS Activity 510 Annual Progress Report.
  - <u>Cycle Verification</u>: A full verification of participation is on a cycle schedule (Class 5-9 communities: every 5 years; Class 1-4 communities or top 10% policy discount communities: every 3 years). Communities will work with their CRS Resource Specialist to fulfill recertification activities.
- <u>Construction Certificates ("CC")</u>: Included in annual recertifications include providing documentation on Construction Certificates. These include finished construction Elevation Certificates, Floodproofing Certificates, V Zone Certificates, and Engineered Opening Certificates. Each year, a participating CRS community must submit their CCs at their recertification date. For those years a community is not undergoing their cycle verification, these CCs are submitted with their recertification packet. During the year of their cycle verification, only the permit list and all corresponding CCs are submitted at their recertification date.

In Rhode Island, annual recertification information is distributed to communities on *December 15* and recertification documentation is due by **February 1**.

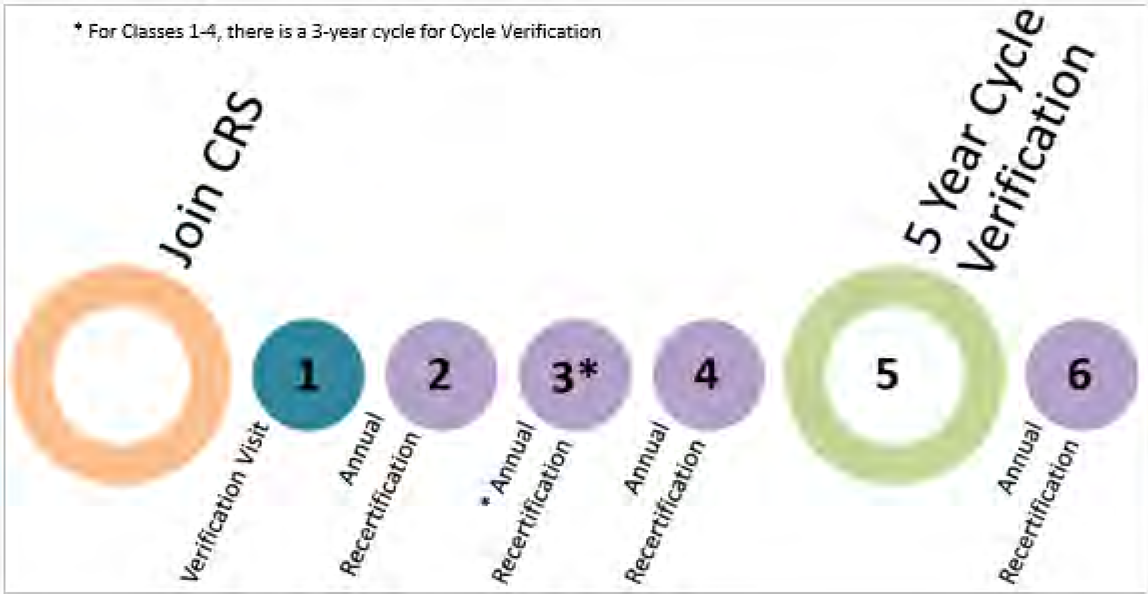


Figure 76- CRS Annual Certification Timeline

6.3 Plan Integration into Future/Updated Town Planning Mechanisms

This section describes the requirements for coordinating, implementing, or integrating the HMP into other Town planning mechanisms.

After the HMP is adopted and implemented, members of the Planning Team members will ensure that the HMP is integrated into updated Town planning mechanisms. These mechanisms may include their Emergency Operations Plan, Continuity of Operations Plan, Comprehensive Plan, Capital Improvement Plan, etc., where appropriate. Integrating and implementing this philosophy and activities may require updating or amending specific planning mechanisms.

This section will also act as a guide to apply for grants to create the plans that the HM&FMP should be integrated into.

The Planning Team will achieve mitigation action and initiative integration by undertaking the following activities:

HM&FMP Section	Existing Plan/ Policy/Program	Process for Integration
Section 3- Risk Assessment	Land Use Plan	Incorporate hazard areas into the update of a Land Use Plan/ Comprehensive Plan section to restrict future development in hazard areas as well as strategic community planning for relocation out of hazard areas.
	Emergency Operations Plan/ Continuity of Operations Plan	Incorporate risk assessment findings into the development of a Town EOP/COOP to help identify and ensure critical resources to maintain operations internally and externally during and after a hazard event.

HM&FMP Section	Existing Plan/ Policy/Program	Process for Integration
	Debris Management Plan	Incorporate risk assessment findings into the development of a Debris Management Plan to help coordinate efficient cleanup after a hazard event or disaster.
	Stormwater Management Plan	Incorporate hazard areas into the development of a Stormwater Management Plan and best practices to mitigate impacts from drought and water conservation.
Section 5- Mitigation Strategy	Capital Improvement Plan Stormwater Management Plan	Incorporate the mitigation actions provided in the MAP into the development of a Capital Improvement Plan or a Stormwater Management Plan by further studying and evaluating the underlying problems or if studies exist that outline potential solutions. Begin the design stage to develop a plan for each identified project, the actions to be taken, engineering and construction required, schedule, and estimated costs.
General	Comprehensive Plan	Integrate all aspects of the HMP into an updated Comprehensive Plan to ensure continuity of community goals and objectives. Include updated information on hazards and threatened facilities/areas of the Town. The Exeter Comprehensive Plan was recently updated in 2024 and includes visions for the Town through 2044. The West Greenwich Comprehensive Plan is currently being updated (2024/2025) and aspects of the MJHM&FMP will be incorporated into the final version.

7. PLAN UPDATE

This section describes changes in development and changes in mitigation priorities since 2005.

This section addresses Element E of the Local Mitigation Plans regulation checklist.

Regulation Checklist- 44 CFR § 201.6 Local Mitigation Plans
ELEMENT E. Plan Update
E1. Was the plan revised to reflect changes in development? (Requirement 44 CFR § 201.6(d)(3)) E1-a. Does the plan describe the changes in development that have occurred in hazard-prone areas that have increased or decreased each community's vulnerability since the previous plan was approved? E2. Was the plan revised to reflect changes in priorities and progress in local mitigation efforts? (Requirement 44 CFR § 201.6(d)(3)) E2-a. Does the plan describe how it was revised due to changes in community priorities? E2-b. Does the plan include a status update for all mitigation actions identified in the previous mitigation plan? E2-c. Does the plan describe how jurisdictions integrated the mitigation plan, when appropriate, into other planning mechanisms?
Source: FEMA 2025 (Local)

7.1 Changes in Development in Hazard-Prone Areas

Since 2005, there has not been significant development in Exeter or West Greenwich, and the Towns' risk to natural hazards has not changed (Figure 68 and Figure 69).

Compared to the rest of Rhode Island, Exeter and West Greenwich have very little urban/commercial development (Figure 70). Both Exeter and West Greenwich have large portions of land designated as conservation lands, major parks, open space, and water bodies throughout the Towns that limit development (Figure 69). Interstate 95 runs vertically through the Towns, essentially creating an eastern and western portion of the Town. Urban/commercial development has typically been concentrated in the eastern portions of the Towns, near the I-95 corridor, while the western portions have had little urban/commercial development.

Balancing growth while preserving aspects of rural character is important to both Exeter and West Greenwich and their residents.

7.2 Changes in Town Priorities and Mitigation Efforts

Since 2005, the Towns have completed or begun over half of the proposed actions from the 2005 HMPs. The status of each mitigation action can be found in Table 68 (Exeter) and Table 69 (West Greenwich). Since the previous HMPs expired in 2010, the Towns have not been eligible for FEMA HMA programs for 15 years. The Towns have utilized other funding sources that do not require an active HMP to apply for funding to implement their mitigation strategies.

While many actions identified in 2005 are applicable in 2025 and selected by the HMPCs, actions selected and prioritized during this plan update process vary from structural projects, to plans and studies, to public outreach.

While wildfires/brushfires have been impacting the area for decades, both Towns had significant fires in 2023. Both Towns view fire mitigation actions and policies as a high priority to reduce future impacts from a fire. The HMPCs are also focused on actions that increase public awareness of natural hazards that occur in the region and individual preparedness. Several actions were selected that relate to hazard awareness and public education. The 2023 fire events highlighted the importance of effective emergency communications, as well as public education and preparedness.

The Town of Exeter is also focused on increasing Town capacity (staff, volunteers, training) and updating the Town's policies and implementing ordinances to further mitigate natural hazard impacts.

7.3 Integration of the HMP Into Other Town Planning Mechanisms

As the 2005 HMPs are outdated, most other planning documents created in the early to mid-2000s are also likely outdated. The 2005 HMPs had minimal mapping to display hazard areas and aid in land use planning.

In both Towns, the 2005 HMPs have been used when developing and reviewing hazard-specific ordinances.

The 2005 Exeter Hazard Mitigation Plan was referenced in the recently updated 2024-2044 Exeter Comprehensive Plan. Hazard areas, projects, and land use information identified in the 2005 HMPs was integrated into the 2024-2044 Comprehensive Plan. The updated Comprehensive Plan notes that 2005 HMP was out of date and the need for and importance of having an active HMP in place.

The 2005 West Greenwich Hazard Mitigation Plan is being referenced in West Greenwich's Comprehensive Plan that is currently being updated (2024/2025). Once this version of the HMP is active, updated and current information will be used in the final version of the Comprehensive Plan.

8. PLAN ADOPTION

This section fulfills the Towns of Exeter and West Greenwich's formal MJHM&FMP adoption requirements.

This section addresses Element F of the Local Mitigation Plans regulation checklist.

Regulation Checklist- 44 CFR § 201.6 Local Mitigation Plans
ELEMENT F. Plan Adoption
F1. For single-jurisdictional plans, has the governing body of the jurisdiction formally adopted the plan to be eligible for certain FEMA assistance? (Requirement 44 CFR § 201.6(c)(5)) F1-a. Does the participant include documentation of adoption? F2. For multi-jurisdictional plans, has the governing body of each jurisdiction officially adopted the plan to be eligible for certain FEMA assistance? (Requirement 44 CFR § 201.6(c)(5)) F2-a. Did each participant adopt the plan and provide documentation of that adoption?
Source: FEMA 2025 (Local)

CRS Activity 510 Planning Process- Credit Checklist
Step 9. Adopt the Plan (2 credits)
9. Adopt the Plan (2 credits)
Source: FEMA NFIP CRS Coordinator's Manual (2017), 2021 Addendum

The Towns of Exeter and West Greenwich Town Councils met at their monthly council meetings on June 2, 2025 and June 11, 2025 (respectively) to adopt the Multi-Jurisdictional Hazard Mitigation and Floodplain Management Plan.

The 2025 MJHM&FMP Update was then submitted to RIEMA and FEMA for formal approval.

A scanned copy of the adoption resolutions are located in Appendix A- Adoption Resolutions.

9. REFERENCES

ABC News 15 2024. Residents asked to evacuate a brush fire burns in Rhode Island town. Written by: WJAR Staff. https://wpde.com/news/nation-world/residents-asked-to-evacuate-as-brush-fire-burns-in-rhode-island-town-flames-blaze-department-environmental-management-helicopter

Baker, Roberta 1976. Bits and Pieces of West Greenwich.

CBS News 2010. Northeast Flood Woes. https://www.cbsnews.com/pictures/northeast-flood-woes/

Climate.gov 2025. Data Snapshots Image Gallery Historic Probability of Severe Weather. https://www.climate.gov/maps-data/data-snapshots/data-source/historic-probability-severe-weather

ClimRR- Climate Risk and Resilience Portal- Argonne National Laboratory 2024. https://climrr.anl.gov/climateprojections

Boston College Weston Observatory 2024. Historical Events. http://aki.bc.edu/index.htm

EC4 STAB 2016. Current State of Climate Science in Rhode Island: A Report From the STAB to the EC4. https://climatechange.ri.gov/sites/g/files/xkgbur481/files/documents/ec4-science-and-technical-advisory-board-report.pdf

EPA 2013. FRS Environmental Interest Types. https://www.epa.gov/sites/default/files/2020-01/documents/interest_types.pdf

EPA 2019. Recommendations for Cyanobacteria and Cyanotoxin Monitoring in Recreational Waters. https://www.epa.gov/sites/default/files/2019-09/documents/recommend-cyano-rec-water-2019-update.pdf

EPA 2019b. Managing Your Hazardous Waste: A Guide for Small Businesses. https://www.epa.gov/sites/default/files/2019-10/documents/10008_managingyourhazwaste_508pdf_october_16_2019.pdf

EPA 2024a. EPCRA Section 312 Applicability. https://www.epa.gov/epcra/epcra-section-312-applicability

EPA 2024b. Hazardous Waste Generator Regulatory Summary. https://www.epa.gov/hwgenerators/hazardous-waste-generator-regulatory-summary

EPA 2024c. Final PFAS National Primary Drinking Water Regulation. https://www.epa.gov/sdwa/and-polyfluoroalkyl-substances-pfas

Erratt, Kevin J., Irena F. Creed, David A. Lobb, John P. Smol, and Charles G. Trick. 2023. Climate change amplifies the risk of potentially toxigenic cyanobacteria. Global Change Biology. 29(18). pp5240-5249. https://onlinelibrary.wiley.com/doi/pdf/10.1111/gcb.16838

Exeter Historical Association 2015. Looking Back on the March 2010 Floods. http://www.yorkerhill.com/eha/Stories/Exeter_2010_flood.pdf

FEMA Floodplain Maps

FEMA 2017. CRS Coordinator's Manual, 2017 Edition. https://www.fema.gov/sites/default/files/documents/fema_community-rating-system_coordinators-manual_2017.pdf

FEMA 2021. CRS 2021 Addendum to the Coordinator's Manual, 2017 Edition. https://www.fema.gov/sites/default/files/documents/fema_community-rating-system_coordinator-manual_addendum-2021.pdf

FEMA 2024. Declared Disaster Declarations. https://www.fema.gov/disaster/declarations

FMCSA 2013. Nine Classes of Hazardous Materials. https://www.fmcsa.dot.gov/sites/fmcsa.dot.gov/files/docs/Nine_Classes_of_Hazardous_Materials-4-

2013_508CLN.pdf

Harpin, Mathias P. and Albro, Waite 2003. In the Shadow of the Trees.

HUD 2022. Total Development Costs (TDC) for Affordable Housing under the Native American Housing Assistance and Self-Determination Act of 1996 (NAHASDA). https://www.hud.gov/sites/dfiles/PIH/documents/PIH%202022-16%20TDC%20for%20NAHASDA.pdf

Metcalf School, Talented and Gifted Program 1989. A Stitch in Time: A Historical Sampler of Exeter and West Greenwich.

Moffitt, Victor 2015. Eminent Domain Violated in Rhode Island: The Big River Reservoir.

NBC News 10 2021. Community rallies behind Exeter family whose home was devastated by Henri. Written by Sam Read. https://turnto10.com/news/local/community-rallies-behind-exeter-family-whose-home-was-devastated-by-henri

NBC News 10 2023. Over 150 acres of land burn in West Greenwich brush fire. Written by Temi-Tope Adeleye and Molly Levine. https://turnto10.com/news/local/crews-work-to-contain-west-greenwich-brush-fire

NCEI 2016. Climate Change and Extreme Snow in the U.S. https://www.ncei.noaa.gov/news/climate-change-and-extreme-snow-us#:~:text=Years%20with%20heavy%20seasonal%20snow,increased%20over%20the%20past%20century

NCEI 2022. State Climate Summaries 2022- Rhode Island. https://statesummaries.ncics.org/chapter/ri/#:~:text=In%20Providence%2C%20average%20temperatures%20in,inches%20of%20precipitation)%20was%201972

NCEI 2023. Statewide Time Series. https://www.ncei.noaa.gov/access/monitoring/climate-at-a-glance/statewide/time-series/

NCEI 2024. Climate at a Glance: County Time Series. https://www.ncei.noaa.gov/access/monitoring/climate-at-a-glance/county/time-series

NID 2024. National Inventory of Dams. https://nid.sec.usace.army.mil/#/

NOAA 2023. Tornadoes and Climate Change. https://www.noaa.gov/sites/default/files/2023-10/Tornadoes_Climate_OnePager_July2023.pdf

NOAA 2024. Historical Hurricane Tracks. https://coast.noaa.gov/hurricanes/#map=4/32/-80

NOAA NHC 2021. National Hurricane Center- Tropical Cyclone Climatology. https://www.nhc.noaa.gov/climo/

NOAA NIDIS 2024a. Drought Conditions for Washington County. https://www.drought.gov/states/rhode-island/county/washington

NOAA NIDIS 2024b. Drought Conditions for Kent County. https://www.drought.gov/states/rhode-island/county/kent

NWS 2024a. Storm Events Database and Storm Prediction Center Product. https://www.ncdc.noaa.gov/stormevents/

NWS 2024b. Storm Predication Center (Hail, Wind, Tornado). https://www.spc.noaa.gov/gis/svrgis/

Raupach, Timothy & Martius, Olivia & Allen, John & Kunz, Michael & Lasher-Trapp, Sonia & Mohr, Susanna & Rasmussen, Kristen & Trapp, Robert & Zhang, Qinghong. (2021). The effects of climate change on hailstorms. Nature Reviews Earth & Environment. 2. https://doi.org/10.1038/s43017-020-00133-9

Rhode Island Climate Change Commission 2018. Resilient Rhody: An Actionable Vision for Addressing the Impacts of Climate Change in Rhode Island.

RIDEM 2002a. Boone Lake Dam Reservoir Dam Downstream Impact Analysis. https://dem.ri.gov/sites/g/files/xkgbur861/files/programs/maps/mapfile/damfiles/219_is.pdf

RIDEM 2002b. Yorker Mill Pond Dam Downstream Impact Analysis. https://dem.ri.gov/sites/g/files/xkgbur861/files/programs/maps/mapfile/damfiles/240_is.pdf

RIDEM 2007a. Slocum Reservoir Dam Downstream Impact Analysis. https://dem.ri.gov/sites/g/files/xkgbur861/files/programs/maps/mapfile/damfiles/239_is.pdf

RIDEM 2007b. Metcalf Wildlife Marsh Dam Downstream Impact Analysis. https://dem.ri.gov/sites/g/files/xkgbur861/files/programs/maps/mapfile/damfiles/527_is.pdf

RIDEM 2007c. Browning Mill Pond Dam Downstream Impact Analysis. https://dem.ri.gov/sites/g/files/xkgbur861/files/programs/maps/mapfile/damfiles/221_is.pdf

RIDEM 2007d. Edward's Pond Dam Downstream Impact Analysis. https://dem.ri.gov/media/60096/download

RIDEM 2012. Edward's Pond Dam Visual Inspection/Evaluation Report. https://dem.ri.gov/sites/g/files/xkgbur861/files/programs/maps/mapfile/damfiles/238.pdf

RIDEM 2014. Browning Mill Pond Dam Visual Inspection/Evaluation Report. https://dem.ri.gov/sites/g/files/xkgbur861/files/programs/maps/mapfile/damfiles/221.pdf

RIDEM 2016. Cyanobacteria Fact Sheet. https://dem.ri.gov/sites/g/files/xkgbur861/files/programs/benviron/water/quality/surfwq/pdfs/bgalgae.pdf

RIDEM 2019. Slocum Reservoir Dam Visual Inspection/Evaluation Report. https://dem.ri.gov/sites/g/files/xkgbur861/files/programs/maps/mapfile/damfiles/239.pdf

RIDEM 2020. 2019 Annual Report to the Governor on the Activities of the Dam Safety Program. https://dem.ri.gov/sites/g/files/xkgbur861/files/programs/benviron/compinsp/pdf/damrpt19.pdf

RIDEM 2021a. Yorker Mill Pond Dam Visual Inspection/Evaluation Report. https://dem.ri.gov/sites/g/files/xkgbur861/files/programs/maps/mapfile/damfiles/240.pdf

RIDEM 2021b. Metcalf Wildlife Marsh Dam Visual Inspection/Evaluation Report. https://dem.ri.gov/sites/g/files/xkgbur861/files/programs/maps/mapfile/damfiles/527.pdf

RIDEM 2021c. 2020 Annual Report to the Governor on the Activities of the Dam Safety Program. https://dem.ri.gov/sites/g/files/xkgbur861/files/programs/benviron/compinsp/pdf/damrpt20.pdf

RIDEM 2022a. Boone Lake Dam Visual Inspection/Evaluation Report. https://dem.ri.gov/media/60006/download

RIDEM 2022b. 2021 Annual Report to the Governor on the Activities of the Dam Safety Program. https://dem.ri.gov/sites/g/files/xkgbur861/files/2022-08/damrpt21.pdf

RIDEM 2022c. What is a Brownfield? https://dem.ri.gov/environmental-protection-bureau/land-revitalization-and-sustainable-materials-management/state-0

RIDEM 2023a. 2022 Annual Report to the Governor on the Activities of the Dam Safety Program. https://dem.ri.gov/sites/g/files/xkgbur861/files/2023-06/damrpt22.pdf

RIDEM 2023b. Cyanobacteria Monitoring Program 2023 Report. https://dem.ri.gov/sites/g/files/xkgbur861/files/2024-03/cyano23.pdf

RIDEM 2024a. 2023 Annual Report to the Governor on the Activities of the Dam Safety Program. https://dem.ri.gov/sites/g/files/xkgbur861/files/2024-05/damrpt23.pdf

RIDEM 2024b. Cyanobacteria (Blue-Green Algae). https://dem.ri.gov/environmental-protection-bureau/water-resources/research-monitoring/cyanobacteria-blue-green-algae

RIDOH 2024. Update on Public Water System Compliance with the Rhode Island PFAS in Drinking Water, Groundwater, and Surface Waters Act, March 2024. https://health.ri.gov/publications/reports/Update-on-PFAS-Act-Compliance.pdf

RIDOT 2024. Rhode Island Bridge Condition Map. https://experience.arcgis.com/experience/9e4e6fb1f2d848b68808c1ece9e2db0b

RIEC4 2022. Rhode Island 2022 Climate Update.

RIEMA 2022. Boone Lake Dam Emergency Action Plan. https://www.boonelakeri.org/uploads/1/1/7/0/117082001/219_boone_lake_dam_eap_june_2022.pdf

RIEMA 2023a. West Greenwich Brushfire aka Congdon Mill Road Fire After-Action Report/Improvement Plan.

RIEMA 2023b. Exeter Brushfire a.k.a. Queens River Preserve Fire After-Action Report/Improvement Plan.

RIEMA 2024. 2024 State of Rhode Island Hazard Mitigation Plan. https://riema.ecms.ri.gov/sites/g/files/xkgbur671/files/2024-02/2024%20RI%20Hazard%20Mitigation%20Plan%20FINAL%20_Reduced%20size.pdf

RIGIS 2024. Rhode Island GIS Database. https://www.rigis.org/

RIIB MRP 2023. West Greenwich Municipal Resilience Program Community Resilience Building Summary of Findings June 2023. https://www.riib.org/wp-content/uploads/2023/07/Final-West-Greenwich-Community-Resilience-Building-Summary-of-Findings-June-2023.pdf

RIIB MRP 2024. Exeter Municipal Resilience Program Community Resilience Building Summary of Findings. August 2024.

Rhode Island Current 2023. Governor briefed on West Greenwich brush fire. Written by: Christopher Shea. https://rhodeislandcurrent.com/briefs/governor-to-be-briefed-on-west-greenwich-brush-fire/

Sierra Club 2024. PFAS in Rhode Island Water. https://www.sierraclub.org/pfas-rhode-island-water

Simister, Florence Parker 1978. A Short history of Exeter Rhode Island.

Swann, Kathleen A. 2011. Images of America: West Greenwich

Town of Exeter 2005. Hazard Mitigation Plan.

Town of Exeter 2024-2044 2024. Exeter Comprehensive Plan.

Town of West Greenwich 1995. Comprehensive Plan, amended 2004-2008. https://www.wgtownri.org/sites/g/files/vyhlif5186/f/uploads/1995_west_greenwich_comprehensive_plan_cover_and_table_of_contents.pdf

Town of West Greenwich DRAFT 2025. Comprehensive Plan (partial data).

Town of West Greenwich 2005. Hazard Mitigation Plan

USFA FEMA 2024. What is the WUI? https://www.usfa.fema.gov/wui/what-is-the-wui.html

WPRI 2010. Swollen rivers, submerged homes: Looking back at the historic 2010 floods 10 years later. Written by: T.J. Del Santo and Sarah Doiron. https://www.wpri.com/weather/swollen-rivers-submerged-homes-looking-back-at-the-historic-2010-floods-10-years-later/

WPRI 2020. Police say arrests unlikely in 7 ransomware attacks on RI cities, towns. Written by: Kim Kalunian. https://www.wpri.com/news/crime/police-say-arrests-unlikely-in-7-ransomware-attacks-on-ri-cities-towns/

WPWA 2017. Wood-Pawcatuck Watershed Flood Resiliency Management Plan, Fuss & O'Neill. https://wpwa.org/projects/flood-resiliency/

WPWA 2018. Wood-Pawcatuck Wild and Scenic Rivers Stewardship Plan for the Beaver, Chipuxet, Green Fall-Ashaway, Pawcatuck, Queen-Usquepaugh, Shunock, and Wood Rivers. https://www.rivers.gov/rivers/sites/rivers/files/documents/plans/wood-pawcatuck-plan.pdf

Texas State 2024. The Meadows Center for Water and the Environment- Tornadoes. https://www.meadowscenter.txst.edu/climatechange/climatedashboard/tornadoes.html

USGS 2018. 2018 Long-term National Seismic Hazard Map. https://www.usgs.gov/media/images/2018-long-term-national-seismic-hazard-map

USGS 2022a. Droughts and Climate Change. https://www.usgs.gov/science/science-explorer/climate/droughts-and-climate-change

USGS 2022b. Introduction to the National Seismic Hazard Maps. https://www.usgs.gov/programs/earthquake-hazards/science/introduction-national-seismic-hazard-maps

10. APPENDICES

Appendix A- Adoption Resolutions

TOWN OF EXETER, RI

TOWN COUNCIL
Daniel W. Patterson, President
Raymond A. Morrissey, Jr., Vice President
Diane Bampton Allen
Olivia DeFrancesco
Calvin A. Ellis

675 Ten Rod Road
Exeter, R.I. 02822
Ph: (401) 294-3891
Fax: (401) 295-1248
clerk@exeterri.gov

TOWN OF EXETER
RHODE ISLAND

RESOLUTION 2025-05

RESOLUTION OF THE EXETER TOWN COUNCIL

<u>SUBJECT:</u> ADOPTING THE 2025 TOWNS OF EXETER AND WEST GREENWICH MULTI-JURISDICTIONAL HAZARD MITIGATION AND FLOODPLAIN MANAGEMENT PLAN UPDATE

That the Town of Exeter ("Town") adopts a "Hazard Mitigation and Floodplain Management Plan Update" Resolution as follows:

WHEREAS, the Town of Exeter's Town Council pursuant to Rhode Island statute and the Town of Exeter's Charter, is vested with the authority of administering the affairs of the Town of Exeter; and

WHEREAS, the Town recognizes the threat that natural hazards pose to people and property within the Town of Exeter; and

WHEREAS, the Federal Emergency Management Agency (FEMA) published on February 26, 2002 CFR parts 202 and 205, which require review and approval by FEMA of local Hazard Mitigation Plans as a condition for pre and post-disaster grants, and

WHEREAS, the *2025 Towns of Exeter and West Greenwich 2025 Multi-Jurisdictional Hazard Mitigation and Floodplain Management Plan Update* identifies mitigation goals and actions to reduce or eliminate long-term risk to people and property in the Town from the impacts of future hazards and disasters; and

WHEREAS, the Hazard Mitigation Planning Committee (HMPC), under direction of the Town Emergency Manager, will meet annually in January to review, monitor, and evaluate the Plan; and

WHEREAS, the HMPC will submit all annual progress reports to RIEMA and FEMA for annual CRS recertification; and

WHEREAS, adoption by the Exeter Town Council demonstrates its commitment to hazard mitigation and achieving the goals outlined in the *2025 Towns of Exeter and West Greenwich 2025 Multi-Jurisdictional Hazard Mitigation and Floodplain Management Plan Update*.

NOW THEREFORE, BE IT RESOLVED that: In accordance with Town Statute, the Town of Exeter Town Council adopts the *2025 Towns of Exeter and West Greenwich 2025 Multi-Jurisdictional Hazard Mitigation and Floodplain Management Plan Update*. While content related to the Town may require revisions to meet the plan approval requirements, changes occurring after adoption will not require the

Town to re-adopt any further iterations of the plan. Subsequent plan updates following the approval period for this plan will require separate adoption resolutions.

Approved by vote of the Exeter Town Council on this 2ND day of June, 2025.

Daniel W. Patterson
Town Council President

Raymond A. Morrissey
Town Council Vice President

Diane Bampton Allen
Town Council Member

ABSENT FROM MEETING

Olivia DeFrancesco
Town Council Member

Calvin A. Ellis
Town Council Member

IN WITNESS HEREOF, I hereby set my hand and the Official Seal of the Town of Exeter this 2ND day of June, 2025.

Lynn M. Hawkins, CMC
Town Clerk

TEL: 401-392-3800
FAX: 401-392-3805

Town of West Greenwich

INCORPORATED 1741

MAILING ADDRESS
280 VICTORY HIGHWAY
WEST GREENWICH
RHODE ISLAND 02817-2113

**TOWN OF WEST GREENWICH, RHODE ISLAND
RESOLUTION OF THE WEST GREENWICH TOWN COUNCIL
ADOPTING THE 2025 TOWNS OF EXETER AND WEST GREENWICH MULTI-JURISDICTIONAL HAZARD MITIGATION AND FLOODPLAIN MANAGEMENT PLAN UPDATE**

RESOLUTION 2025-8

That the Town of West Greenwich ("Town") adopts a "Hazard Mitigation and Floodplain Management Plan Update" Resolution as follows:

WHEREAS, the Town of West Greenwich's Town Council pursuant to Rhode Island statute and the Town of West Greenwich's Charter, is vested with the authority of administering the affairs of the Town of West Greenwich; and

WHEREAS, the Town recognizes the threat that natural hazards pose to people and property within the Town of West Greenwich; and

WHEREAS, the Town has prepared a hazard mitigation plan, hereby known as the *2025 Towns of Exeter and West Greenwich 2025 Multi-Jurisdictional Hazard Mitigation and Floodplain Management Plan Update* in accordance with federal laws, including the Robert T. Stafford Disaster Relief and Emergency Assistance Act, as amended; the National Flood Insurance Act of 1968, as amended; and the National Dam Safety Program Act, as amended; and

WHEREAS, the *2025 Towns of Exeter and West Greenwich 2025 Multi-Jurisdictional Hazard Mitigation and Floodplain Management Plan Update* identifies mitigation goals and actions to reduce or eliminate long-term risk to people and property in the Town from the impacts of future hazards and disasters; and

WHEREAS, the Hazard Mitigation Planning Committee (HMPC), under direction of the Town Emergency Manager, will meet annually in January to review, monitor, and evaluate the Plan; and

WHEREAS, the HMPC will submit all annual progress reports to RIEMA and FEMA for annual CRS recertification; and

WHEREAS, adoption by the West Greenwich Town Council demonstrates its commitment to hazard mitigation and achieving the goals outlined in the *2025 Towns of Exeter and West Greenwich 2025 Multi-Jurisdictional Hazard Mitigation and Floodplain Management Plan Update*.

NOW THEREFORE, BE IT RESOLVED that: In accordance with Town Statute, the Town of West Greenwich Town Council adopts the *2025 Towns of Exeter and West Greenwich 2025 Multi-Jurisdictional Hazard Mitigation and Floodplain Management Plan Update*. While content related to the Town may require revisions to meet the plan approval requirements, changes occurring after adoption will not require the Town to re-adopt any further iterations of the plan. Subsequent plan updates following the approval period for this plan will require separate adoption resolutions.

ADOPTED by a vote of 5 in favor and 0 against, and 0 abstaining, this 11th day of June, 2025.

WHERETO the following bear witness:

Signed: 6-11-2025

Kelly M. Laiho, Town Clerk

West Greenwich Town Council

Mark D. Boyer, President

Sheryl R. Green, Vice President

Thomas E. Mulcahey, Councilman

Charles C. Calenda, Councilman

Stephen W. Salisbury, Councilman

Appendix B- FEMA Plan Review Tool, Local Hazard Mitigation Plan

Local Mitigation Plan Review Tool

Cover Page

The Local Mitigation Plan Review Tool (PRT) demonstrates how the local mitigation plan meets the regulation in 44 CFR § 201.6 and offers states and FEMA Mitigation Planners an opportunity to provide feedback to the local governments, including special districts.

1. The Multi-Jurisdictional Summary Sheet is a worksheet that is used to document how each jurisdiction met the requirements of the plan elements (Planning Process; Risk Assessment; Mitigation Strategy; Plan Maintenance; Plan Update; and Plan Adoption).
2. The Plan Review Checklist summarizes FEMA's evaluation of whether the plan has addressed all requirements.

For greater clarification of the elements in the Plan Review Checklist, please see Section 4 of this guide. Definitions of the terms and phrases used in the PRT can be found in Appendix E of this guide.

Plan Information	
Jurisdiction(s)	Town of Exeter, Town of West Greenwich
Title of Plan	2025 Towns of Exeter and West Greenwich Multi-Jurisdictional Hazard Mitigation and Floodplain Management Plan Update
New Plan or Update	Update
Single- or Multi-Jurisdiction	Multi-jurisdiction
Date of Plan	Click or tap to enter a date.
Local Point of Contact	
Title	Dori Boardman- EMA Director
Agency	Town of Exeter
Address	675 Ten Rod Road, Exeter, RI 02822
Phone Number	401-360-4762
Email	Dori.boardman@exeterri.gov

Additional Point of Contact	
Title	Brooke Lawrence- EMA Director
Agency	Town of West Greenwich
Address	280 Victory Highway, West Greenwich, RI 02817
Phone Number	401-651-6972
Email	blawrence@rimc.org

Review Information	
State Review	
State Reviewer(s) and Title	Rae-Anne Culp, State Hazard Mitigation Officer
State Review Date	7/15/2025
FEMA Review	
FEMA Reviewer(s) and Title	Alexis Meehan, FEMA R1 Community Planner
Date Received in FEMA Region	8/6/2025
Plan Not Approved	Click or tap to enter a date.
Plan Approvable Pending Adoption	Click or tap to enter a date.
Plan Approved	**8/21/2025**

Multi-Jurisdictional Summary Sheet

In the boxes for each element, mark if the element is met (Y) or not met (N).

#	Jurisdiction Name	A. Planning Process	B. Risk Assessment	C. Mitigation Strategy	D. Plan Maintenance	E. Plan Update	F. Plan Adoption	G. HHPD Requirements	H. State Requirements
1	Town of Exeter	Y	Y	Y	Y	Y	Y	Y	Y
2	Town of West Greenwich	Y	Y	Y	Y	Y	Y	Y	Y
3									
4									
5									
6									
7									
8									
9									
10									

Plan Review Checklist

The Plan Review Checklist is completed by FEMA. States and local governments are encouraged, but not required, to use the PRT as a checklist to ensure all requirements have been met prior to submitting the plan for review and approval. The purpose of the checklist is to identify the location of relevant or applicable content in the plan by element/sub-element and to determine if each requirement has been “met” or “not met.” FEMA completes the “required revisions” summary at the bottom of each element to clearly explain the revisions that are required for plan approval. Required revisions must be explained for each plan sub-element that is “not met.” Sub-elements in each summary should be referenced using the appropriate numbers (A1, B3, etc.), where applicable. Requirements for each element and sub-element are described in detail in Section 4: Local Plan Requirements of this guide.

Plan updates must include information from the current planning process.

If some elements of the plan do not require an update, due to minimal or no changes between updates, the plan must document the reasons for that.

Multi-jurisdictional elements must cover information unique to all participating jurisdictions.

Element A: Planning Process

Element A Requirements	Location in Plan (section and/or page number)	Met / Not Met
A1. Does the plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement 44 CFR § 201.6(c)(1))		
A1-a. Does the plan document how the plan was prepared, including the schedule or time frame and activities that made up the plan’s development, as well as who was involved?	Section 2.1 and Section 2.2	Met
A1-b. Does the plan list the jurisdiction(s) participating in the plan that seek approval, and describe how they participated in the planning process?	Section 2.1 and Section 2.2	Met

Element A Requirements	Location in Plan (section and/or page number)	Met / Not Met
A2. Does the plan document an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development as well as businesses, academia, and other private and non-profit interests to be involved in the planning process? (Requirement 44 CFR § 201.6(b)(2))		
A2-a. Does the plan identify all stakeholders involved or given an opportunity to be involved in the planning process, and how each stakeholder was presented with this opportunity?	Section 2.3	Met
A3. Does the plan document how the public was involved in the planning process during the drafting stage and prior to plan approval? (Requirement 44 CFR § 201.6(b)(1))		
A3-a. Does the plan document how the public was given the opportunity to be involved in the planning process and how their feedback was included in the plan?	Section 2.4	Met
A4. Does the plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement 44 CFR § 201.6(b)(3))		
A4-a. Does the plan document what existing plans, studies, reports and technical information were reviewed for the development of the plan, as well as how they were incorporated into the document?	Section 2.5	Met

ELEMENT A REQUIRED REVISIONS
Required Revision: Click or tap here to enter text.

Element B: Risk Assessment

Element B Requirements	Location in Plan (section and/or page number)	Met / Not Met
B1. Does the plan include a description of the type, location, and extent of all natural hazards that can affect the jurisdiction? Does the plan also include information on previous occurrences of hazard events and on the probability of future hazard events? (Requirement 44 CFR § 201.6(c)(2)(i))		
B1-a. Does the plan describe all natural hazards that can affect the jurisdiction(s) in the planning area, and does it provide the rationale if omitting any natural hazards that are commonly recognized to affect the jurisdiction(s) in the planning area?	Section 3.2 and 3.2.1	Met
B1-b. Does the plan include information on the location of each identified hazard?	STS: Section 3.3.1.2 DF: Section 3.2.2.2 FL: Section 3.3.3.2 EXTS: Section 3.3.4.2 SWW: Section 3.3.5.2 BF/WF: Section 3.3.6.2 DT: Section 3.3.7.2 EXT: Section 3.3.8.2 TO: Section 3.3.9.2 EQ: Section 3.3.10.2 HAZMAT: Section 3.3.11.2 WQ: Section 3.3.12.2 CYBER: Section 3.3.13.2	Met

Element B Requirements	Location in Plan (section and/or page number)	Met / Not Met
B1-c. Does the plan describe the extent for each identified hazard?	STS: Section 3.3.1.4 DF: Section 3.2.2.4 FL: Section 3.3.3.4 EXTS: Section 3.3.4.4 SWW: Section 3.3.5.4 BF/WF: Section 3.3.6.4 DT: Section 3.3.7.4 EXT: Section 3.3.8.4 TO: Section 3.3.9.4 EQ: Section 3.3.10.4 HAZMAT: Section 3.3.11.4 WQ: Section 3.3.12.4 CYBER: Section 3.3.13.4	Met
B1-d. Does the plan include the history of previous hazard events for each identified hazard?	STS: Section 3.3.1.3 DF: Section 3.2.2.3 FL: Section 3.3.3.3 EXTS: Section 3.3.4.3 SWW: Section 3.3.5.3 BF/WF: Section 3.3.6.3 DT: Section 3.3.7.3 EXT: Section 3.3.8.3 TO: Section 3.3.9.3 EQ: Section 3.3.10.3 HAZMAT: Section 3.3.11.3 WQ: Section 3.3.12.3 CYBER: Section 3.3.13.3	Met

Element B Requirements	Location in Plan (section and/or page number)	Met / Not Met
B1-e. Does the plan include the probability of future events for each identified hazard, including the type, location and range of anticipated intensities?	<u>Probability</u> STS: Section 3.3.1.5 DF: Section 3.2.2.5 FL: Section 3.3.3.5 EXTS: Section 3.3.4.5 SWW: Section 3.3.5.5 BF/WF: Section 3.3.6.5 DT: Section 3.3.7.5 EXT: Section 3.3.8.5 TO: Section 3.3.9.5 EQ: Section 3.3.10.5 HAZMAT: Section 3.3.11.5 WQ: Section 3.3.12.5 CYBER: Section 3.3.13.5 <u>Climate Change</u> TS: Section 3.3.1.7 DF: Section 3.2.2.7 FL: Section 3.3.3.7 EXTS: Section 3.3.4.7 SWW: Section 3.3.5.7 BF/WF: Section 3.3.6.7 DT: Section 3.3.7.7 EXT: Section 3.3.8.7 TO: Section 3.3.9.7 EQ: Section 3.3.10.7 HAZMAT: Section 3.3.11.7 WQ: Section 3.3.12.7 CYBER: Section 3.3.13.7	Met
B1-f. For participating jurisdictions in a multi-jurisdictional plan, does the plan describe any hazards that are unique to and/or vary from those affecting the overall planning area?	Section 3.2	Met

Element B Requirements	Location in Plan (section and/or page number)	Met / Not Met
B2. Does the plan include a summary of the jurisdiction's vulnerability and the impacts on the community from the identified hazards? Does this summary also address NFIP-insured structures that have been repetitively damaged by floods? (Requirement 44 CFR § 201.6(c)(2)(ii))		
B2-a. Does the plan provide an overall summary of each jurisdiction's vulnerability to the identified hazards?	Section 3.4.1	Met
B2-b. For each participating jurisdiction, does the plan describe the potential impacts of each of the identified hazards on each participating jurisdiction?	TS: Section 3.3.1.6 DF: Section 3.2.2.6 FL: Section 3.3.3.6 EXTS: Section 3.3.4.6 SWW: Section 3.3.5.5 BF/WF: Section 3.3.6.6 DT: Section 3.3.7.6 EXT: Section 3.3.8.6 TO: Section 3.3.9.6 EQ: Section 3.3.10.6 HAZMAT: Section 3.3.11.6 WQ: Section 3.3.12.6 CYBER: Section 3.3.13.6	Met
B2-c. Does the plan address NFIP-insured structures within each jurisdiction that have been repetitively damaged by floods?	Section 4.3- No RL structures	Met

ELEMENT B REQUIRED REVISIONS
Required Revision: Click or tap here to enter text.

Element C: Mitigation Strategy

Element C Requirements	Location in Plan (section and/or page number)	Met / Not Met
C1. Does the plan document each participant's existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs? (Requirement 44 CFR § 201.6(c)(3))		
C1-a. Does the plan describe how the existing capabilities of each participant are available to support the mitigation strategy? Does this include a discussion of the existing building codes and land use and development ordinances or regulations?	Section 4.1 Section 4.2	Met
C1-b. Does the plan describe each participant's ability to expand and improve the identified capabilities to achieve mitigation?	Section 4.1.1	Met
C2. Does the plan address each jurisdiction's participation in the NFIP and continued compliance with NFIP requirements, as appropriate? (Requirement 44 CFR § 201.6(c)(3)(ii))		
C2-a. Does the plan contain a narrative description or a table/list of their participation activities?	Section 4.3	Met
C3. Does the plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards? (Requirement 44 CFR § 201.6(c)(3)(i))		
C3-a. Does the plan include goals to reduce the risk from the hazards identified in the plan?	Section 5.1	Met
C4. Does the plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? (Requirement 44 CFR § 201.6(c)(3)(ii))		
C4-a. Does the plan include an analysis of a comprehensive range of actions/projects that each jurisdiction considered to reduce the impacts of hazards identified in the risk assessment?	Section 5.2 and Section 5.4	Met
C4-b. Does the plan include one or more action(s) per jurisdiction for each of the hazards as identified within the plan's risk assessment?	Section 5.4	Met

Element C Requirements	Location in Plan (section and/or page number)	Met / Not Met
C5. Does the plan contain an action plan that describes how the actions identified will be prioritized (including a cost-benefit review), implemented, and administered by each jurisdiction? (Requirement 44 CFR § 201.6(c)(3)(iv)); (Requirement §201.6(c)(3)(iii))		
C5-a. Does the plan describe the criteria used for prioritizing actions?	Section 5.3	Met
C5-b. Does the plan provide the position, office, department or agency responsible for implementing/administrating the identified mitigation actions, as well as potential funding sources and expected time frame?	Section 5.4	Met

ELEMENT C REQUIRED REVISIONS
Required Revision: Click or tap here to enter text.

Element D: Plan Maintenance

Element D Requirements	Location in Plan (section and/or page number)	Met / Not Met
D1. Is there discussion of how each community will continue public participation in the plan maintenance process? (Requirement 44 CFR § 201.6(c)(4)(iii))		
D1-a. Does the plan describe how communities will continue to seek future public participation after the plan has been approved?	Section 6.1	Met
D2. Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a five-year cycle)? (Requirement 44 CFR § 201.6(c)(4)(i))		
D2-a. Does the plan describe the process that will be followed to track the progress/status of the mitigation actions identified within the Mitigation Strategy, along with when this process will occur and who will be responsible for the process?	Section 6.2	Met

Element D Requirements	Location in Plan (section and/or page number)	Met / Not Met
D2-b. Does the plan describe the process that will be followed to evaluate the plan for effectiveness? This process must identify the criteria that will be used to evaluate the information in the plan, along with when this process will occur and who will be responsible.	Section 6.2.3 Section 6.2.5	Met
D2-c. Does the plan describe the process that will be followed to update the plan, along with when this process will occur and who will be responsible for the process?	Section 6.2.4 Section 6.2.5	Met
D3. Does the plan describe a process by which each community will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate? (Requirement 44 CFR § 201.6(c)(4)(ii))		
D3-a. Does the plan describe the process the community will follow to integrate the ideas, information and strategy of the mitigation plan into other planning mechanisms?	Section 6.3	Met
D3-b. Does the plan identify the planning mechanisms for each plan participant into which the ideas, information and strategy from the mitigation plan may be integrated?	Section 6.3	Met
D3-c. For multi-jurisdictional plans, does the plan describe each participant's individual process for integrating information from the mitigation strategy into their identified planning mechanisms?	Section 6.3	Met

ELEMENT D REQUIRED REVISIONS
Required Revision: Click or tap here to enter text.

Element E: Plan Update

Element E Requirements	Location in Plan (section and/or page number)	Met / Not Met
E1. Was the plan revised to reflect changes in development? (Requirement 44 CFR § 201.6(d)(3))		
E1-a. Does the plan describe the changes in development that have occurred in hazard-prone areas that have increased or decreased each community's vulnerability since the previous plan was approved?	Section 7.1	Met
E2. Was the plan revised to reflect changes in priorities and progress in local mitigation efforts? (Requirement 44 CFR § 201.6(d)(3))		
E2-a. Does the plan describe how it was revised due to changes in community priorities?	Section 7.2	Met
E2-b. Does the plan include a status update for all mitigation actions identified in the previous mitigation plan?	Section 5.2	Met
E2-c. Does the plan describe how jurisdictions integrated the mitigation plan, when appropriate, into other planning mechanisms?	Section 7.3	Met

ELEMENT E REQUIRED REVISIONS
Required Revision**:** Click or tap here to enter text.

Element F: Plan Adoption

Element F Requirements	Location in Plan (section and/or page number)	Met / Not Met
F1. For single-jurisdictional plans, has the governing body of the jurisdiction formally adopted the plan to be eligible for certain FEMA assistance? (Requirement 44 CFR § 201.6(c)(5))		
F1-a. Does the participant include documentation of adoption?	Section 8; Appendix A	Met

Element F Requirements	Location in Plan (section and/or page number)	Met / Not Met
F2. For multi-jurisdictional plans, has the governing body of each jurisdiction officially adopted the plan to be eligible for certain FEMA assistance? (Requirement 44 CFR § 201.6(c)(5))		
F2-a. Did each participant adopt the plan and provide documentation of that adoption?	Section 8; Appendix A	Met
ELEMENT F REQUIRED REVISIONS		
Required Revision: Click or tap here to enter text.		

Element G: High Hazard Potential Dams (Optional)

HHPD Requirements	Location in Plan (section and/or page number)	Met / Not Met
HHPD1. Did the plan describe the incorporation of existing plans, studies, reports and technical information for HHPDs?		
HHPD1-a. Does the plan describe how the local government worked with local dam owners and/or the state dam safety agency?	Section 4.2.3	Met
HHPD1-b. Does the plan incorporate information shared by the state and/or local dam owners?	Section 3.3.2	Met
HHPD2. Did the plan address HHPDs in the risk assessment?		
HHPD2-a. Does the plan describe the risks and vulnerabilities to and from HHPDs?	Section 3.3.2; Section 3.4.3	Met
HHPD2-b. Does the plan document the limitations and describe how to address deficiencies?	Section 4.2.3	Met
HHPD3. Did the plan include mitigation goals to reduce long-term vulnerabilities from HHPDs?		
HHPD3-a. Does the plan address how to reduce vulnerabilities to and from HHPDs as part of its own goals or with other long-term strategies?	Section 5.1	Met
HHPD3-b. Does the plan link proposed actions to reducing long-term vulnerabilities that are consistent with its goals?	Section 5.4	Met

HHPD Requirements	Location in Plan (section and/or page number)	Met / Not Met
HHPD4-a. Did the plan include actions that address HHPDs and prioritize mitigation actions to reduce vulnerabilities from HHPDs?		
HHPD4-a. Does the plan describe specific actions to address HHPDs?	Section 5.4	Met
HHPD4-b. Does the plan describe the criteria used to prioritize actions related to HHPDs?	Section 5.3	Met
HHPD4-c. Does the plan identify the position, office, department or agency responsible for implementing and administering the action to mitigate hazards to or from HHPDs?	Section 5.4	Met

HHPD Required Revisions
Required Revision: Click or tap here to enter text.

Element H: Additional State Requirements (Optional)

Element H Requirements	Location in Plan (section and/or page number)	Met / Not Met
This space is for the State to include additional requirements.		
Provide 1 month out of the year that you will hold a Hazard Mitigation meeting per the requirements below (2 times per year is preferred, but a minimum of 1 is required).	Section 6.2.2	Met

Plan Assessment

These comments can be used to help guide your annual/regularly scheduled updates and the next plan update.

Element A. Planning Process

Strengths

- Community officials and leaders from each participating jurisdiction were engaged in the planning process. This helps the plan reflect how vulnerable the planning area is to hazard impacts. The plan can also reflect the area's capabilities and concerns.
- The public outreach strategy gave the public a number of ways to take part and give feedback. In particular, the coordination with the Exeter-West Greenwich High School to invite students to participate on the planning team as a student representative or assist with community engagement was a great effort to get buy-in from local students. This should be highlighted as a best practice and should be encouraged to be offered earlier on in the academic year for the next update of this plan.
- The Draft MDHM&FMP scavenger hunt as well as the prizes for gift cards to local establishments is a very creative and unique approach to engage the public.
- The plan acknowledges the barriers to having a planning process that takes the whole community into account. It discusses how these challenges were addressed in the planning process and the public input strategies that were utilized by the HMPC.
- The planning team used a range of studies, reports and plans. The plan draws from local, state, federal and other resources. It is in-depth. (such as Municipal Community Resilience Building Summaries, High Hazard Dam EAPs, historical newspapers, Wood-Pawtucket Watershed Flood Resiliency Management Plan (2017), etc.).

Opportunities for Improvement

- N/A

Element B. Risk Assessment

Strengths

- Hazard profiles are well defined. There is a lot of detail about the context of the hazard and the risk it presents.
- The plan clearly details the state and federal disaster declarations that included this planning area. The historical events that led to a disaster declaration can be referenced. They note the location, extent, and potential impacts of a severe hazard event.
- Using Hazus in the hazard mitigation plan is a great way to learn how historic and future events might affect the community. Keep enhancing the Hazus analyses with more local data, to raise their accuracy.

Opportunities for Improvement

- Identify any data gaps in the studies, reports and/or datasets used for the risk assessment. This can help keep the plan up to date. When new or updated information comes out, its need has already been identified.
- Problem statements could help sum up the vulnerabilities laid out in the risk assessment. They could also lead to potential actions that are specific to each hazard, to include in the mitigation strategy. This would connect the two sections of the plan.

Element C. Mitigation Strategy

Strengths

- The way participants carry out their floodplain regulations is well described, detailed and clear. It includes how they carry out their substantial damage provisions.
- The plan addresses the specific areas and capabilities within the Towns that can be expanded upon or improved.
- The plan's goals and mitigation actions are integrated with other local planning goals. This will help to carry out the mitigation strategy. They relate directly and clearly to the mitigation actions and to the risks and vulnerabilities.

Opportunities for Improvement

- For a plan update, note how the community's capabilities have changed in the last 5 years. OR discuss changes over the span of the current hazard mitigation plan.
- There are a significant number of proposed mitigation actions (91 in total) and many of these actions are not mitigation actions and are focused on emergency services (response/preparedness). The mitigation of future risk should be the focus of a mitigation strategy. Mitigation actions reduce long-term risk; they are not taken to prepare for or respond to a hazard events.
- Multi-hazard and all-hazard actions must be directly linked to the vulnerabilities named in the risk assessment. Still, a community is strongly advised to develop a unique action for each hazard in the plan.

Element D. Plan Maintenance

Strengths

- The plan proposes a system to track mitigation actions. This makes it easy to monitor progress. It will be easy to know which actions are advancing and which may have run into a hurdle.
- The plan includes a realistic timeline for completing the plan update. It takes into account the need to apply for a planning grant well before the plan expires. (The process to acquire grant funding can take a while.)
- The HMP spells out how each community will use its data, goals, actions and other elements in other plans and planning processes.

Opportunities for Improvement

- Discuss the strength of the last plan's maintenance strategy. Did the community face any hardships during the monitoring, evaluating and updating? Were any strong elements carried over in the plan update? Explain how the last plan's maintenance shaped those items planned for the next five years.
- Think of other plans where one could add hazard mitigation data, goals and strategies. This could be economic development plans, general plans, and others.

Element E. Plan Update

Strengths

- The progress made on mitigation actions is clear and in-depth. It shows cumulative progress since the first plan was approved.
- Priorities are based on the current conditions and vision of the community. Priorities reflect the planning process, the risk assessment, and the mitigation strategy. This way, the plan is truly the community's plan.

Opportunities for Improvement

- Give more details on how development trends have changed since the last plan update. For example, add data on building permits, major renovations, population changes, or the number of structures in the 1%-annual-chance floodplain.
- Keep in mind that changes in development, especially those associated with mitigation actions, can reduce risk. When this is the case, highlight it as a success!

Element G. HHPD Requirements (Optional)

Strengths

- The plan clearly identifies and describes the limitations to coordinating dam safety and proposes action in the mitigation strategy to address how they can be resolved.
- The dams' inundation maps and information from the inspection reports and EAPs are thoroughly discussed and included in the risk assessment. Figure 11 does a great job of synthesizing this inundation information. This can be further improved by including important community lifelines and critical infrastructure to highlight which assets would be impacted visually.

Opportunities for Improvement

- The plan describes how the local government(s) worked with the state dam safety agency but does not fully address how and if there was any coordination with the local dam owners in this update of the plan.
- Further develop the potential impacts section for dam failure to address economic, environmental and social impacts of HHPD-related flooding. This can be addressed by describing the estimated potential economic impacts of dam failure on local businesses and community assets that are located in the HHPD inundation zones, how natural features located in an HHPD

inundation zone could be affected by dam failure, and how populations in an HHPD zone could be affected by dam failure.

Element H. Additional State Requirements (Optional)

Strengths

- [insert comments]

Opportunities for Improvement

- [insert comments]

Appendix C- CRS Activity 510: Floodplain Management Planning Checklist

Community: **Town of Exeter, RI**
Town of West Greenwich, RI

Towns of Exeter and West Greenwich, RI 2025 Hazard Mitigation and Floodplain Management Plan Update

510 FLOODPLAIN MANAGEMENT PLANNING

512.a Floodplain Management Planning (FMP)

Credit Points: *Enter the section or page number in the plan where each credited item can be found. Add notes on AW-510-4.*

CRS Step	Section/Page	Item Score	Step Total
1. Organize to prepare the plan. (15 Max)			
a. Involvement of Office Responsible for Community Planning (4)	Section 2.2	4	15
b. Planning committee of department staff (9)	Section 2.2	9	
c. Process formally created by the community's governing board (2)	Section 2.2	2	
2. Involve the public. (120 Max)			
a. Planning process conducted through a planning committee (60)	Section 2.2	60	120
b. Public meetings held at the beginning of the planning process (15)	Section 2.1/Table 3	15	
c. Public meeting held on draft plan (15)	Section 2.1/Table 3	15	
d . Other public information activities to encourage input (Up to 30)	Section 2.4, Appendix D	30	
3. Coordinate with other agencies. (35 Max)			
a. Review of existing studies and plans (required) (5)	Section 2.5	5	35
b. coordinating with communities and other agencies (Up to 30)	Section 2.3	30	
4. Assess the hazard. (Max 35)			
a. Plan includes an assessment of the flood hazard (REQUIRED) with:			
(1) A map of known flood hazards (5)	Section 3.3.3.2, Appendix L	5	35
(2) A description of known flood hazard (5)	Section 3.3.3.1	5	
(3) A discussion of past floods (5)	Section 3.3.3.3	5	
b. Plan includes assessment of less frequent floods (10)	Section 3.3.3.1, Section 3.3.2	10	
c. Plan includes assessment of areas likely to flood (5)	Section 3.3.3.2	5	
d. The plan describes other natural hazards (REQUIRED FOR DMA) (5)	Section 3.3	5	

Community: **Town of Exeter, RI**
Town of West Greenwich, RI

5. Assess the problem. (Max 52)			
a. Summary of each hazard identified in the hazard assessment and their community impact (REQUIRED) (2)	Section 3.2	2	52
b. Description of the impact of the hazards on: (Max 25)			
(1) Life, safety, health, procedures for warning and evacuation (5)	Section 3.3.3.6	5	
(2) Public health including health hazards to floodwaters/mold (5)	Section 3.3.3.6	5	
(3) Critical facilities and infrastructure (5)	Section 3.3.3.6	5	
(4) The community's economy and tax base (5)	Section 3.3.3.6	5	
(5) Number and type of affected buildings (5)	Section 3.4.5, Section 3.4.6	5	
**c. Review of all damaged buildings/flood insurance claims (5)	Section 4.3	5	
d. Areas that provide natural floodplain functions (5)	Section 3.3.3.2	5	
e. Development/redevelopment/Population Trends (7)	Section 1.4, Section 3.4.7	7	
f. Impact of future flooding conditions outlined in Step 4, item c (8)	Section 3.3.3.6, Section 3.3.3.7	8	
** RL Category: (Insert A, B or C)	0 RL properties in either Town	A	
6. Set goals. (required) (2)	Section 5.1	2	2
7. Review possible activities. (Max 35)	Section 5.4		
a. Preventive activities (5)	Section 5.4	5	35
b. Floodplain Management Regulatory/current & future conditions (5)	Section 5.4	5	
c. Property protection activities (5)	Section 5.4	5	
d. Natural resource protection activities (5)	Section 5.4	5	
e. Emergency services activities (5)	Section 5.4	5	
f. Structural projects (5)	Section 5.4	5	
g . Public information activities (5)	Section 5.4	5	
8. Draft an action plan. (Max 60)			
a. Actions must be prioritized (required)			
1. Recommendations for activities from two of the six categories (10)			

Community: **Town of Exeter, RI**
Town of West Greenwich, RI

2. Recommendations for activities from three of the six categories (20)			60
3. Recommendations for activities from four of the six categories (30)			
4. Recommendations for activities from five of the six categories (45)	Section 5.4	45	
b. Post-disaster mitigation policies and procedures (10)	Section 4.4	10	
c. Action items for mitigation of other hazards (5)	Section 5.4	5	
9. Adopt the plan. (2)	Adopted XX	2	2
10. Implement, evaluate and revise.(Max 26)			
a. Procedures to monitor and recommend revisions (required) (2)	Section 6.2	2	8
b. Same planning committee or successor committee that qualifies under Section 511.a.2 (a) does the evaluation (24)	Section 6.2	6	

FMP= 364

Notes/Comments: Note if step 5c is missed, or if score is capped at 50 points, reference FEMA approval

Appendix D- Public Outreach Activities

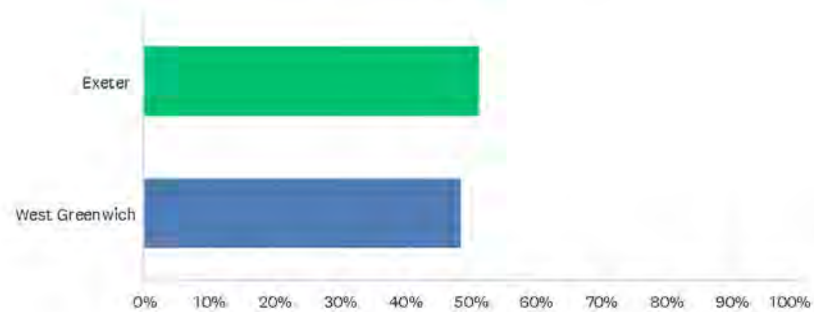
<u>Survey Responses</u>

The public survey was available from October 1, 2025 to May 20, 2025. A total of 35 responses were received.

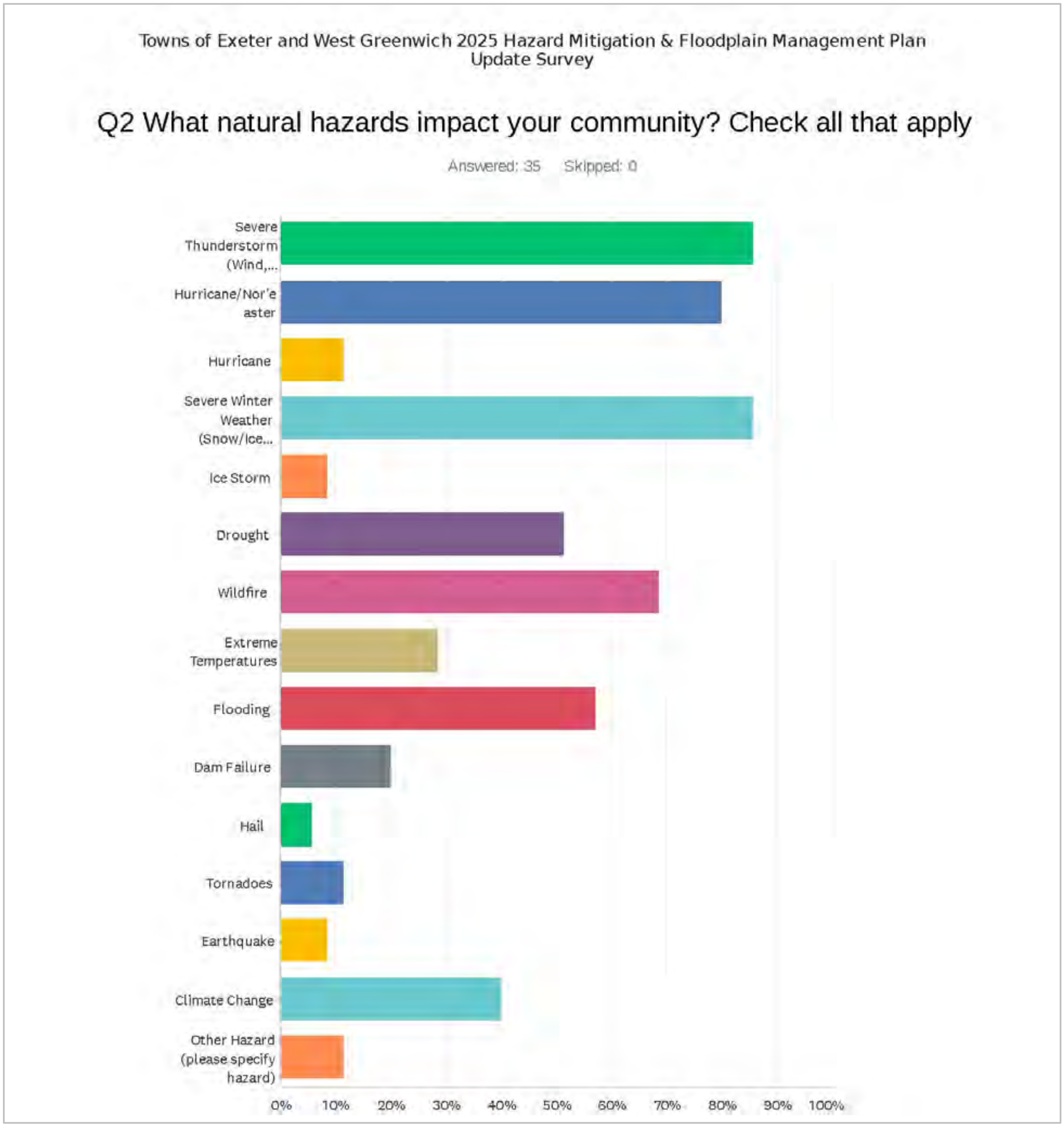
Towns of Exeter and West Greenwich 2025 Hazard Mitigation & Floodplain Management Plan Update Survey

Q1 Which Town do you live in?

Answered: 35 Skipped: 0



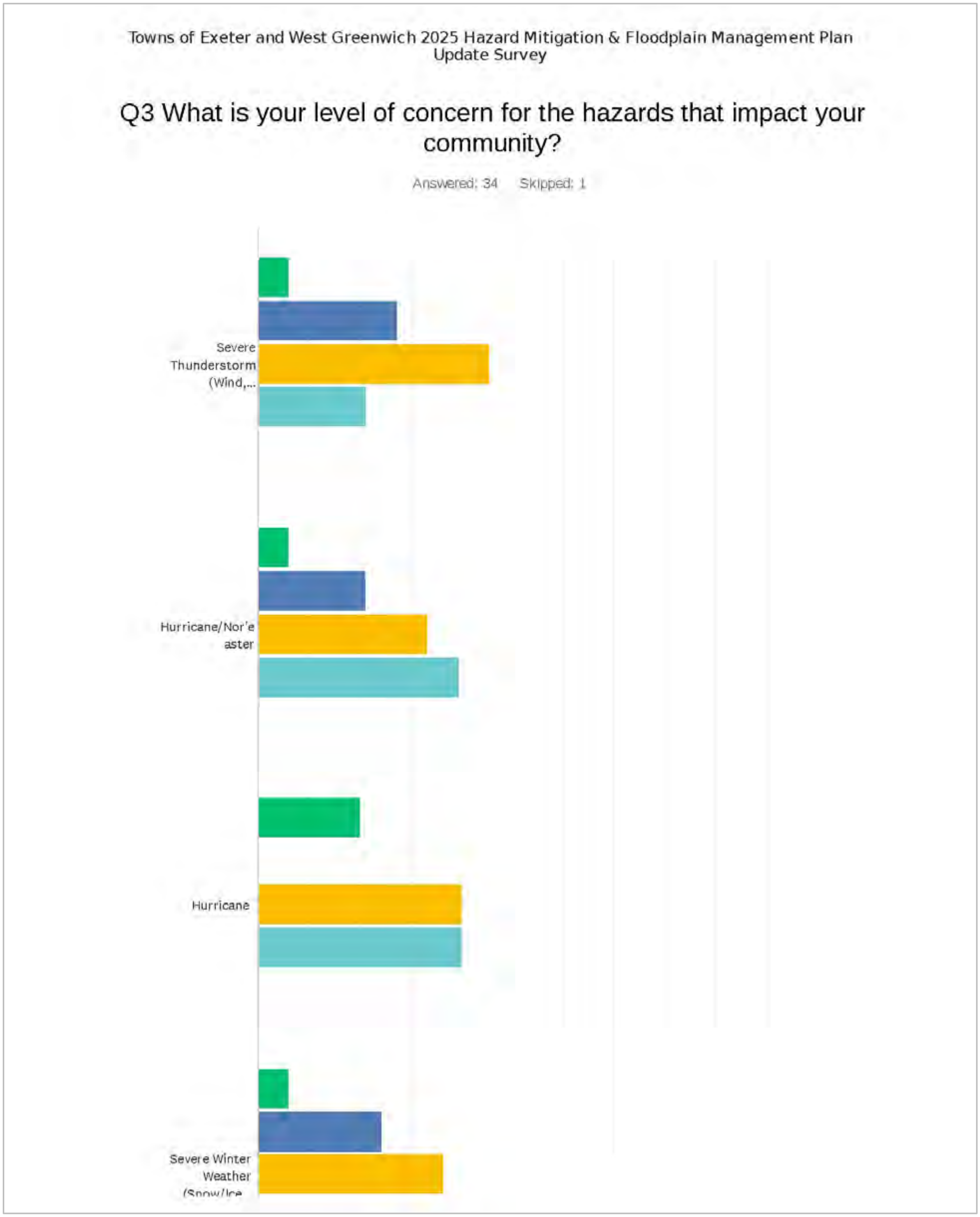
ANSWER CHOICES	RESPONSES	
Exeter	51.43%	18
West Greenwich	48.57%	17
TOTAL		35

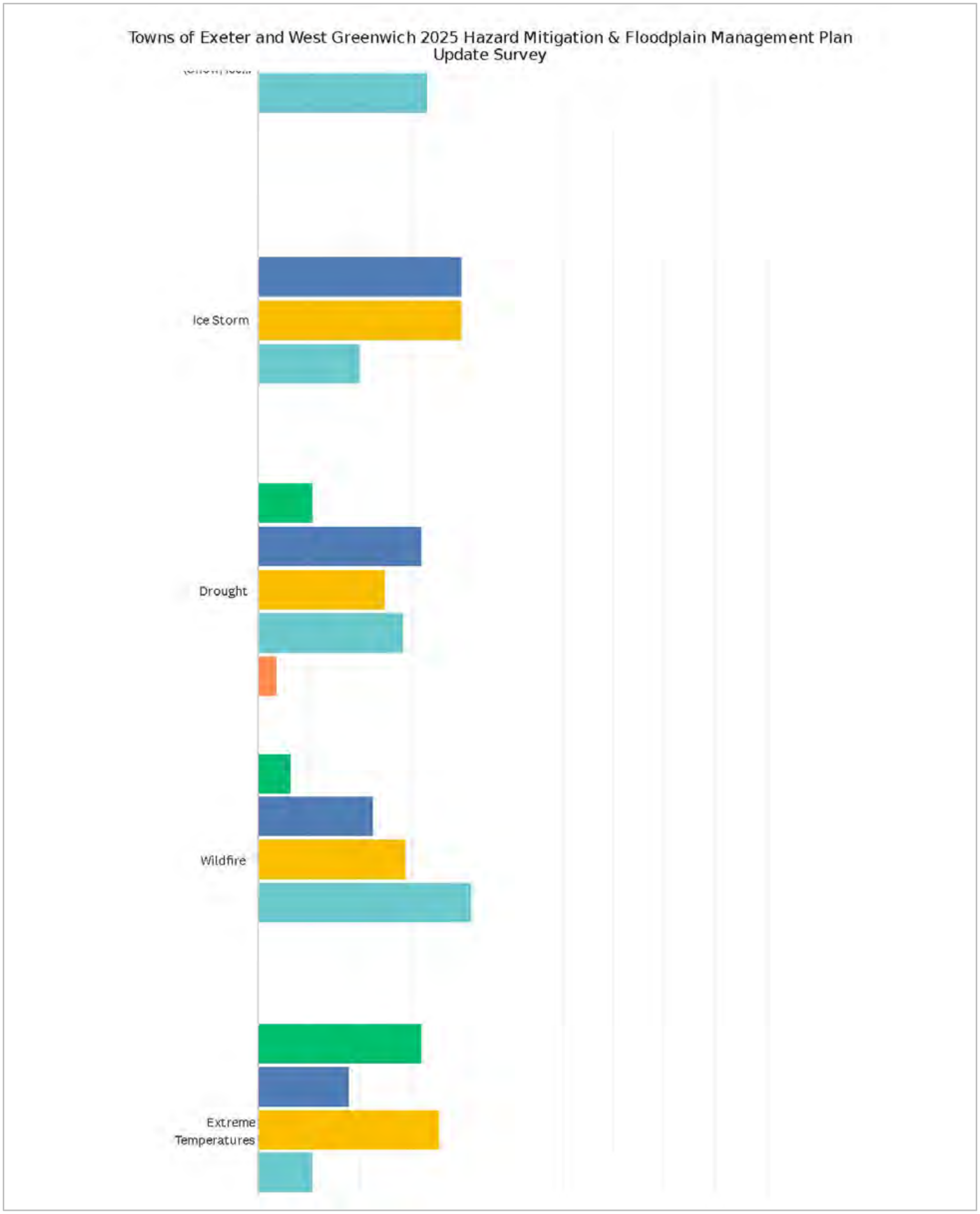

Towns of Exeter and West Greenwich 2025 Hazard Mitigation & Floodplain Management Plan Update Survey
Q2 What natural hazards impact your community? Check all that apply
Answered: 35 Skipped: 0
Severe Thunderstorm (Wind,...
Hurricane/Nor'e aster
Hurricane
Severe Winter Weather (Snow/Ice...
Ice Storm
Drought
Wildfire
Extreme Temperatures
Flooding
Dam Failure
Hail
Tornadoes
Earthquake
Climate Change
Other Hazard (please specify hazard)
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%

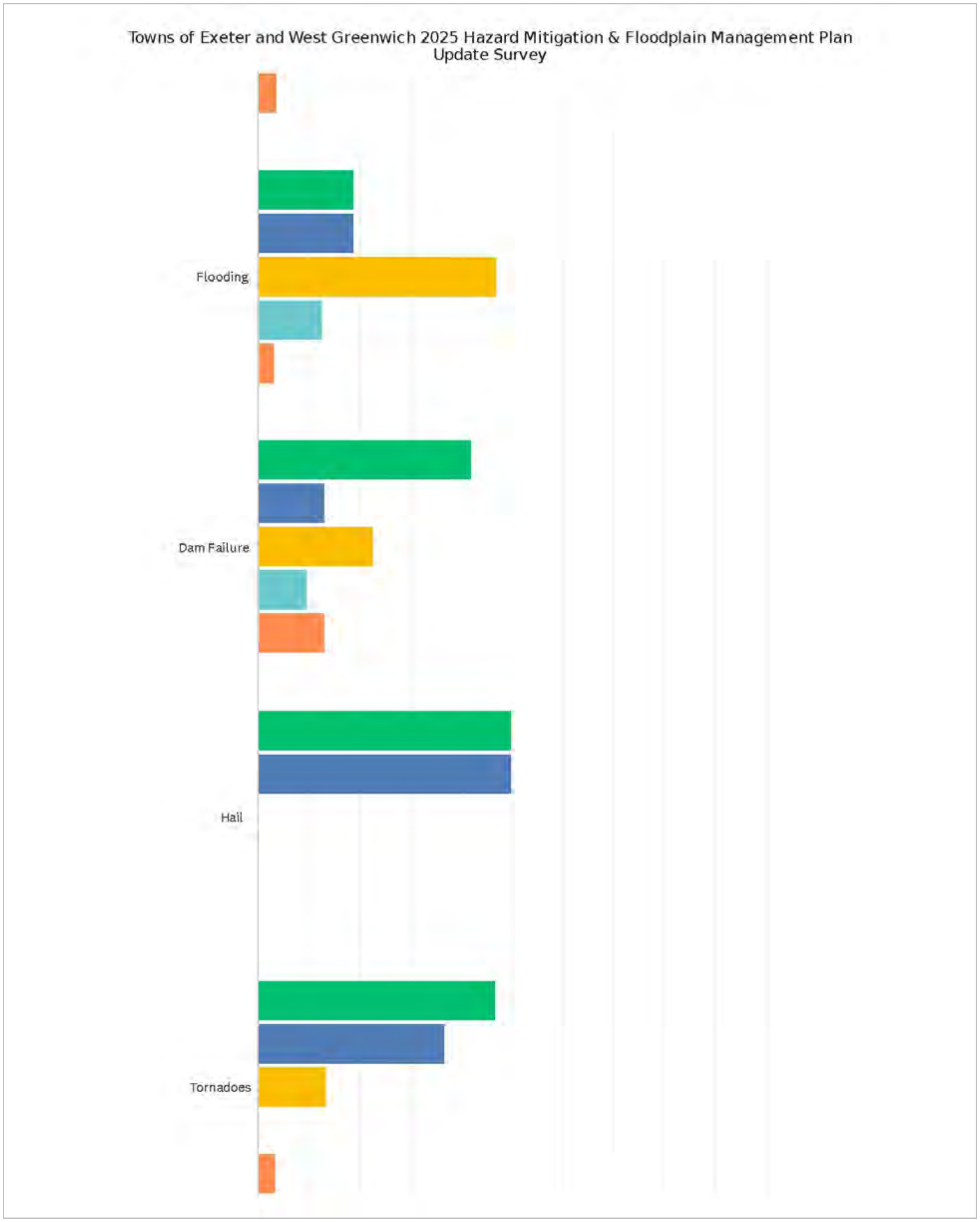
Towns of Exeter and West Greenwich 2025 Hazard Mitigation & Floodplain Management Plan Update Survey

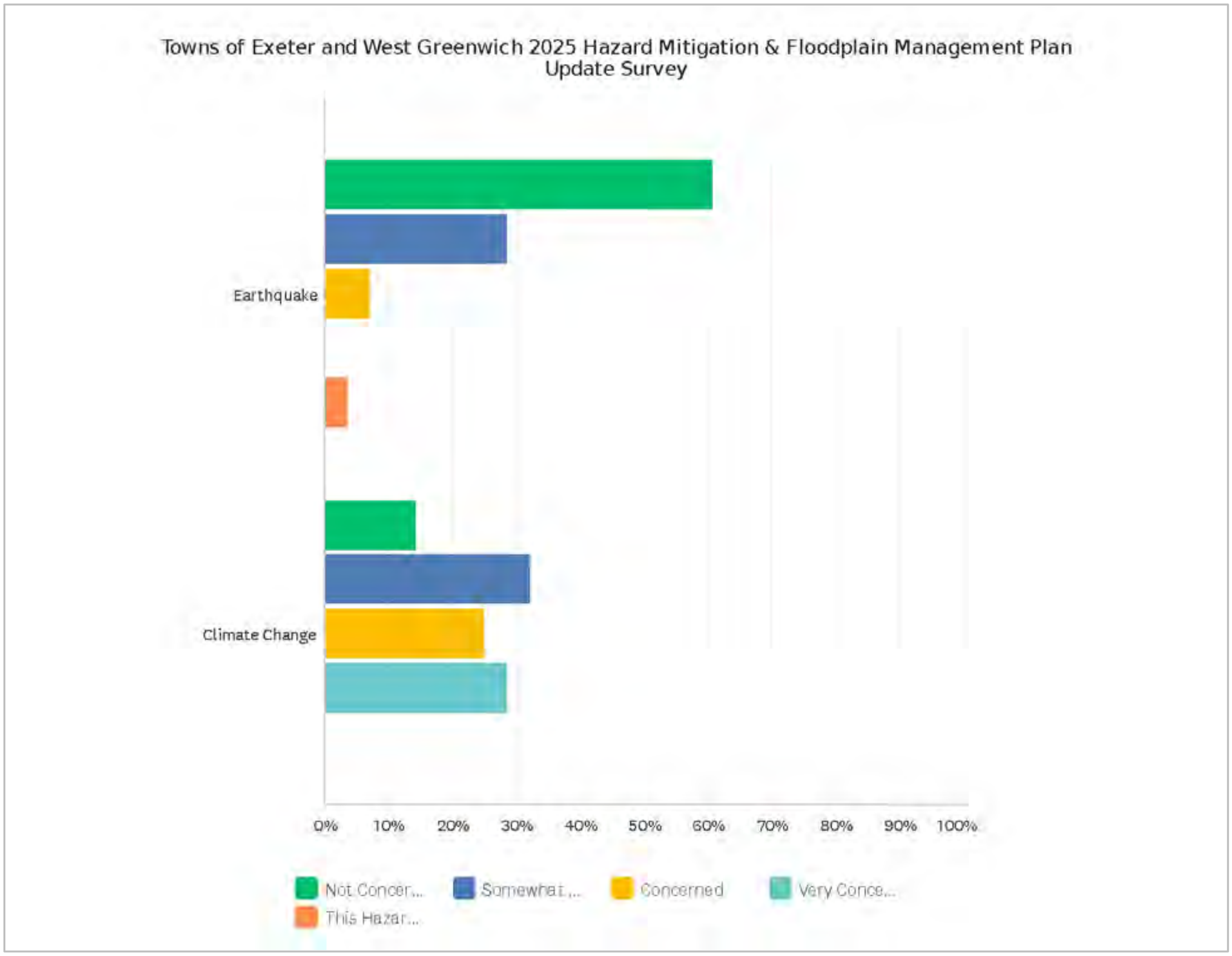
ANSWER CHOICES	RESPONSES	
Severe Thunderstorm (Wind, Lightning Hail)	85.71%	30
Hurricane/Nor'easter	80.00%	28
Hurricane	11.43%	4
Severe Winter Weather (Snow/Ice Storm)	85.71%	30
Ice Storm	8.57%	3
Drought	51.43%	18
Wildfire	68.57%	24
Extreme Temperatures	28.57%	10
Flooding	57.14%	20
Dam Failure	20.00%	7
Hail	5.71%	2
Tornadoes	11.43%	4
Earthquake	8.57%	3
Climate Change	40.00%	14
Other Hazard (please specify hazard)	11.43%	4
Total Respondents: 35		

#	OTHER HAZARD (PLEASE SPECIFY HAZARD)	DATE
1	Chemical Pollutants	5/27/2025 9:47 AM
2	power loss	11/19/2024 10:27 AM
3	Power loss	11/19/2024 10:16 AM
4	cyanobacteria	11/7/2024 2:20 PM


Towns of Exeter and West Greenwich 2025 Hazard Mitigation & Floodplain Management Plan Update Survey
Q3 What is your level of concern for the hazards that impact your community?
Answered: 34 Skipped: 1
Severe Thunderstorm (Wind,...
Hurricane/Nor'e aster
Hurricane
Severe Winter Weather


Towns of Exeter and West Greenwich 2025 Hazard Mitigation & Floodplain Management Plan Update Survey
Ice Storm
Drought
Wildfire
Extreme Temperatures


Towns of Exeter and West Greenwich 2025 Hazard Mitigation & Floodplain Management Plan Update Survey
Flooding
Dam Failure
Hail
Tornadoes


Towns of Exeter and West Greenwich 2025 Hazard Mitigation & Floodplain Management Plan Update Survey
Earthquake
Climate Change
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Not Concer...
Somewhat ...
Concerned
Very Conce...
This Hazar...

Towns of Exeter and West Greenwich 2025 Hazard Mitigation & Floodplain Management Plan Update Survey

	NOT CONCERNED	SOMEWHAT CONCERNED	CONCERNED	VERY CONCERNED	THIS HAZARD DOES NOT IMPACT MY COMMUNITY	TOTAL	WEIGHTED AVERAGE
Severe Thunderstorm (Wind, Lightning, Hail)	6.06% 2	27.27% 9	45.45% 15	21.21% 7	0.00% 0	33	2.82
Hurricane/Nor'easter	6.06% 2	21.21% 7	33.33% 11	39.39% 13	0.00% 0	33	3.06
Hurricane	20.00% 1	0.00% 0	40.00% 2	40.00% 2	0.00% 0	5	3.00
Severe Winter Weather (Snow/Ice Storm)	6.06% 2	24.24% 8	36.36% 12	33.33% 11	0.00% 0	33	2.97
Ice Storm	0.00% 0	40.00% 2	40.00% 2	20.00% 1	0.00% 0	5	2.80
Drought	10.71% 3	32.14% 9	25.00% 7	28.57% 8	3.57% 1	28	2.74
Wildfire	6.45% 2	22.58% 7	29.03% 9	41.94% 13	0.00% 0	31	3.06
Extreme Temperatures	32.14% 9	17.86% 5	35.71% 10	10.71% 3	3.57% 1	28	2.26
Flooding	18.75% 6	18.75% 6	46.88% 15	12.50% 4	3.13% 1	32	2.55
Dam Failure	41.94% 13	12.90% 4	22.58% 7	9.68% 3	12.90% 4	31	2.00
Hail	50.00% 4	50.00% 4	0.00% 0	0.00% 0	0.00% 0	8	1.50
Tornadoes	46.67% 14	36.67% 11	13.33% 4	0.00% 0	3.33% 1	30	1.66
Earthquake	60.71% 17	28.57% 8	7.14% 2	0.00% 0	3.57% 1	28	1.44
Climate Change	14.29% 4	32.14% 9	25.00% 7	28.57% 8	0.00% 0	28	2.68

#	OTHER HAZARD (PLEASE SPECIFY HAZARD AND LEVEL OF CONCERN)	DATE
1	Power loss- concerned	11/19/2024 10:27 AM
2	Power loss- concerned	11/19/2024 10:16 AM
3	cyanobacteria- very concerned	11/7/2024 2:20 PM

Towns of Exeter and West Greenwich 2025 Hazard Mitigation & Floodplain Management Plan Update Survey

Q4 What critical facilities and infrastructure in your community do you rely on? (Example: hospital, bridges, roads, school, etc.)

Answered: 32 Skipped: 3

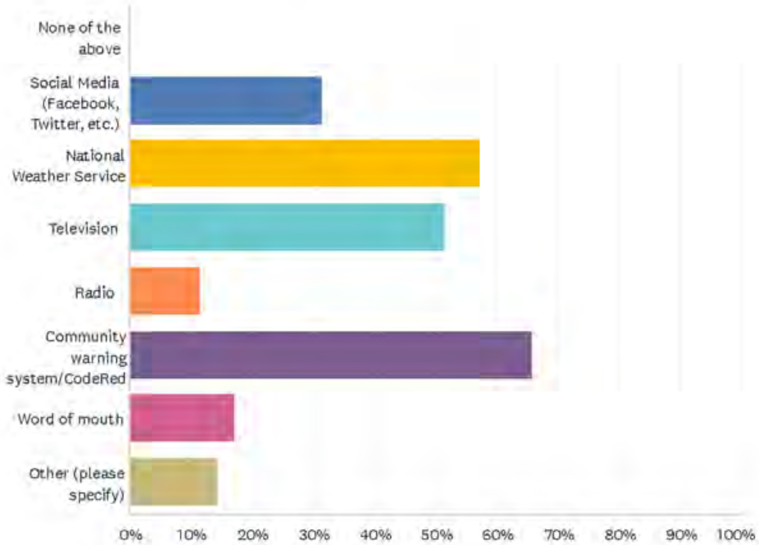
#	RESPONSES	DATE
1	Fire, rescue, police, public works	5/27/2025 9:47 AM
2	snow plowing, police, fire, rescue	5/27/2025 9:45 AM
3	plows/tree cuttings	5/27/2025 9:41 AM
4	Fire department	5/27/2025 9:39 AM
5	plowing, road repair, fire, rescue, police, emergency shelter, dispensing of water	5/27/2025 9:36 AM
6	Street maintenance- bridge upkeep	5/27/2025 9:34 AM
7	Roads, town services such as snow removal. Tree trimming. Drainage ditches	1/17/2025 11:07 AM
8	town offices, schools, fire, police, etc.	11/21/2024 10:00 AM
9	schools, police dept- emergency services	11/19/2024 10:29 AM
10	snow plowing, emergency services	11/19/2024 10:27 AM
11	police + fire	11/19/2024 10:23 AM
12	Snow removal, fire, ems	11/19/2024 10:19 AM
13	fire + emergency rescue	11/19/2024 10:16 AM
14	Fire, rescue, police, town roads	11/19/2024 10:14 AM
15	keeping electrical wires clear of tree branches, snow plowing in winter	11/7/2024 2:43 PM
16	snow plowing	11/7/2024 2:41 PM
17	Town Hall Operations to complete my duties as Tax Assessor. Phone lines/Internet connection/Access to files/programs.	11/7/2024 2:39 PM
18	Roads	11/7/2024 2:34 PM
19	Town government, emergency management	11/7/2024 2:33 PM
20	Power	11/7/2024 2:30 PM
21	the roads	11/7/2024 2:27 PM
22	none	11/7/2024 2:23 PM
23	Fire, police, Medical emergency services, Boone Lake Dam	11/7/2024 2:21 PM
24	dams, fire service, police	11/7/2024 2:20 PM
25	Fire District	11/7/2024 2:16 PM
26	Plain Meeting House Road - potential of flooding Power lines - falling (dead) trees and branches taking out lines	11/6/2024 5:33 AM
27	Interstate 95, Lake Mishnock Fire Department, EWG School System, Kent County Water Authority, Secondary major roads (Rt. 3, Hopkins Hill Rd., Division Rd., Rt. 102).	10/31/2024 12:05 PM
28	Roads, bridges, electric and emergency services	10/6/2024 5:59 AM
29	Bridges	10/5/2024 4:16 PM
30	Road and bridges internet	10/4/2024 10:44 AM

31	roads, bridges, etc.	10/3/2024 4:56 PM
32	Roads	10/1/2024 2:35 PM

Towns of Exeter and West Greenwich 2025 Hazard Mitigation & Floodplain Management Plan Update Survey

Q5 How do you receive warnings regarding hazard events? Please check all that apply.

Answered: 35 Skipped: 0



ANSWER CHOICES	RESPONSES	
None of the above	0.00%	0
Social Media (Facebook, Twitter, etc.)	31.43%	11
National Weather Service	57.14%	20
Television	51.43%	18
Radio	11.43%	4
Community warning system/CodeRed	65.71%	23
Word of mouth	17.14%	6
Other (please specify)	14.29%	5
Total Respondents: 35		

#	OTHER (PLEASE SPECIFY)	DATE
1	Cell phone emergency text	5/27/2025 9:47 AM
2	neighbors/family	11/19/2024 10:19 AM
3	Text from Town Clerk	11/7/2024 2:39 PM

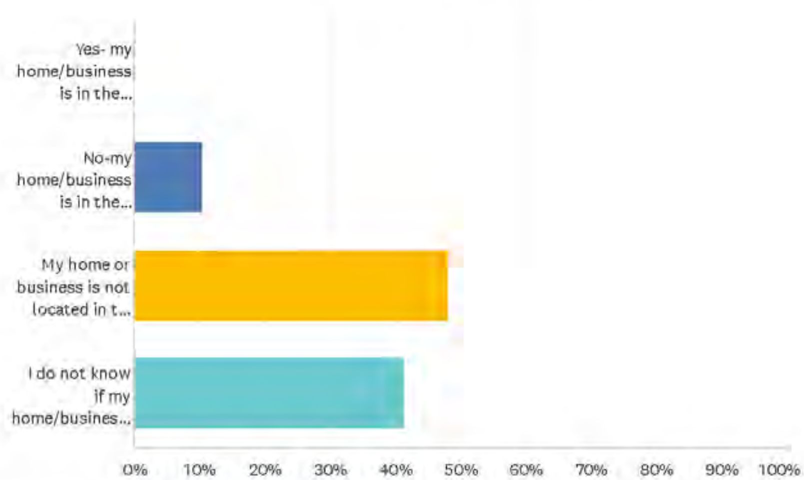
Towns of Exeter and West Greenwich 2025 Hazard Mitigation & Floodplain Management Plan Update Survey

4	Emergency management dept notification	11/7/2024 2:33 PM
5	Town alert system	10/1/2024 2:35 PM

Towns of Exeter and West Greenwich 2025 Hazard Mitigation & Floodplain Management Plan Update Survey

Q6 The Towns of Exeter and West Greenwich participate in the National Flood Insurance Program (NFIP) which allows residents to purchase flood insurance at a reasonable cost to homes and businesses in floodplains. If your home or business is in an identified floodplain, do you carry flood insurance?

Answered: 29 Skipped: 6

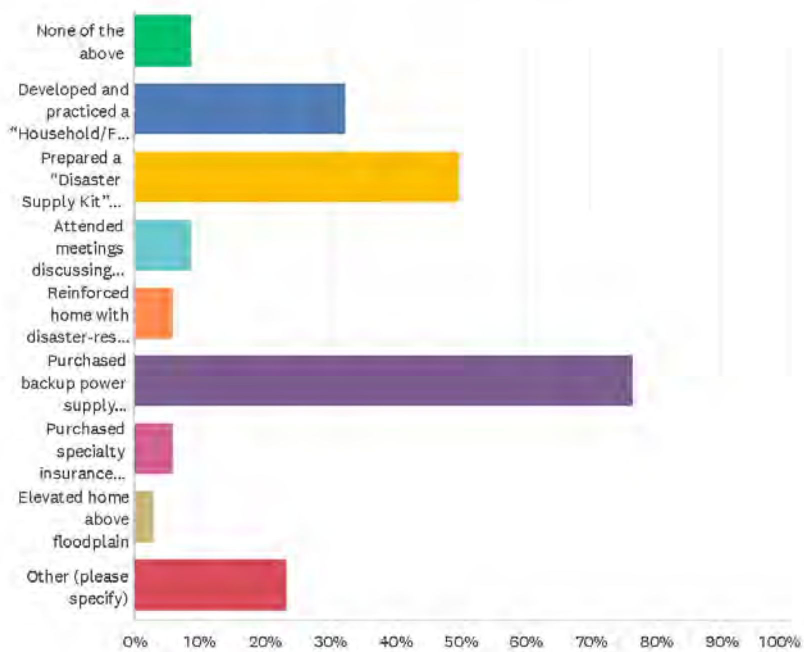


ANSWER CHOICES	RESPONSES	
Yes- my home/business is in the floodplain, and I carry flood insurance	0.00%	0
No-my home/business is in the floodplain, and I do not carry flood insurance	10.34%	3
My home or business is not located in the floodplain	48.28%	14
I do not know if my home/business is located in the floodplain	41.38%	12
TOTAL		29

Towns of Exeter and West Greenwich 2025 Hazard Mitigation & Floodplain Management Plan Update Survey

Q7 What actions have you taken to prepare you and your household for future hazard events?

Answered: 34 Skipped: 1



ANSWER CHOICES	RESPONSES	
None of the above	8.82%	3
Developed and practiced a "Household/Family Emergency Plan" in order to decide what everyone would do in the event of a household emergency	32.35%	11
Prepared a "Disaster Supply Kit" (stored extra food, water, batteries, or other emergency supplies)	50.00%	17
Attended meetings discussing disaster preparedness	8.82%	3
Reinforced home with disaster-resistant materials (ex: installed non-structural seismic restraints for large furniture, secured roofing, etc.)	5.88%	2
Purchased backup power supply (generator, solar panels, etc.)	76.47%	26
Purchased specialty insurance (flood, earthquake, etc.)	5.88%	2
Elevated home above floodplain	2.94%	1
Other (please specify)	23.53%	8
Total Respondents: 34		

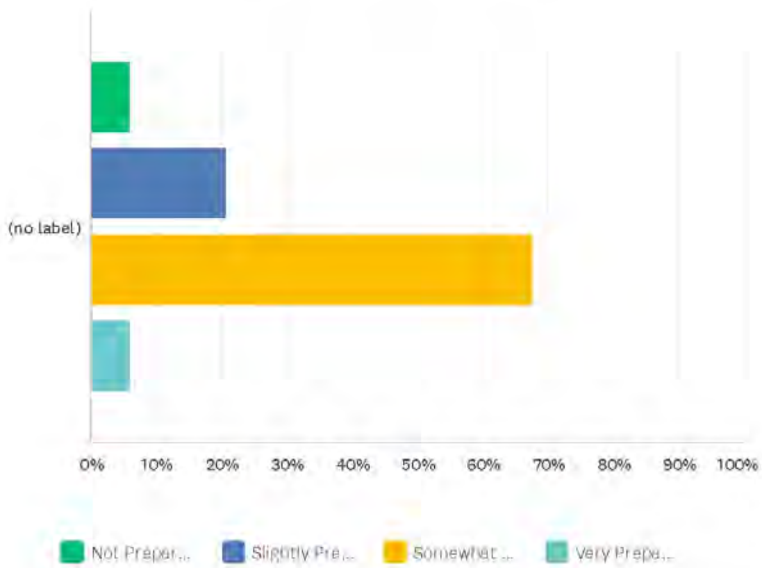
Towns of Exeter and West Greenwich 2025 Hazard Mitigation & Floodplain Management Plan Update Survey

#	OTHER (PLEASE SPECIFY)	DATE
1	Shelter in place	5/27/2025 9:47 AM
2	Drainage system around foundation- french drains + automatic pump with extra generator	5/27/2025 9:34 AM
3	planning to buy a generator	11/21/2024 10:00 AM
4	looked into insurance years ago- too expensive. may need to look again soon	11/19/2024 10:19 AM
5	tree removal	11/7/2024 2:34 PM
6	have a flood water mitigation plan for when nearby stream overflows	11/7/2024 2:23 PM
7	thinking of buying rapid test kits for cyanobacteria toxin that are commercially available on line for about $25 a pop	11/7/2024 2:20 PM
8	Removed tree near house and power lines.	10/6/2024 5:59 AM

Towns of Exeter and West Greenwich 2025 Hazard Mitigation & Floodplain Management Plan Update Survey

Q8 How prepared do you feel your household is for impacts of natural hazard events likely to occur in your community?

Answered: 34 Skipped: 1



	NOT PREPARED	SLIGHTLY PREPARED	SOMEWHAT PREPARED	VERY PREPARED	TOTAL	WEIGHTED AVERAGE
(no label)	5.88% 2	20.59% 7	67.65% 23	5.88% 2	34	2.74

Towns of Exeter and West Greenwich 2025 Hazard Mitigation & Floodplain Management Plan Update Survey

Q9 Do you have any specific ideas for mitigation projects associated with the identified hazards that you would like the Planning Team to consider?

Answered: 16 Skipped: 19

#	RESPONSES	DATE
1	Continue to cut back trees from the streets- clear drainage pipes under roads (fry pond road in west greenwich)	5/27/2025 9:34 AM
2	The state allowing citizens of the town to back up water two points were there never been before raising concern for flooding in an area that was not flood prone	1/17/2025 11:07 AM
3	whenever there is a storm we lose power. manage vegetation/trees around power lines	11/19/2024 10:27 AM
4	no specific ideas except to do more to clean brush. huge brush fire last year- 150 acres lost.	11/19/2024 10:23 AM
5	no- our town does a good job of keeping things in good shape. snow removal/plowing, etc.	11/19/2024 10:19 AM
6	Not sure if it's feasible, but explore putting power lines under ground? We lose power a lot when we get a storm.	11/19/2024 10:16 AM
7	not sure if this is even feasible, but underground power lines would save a lot of trouble, if & when power goes out. power would not go out as often.	11/7/2024 2:43 PM
8	I live in North Kingstown, and work in Exeter. I am set up to work remotely. This helps.	11/7/2024 2:39 PM
9	The road in front of our house always washes out causing a large dip. Hard to get off our driveway onto the road.	11/7/2024 2:27 PM
10	Improve flow rate for stream next to 120 E Shore Dr, either more culverts or a bridge	11/7/2024 2:23 PM
11	No	11/7/2024 2:21 PM
12	For cyanobacteria, there are treatments that can be done to lakes that lock up phosphorous in the bottom sediments and do not allow their re- release during summer thermocline periods. Some form of chemical treatment with binding agents such as Phoslock or Alum that binds phosphorous and precipitates it down to bottom sediments, and it then is trapped in sediments and unavailable to produce cyanobacteria blooms. This is not permanent and after a few years, may require additional treatments to bind up the phosphorous again. Although such treatments may need to be repeated for several years or periodically. There are other treatments as well that tend to get rid of the excess phosphorous . For instance, new product called Trimarine. I think this is more like a pro-biotic treatment where the product helps "digest" the phosphorous and nitrogen. Some studies had shown that it also reduces muck in the bottom that is made up of dead leaves and other organic matter that contains P and N. These treatments are not cheap, and can cost more than $100,000 for a lake the size of Boone. This would likely require a state or federal grant of some type as a bit beyond the BLMD and lakeside residents to afford. However, a first step would be to work with DEM and or URI to do a more detailed nutrient loading study during dry and heavy rainfall periods, (this likely to cost in tens of thousands of $, so less expensive than going right away to a chemical or biologic treatment, and would provide better insight into best treatment options and lowering cost if and when a treatment option is selected) to get a better sense of how much P is entering the lake and from where. However, once the P is in the sediments, it keeps on causing blooms as we have seen annually now for last 3 years with three advisories issued just this year. NH is budgeting $500,000 for lake treatments to address the cyanobacteria blooms. RI needs to consider similar commitments to support towns and lake communities.	11/7/2024 2:20 PM
13	Regular tree trimmings and evaluating storm drains for clearance	11/6/2024 5:33 AM
14	Yes. The risk of a wildfire event happening in "Big River Management Area" is significant. No hazard reduction mitigation has happened on the state level in this area. The homes in and around this area are highly vulnerable with many having minimal "defendable buffer space" around them. I would like to see support for the "NFPA Firewise" program. This program	10/31/2024 12:05 PM

Towns of Exeter and West Greenwich 2025 Hazard Mitigation & Floodplain Management Plan Update Survey

	provides a means to educate and assist property owners in creating defendable space and reducing fuel loads.	
15	Be more pro-active about removing trees with potential to drop power lines.	10/6/2024 5:59 AM
16	Run off coming down Sheffield Hill Rd and Hallville Road and washing away the road and the end of our dirt road; also floodwater filling the marsh, impacting our water level at our house	10/3/2024 4:56 PM

Towns of Exeter and West Greenwich 2025 Hazard Mitigation & Floodplain Management Plan Update Survey

Q10 Is there any information the Town of Exeter or Town of West Greenwich can provide to you to help you better prepare for disasters occurring in your area?

Answered: 11 Skipped: 24

#	RESPONSES	DATE
1	Disaster preparedness workshops	5/27/2025 9:47 AM
2	If FEMA comes into our community, how would it work? What can the town do to fill any gaps the federal grant would miss?	5/27/2025 9:39 AM
3	plans for climate change?	11/19/2024 10:29 AM
4	good to get updates on what the town is doing to prepare for climate changes + storms	11/19/2024 10:19 AM
5	list of area shelters in case of evacuations are needed	11/7/2024 2:43 PM
6	not really. local news and NWS/NHC are best sources.. .plenty of web based weather info is available	11/7/2024 2:23 PM
7	What is the community warning system/Code red? How do I access?	11/7/2024 2:21 PM
8	Cyanobacteria blooms are becoming more frequent in Boone Lake and in others lake systems in RI and NE. This may be a symptom of climate change and increasing temperatures and extreme weather events and rainfall, and other causes such as wakeboard and ski boats that stir up bottom muck with P, and high phosphate loadings from pollution from various sources from septic systems, upper watrshed pollution into streams, etc., I consider this a natural hazard as it can make people and pets sick that swim in the lake. The problem being that DEM testing can take a week or more after a test to get a results back to the community, which means when an heath threat is declared due to cyanobacteria toxins above threshold levels for safe swimming, the elevated level has already been in existence at best for several days and at worse, a week or more when people are still in contact in a contaminated water. The Town, working with State officials should consider mitigation programs to reduce this threat in our lake and other lakes affected, and also look at ways to make testing more timely - within a day or two of sampling or by using rapid tests for preliminary advisories that can then be confirmed by the more careful test. Although when there are green slicks near the shoreline, microscopic inspection can show presence of the cyanobacteria immediately and perhaps advisories go out on presence of cyanobacteria, while the further testing confirms or not if toxin levels are elevated above health risk level. While more timely advisories are in order, addressing root causes also need action. The conversion of so many of what were once summer homes to year round means more nitrogen and phosphorous loadings from septic systems (P being more important for cynaobacteria blooms than N). The Town should take measures (an ordinance?) to insure septic systems are pumped periodically (I believe SK requires this to be done every 3 years?), and older systems like cesspools or non-compliant septic systems need to be replaced when houses are sold or convert from seasonal to year round occupancy. This may require Town and or DEM state-level ordinances or regulations but septic upgrades are think are already required by the the state -DEM, but they have no ability to actually enforce or check-up, so we also need commitment to better monitoring and enforcement.	11/7/2024 2:20 PM
9	I like the CodeRED alerts. These should continue to be utilized as often as feasible. A continuous push to increase people signing up for this service within the communities.	10/31/2024 12:05 PM
10	Publish data identifing types of risks to our area and specific preparations to mitigate loss. Organize and promote neighborhood meetings, so people can get to know each other and check-in on each other during disasters.	10/6/2024 5:59 AM
11	Dam failure	10/4/2024 10:44 AM

Towns of Exeter and West Greenwich 2025 Hazard Mitigation & Floodplain Management Plan Update Survey

Q11 If you have any images of natural hazard damages in your community that you would like to share, upload them here.Please provide the general location and date of the photo.(Please add your contact information below to get credit for your image if it is used in the Plan)

Answered: 0 Skipped: 35

#	FILE NAME	FILE SIZE	DATE
	There are no responses.		

Towns of Exeter and West Greenwich 2025 Hazard Mitigation & Floodplain Management Plan Update Survey

Q12 The Draft HM&FMP is available for public review until May 20, 2025. https://www.exeterri.gov/media/4881. If you have any comments on the Draft HM&FMP, please leave them here or email laura.young@fairweather.com.Note: We will be holding a public meeting on May 14, 2025 to present the Draft Plan and take public comments. Please watch for public meeting location and time details through the Towns' websites.

Answered: 0 Skipped: 35

#	RESPONSES	DATE
	There are no responses.	

Towns of Exeter and West Greenwich 2025 Hazard Mitigation & Floodplain Management Plan Update Survey

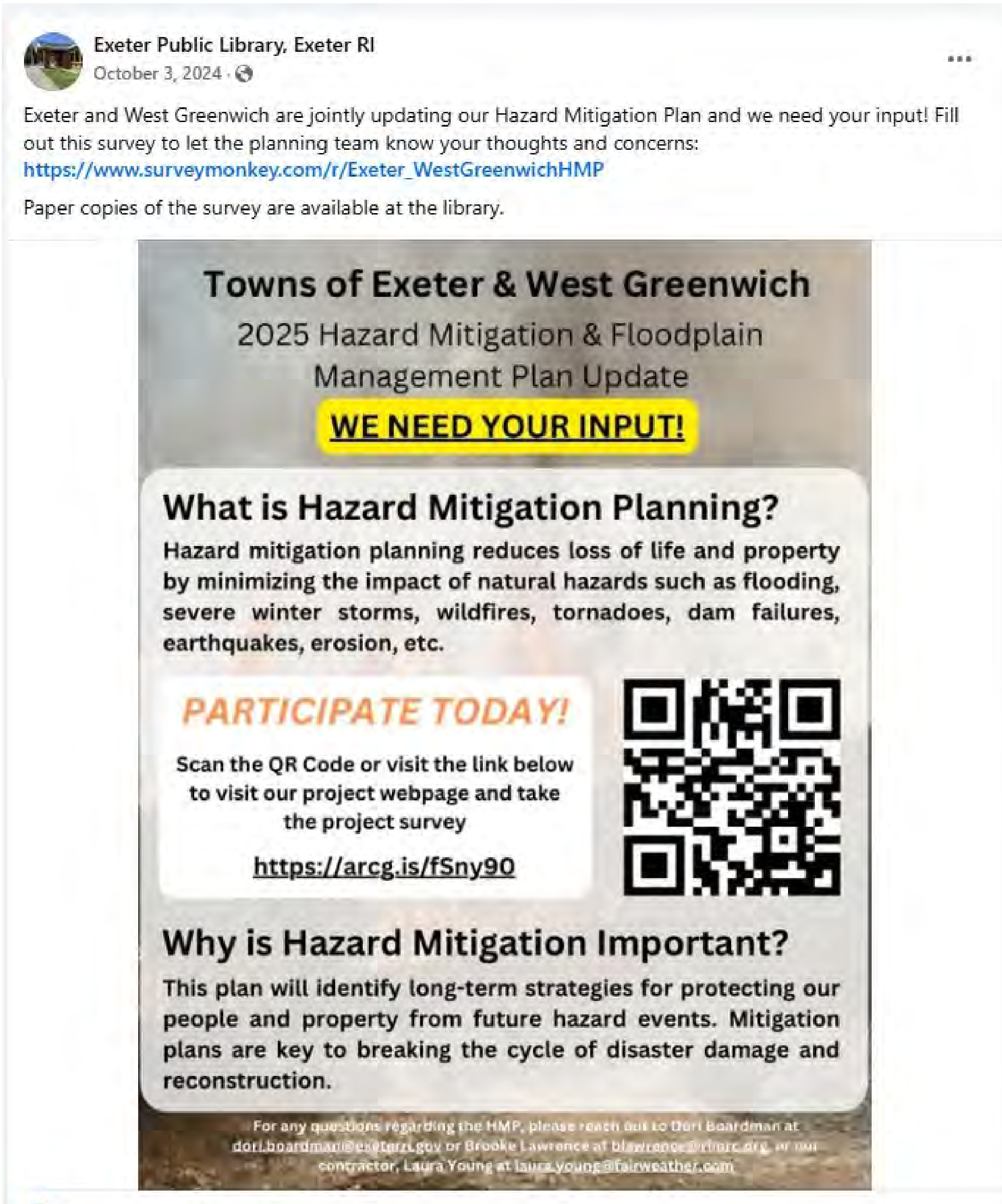
Q13 If you would like to receive updates about the HMP update process and other opportunities for public involvement, please enter your information below.

Answered: 20 Skipped: 15

ANSWER CHOICES	RESPONSES	
Name	100.00%	20
Company	0.00%	0
Address	0.00%	0
Address 2	0.00%	0
City/Town	0.00%	0
State/Province	0.00%	0
ZIP/Postal Code	0.00%	0
Country	0.00%	0
Email Address	95.00%	19
Phone Number	15.00%	3

The Towns of Exeter and West Greenwich shared a flyer on their Facebook page requesting the public to complete the project survey. Hard copies of the survey were available at each of the Town's Public Library.

On November 10, 2024 additional outreach was conducted to collect survey responses from the vulnerable population in Western West Greenwich. This area was identified as vulnerable due to the number of elderly residents who may have limited access to online surveys or technology, and few survey responses had been received from this population. HMP consultant, Lorraine Della Porta, targeted this area on foot and was able to get survey responses from 5 West Greenwich residents and 1 resident that lives in Exeter who happened to be walking her dog with a friend.



Home | About Us | Departments | Boards | How Do I?

Home

Hazard Mitigation Plan

POSTED ON: OCTOBER 15, 2024 - 8:16PM

The Towns of Exeter and West Greenwich are updating our Hazard Mitigation Plan. For information on the project progress, our natural hazards, and ways to participate, please visit our project StoryMap here: 2025 Exeter & West Greenwich Hazard Mitigation Plan Update (arcgis.com)

The Towns of Exeter and West Greenwich are updating our Hazard Mitigation Plan. We are requesting public input through the following link: Towns of Exeter and West Greenwich 2025 Hazard Mitigation & Floodplain Management Plan Update Survey (surveymonkey.com). A fillable/printable copy of the survey is also located here (SEE ATTACHED DOCUMENT). Please return surveys to our contractor at olivia.kavanaugh@fairweather.com

Attachment	Size
ewg_hmp-_fillable_survey.pdf	262.94 KB

Town Hall, 280 Victory Highway, West Greenwich, RI 02817 Ph: 401-392-3800 Fax: 401-392-3805
Website Disclaimer Government Websites by CivicPlus ®
Login

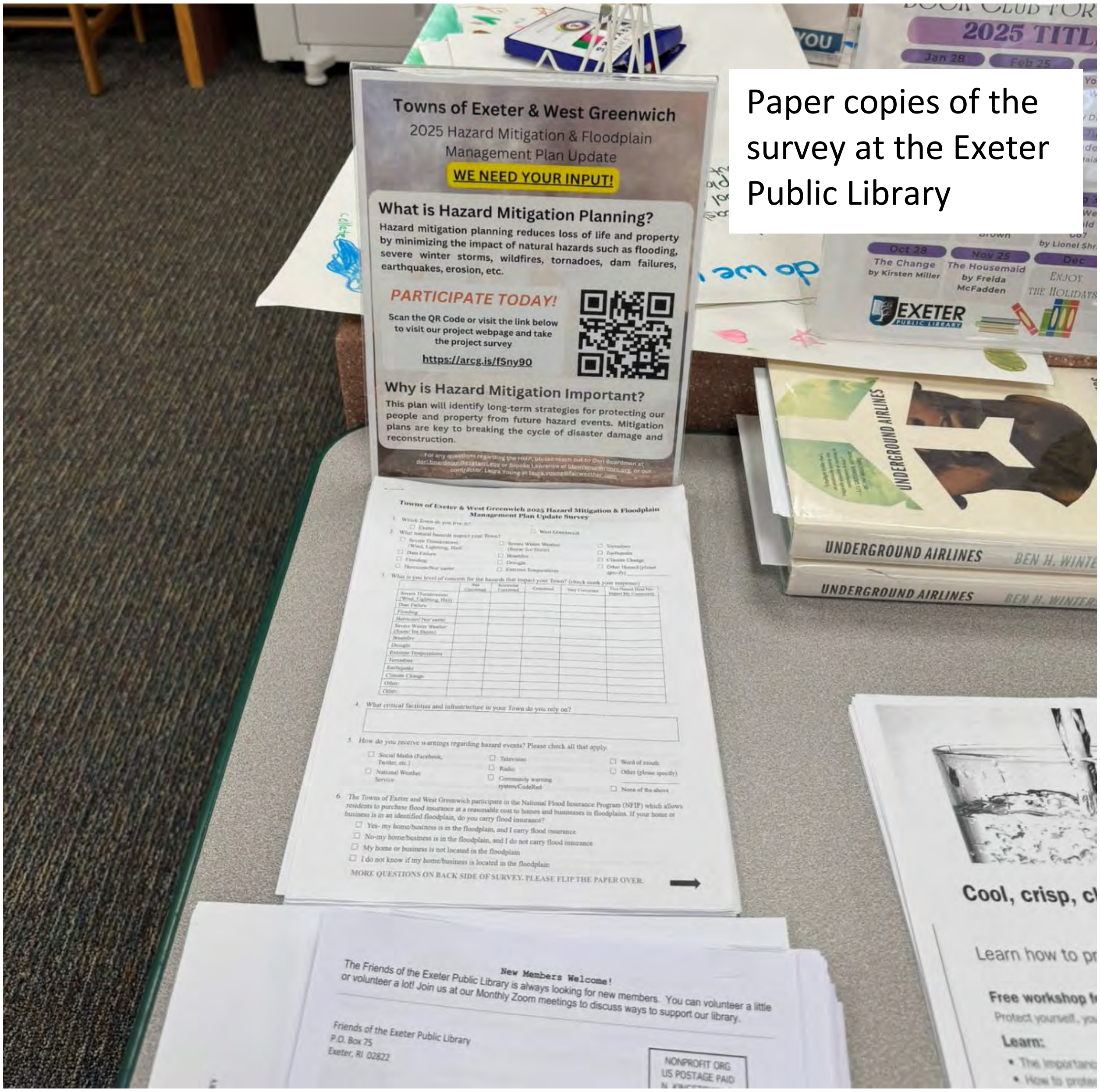
West Greenwich Emergency Management Agency
October 31, 2024 ·

Hazard Mitigation Plan Update Survey. Please take a minute to complete the survey and email it to the contact listed at the bottom survey.

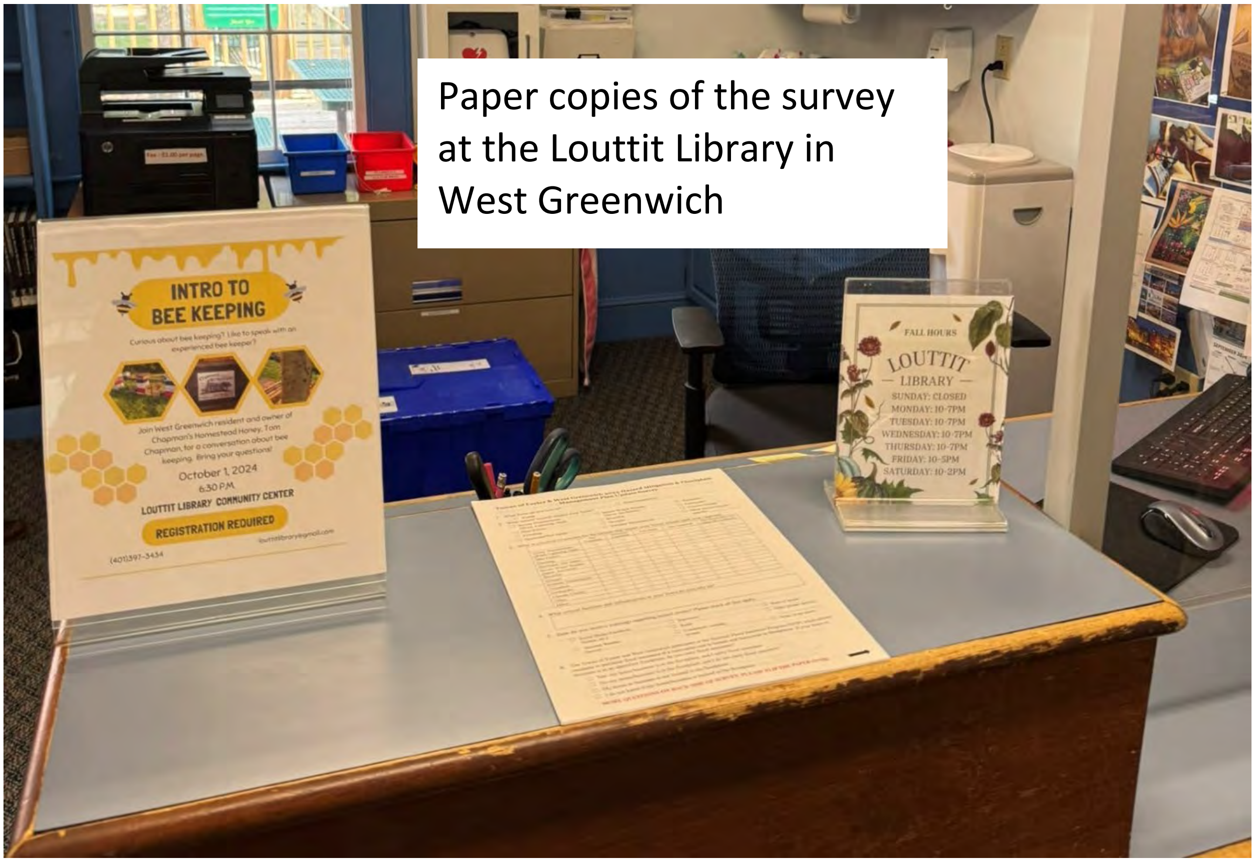
West Greenwich Police Department
West Greenwich EMS
West Greenwich Fire/ Rescue
Lake Mishnock Fire/Rescue
Hianloland Volunteer Fire Company
West Greenwich Land Trust
West Greenwich Animal Control

WGTOWNRI.ORG
www.wgtownri.org

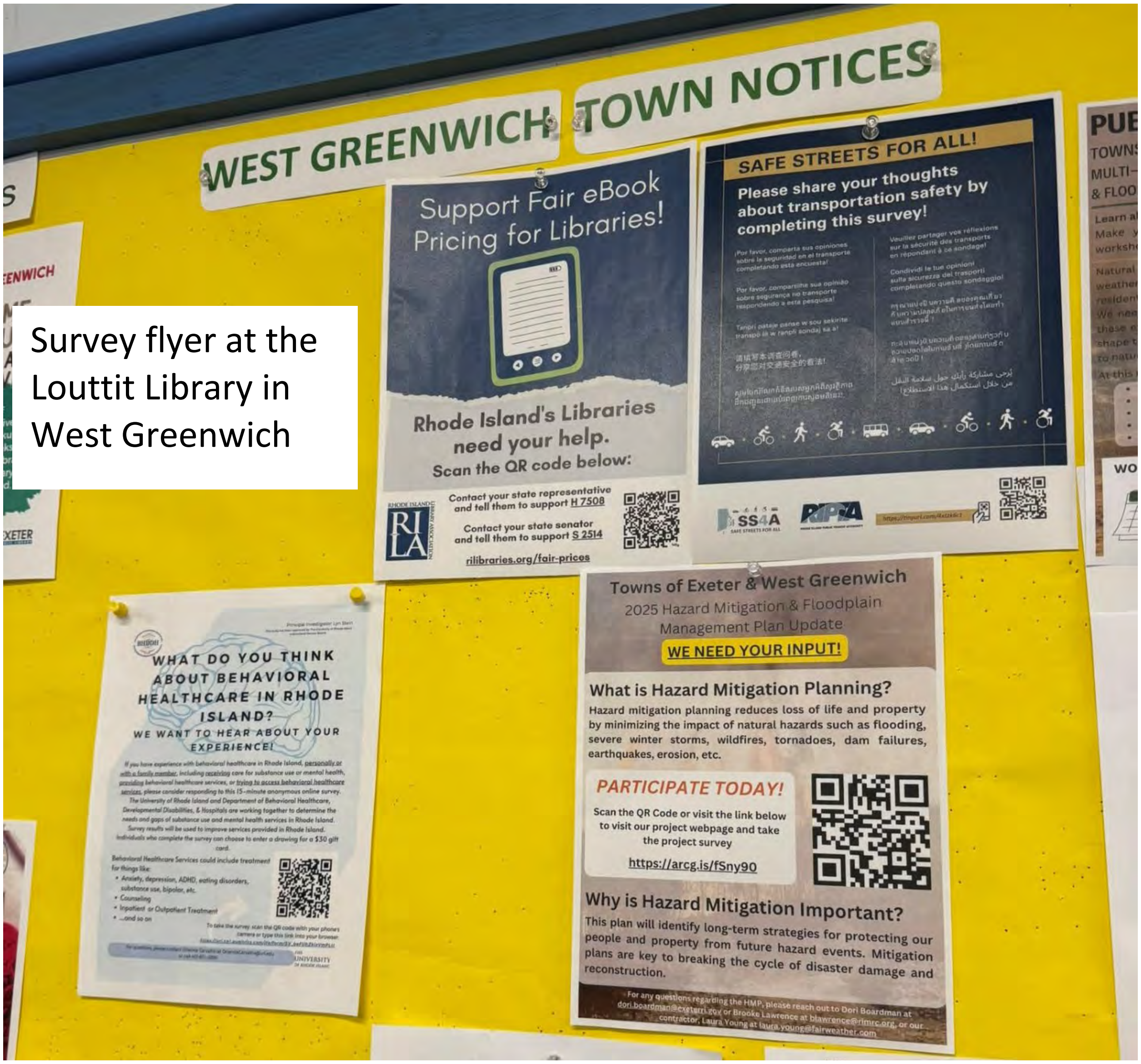
1 1 comment 1 share



Paper copies of the survey at the Exeter Public Library



Paper copies of the survey at the Louttit Library in West Greenwich

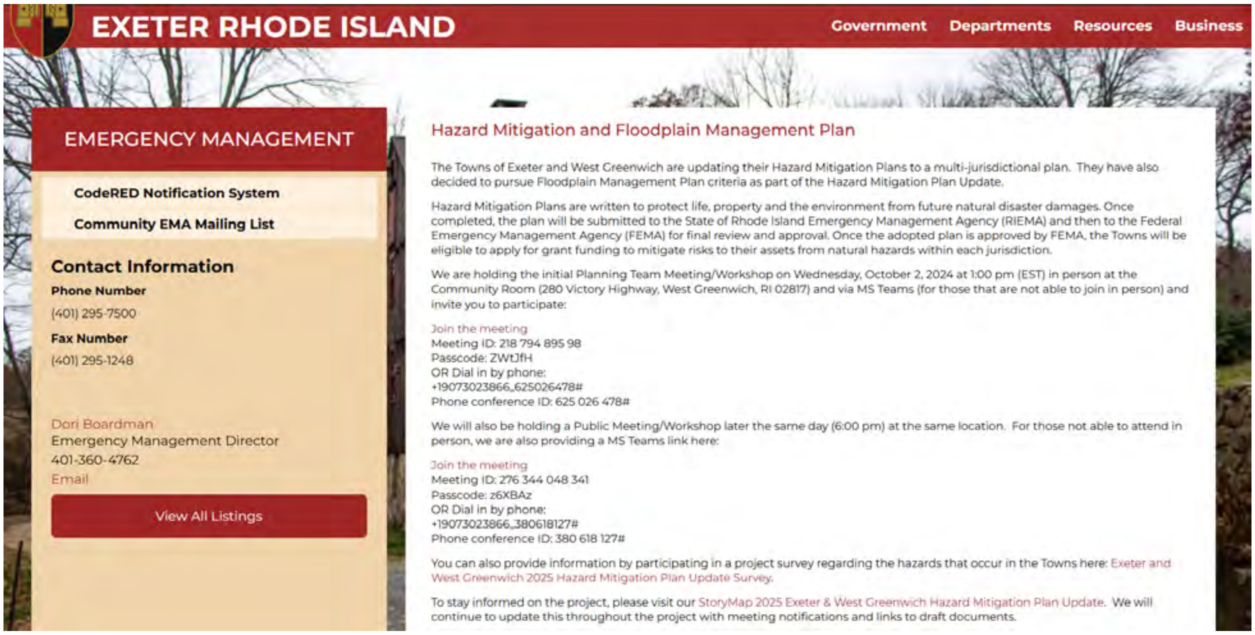


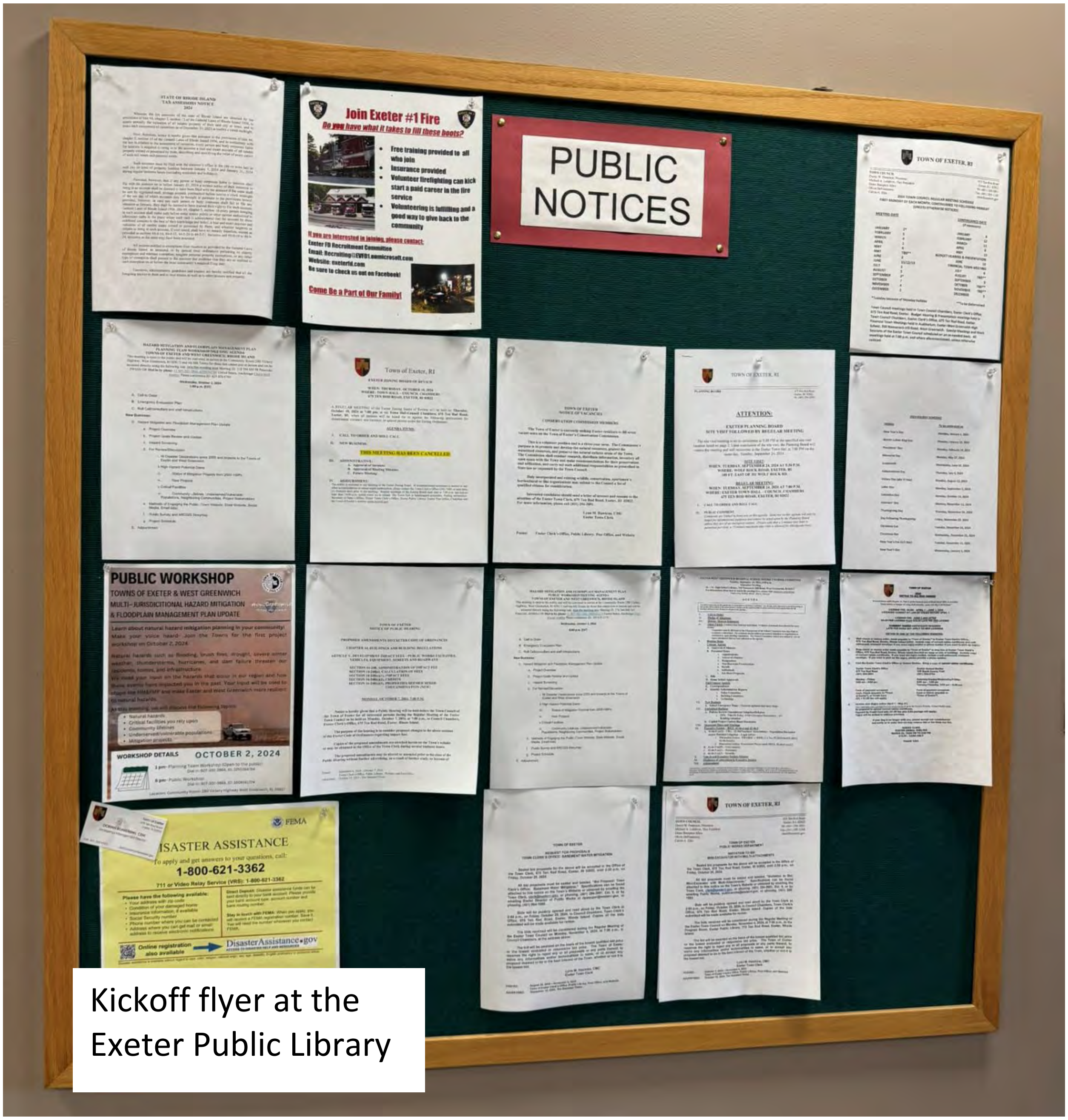
Survey flyer at the Louttit Library in West Greenwich

<u>Public Notices</u>

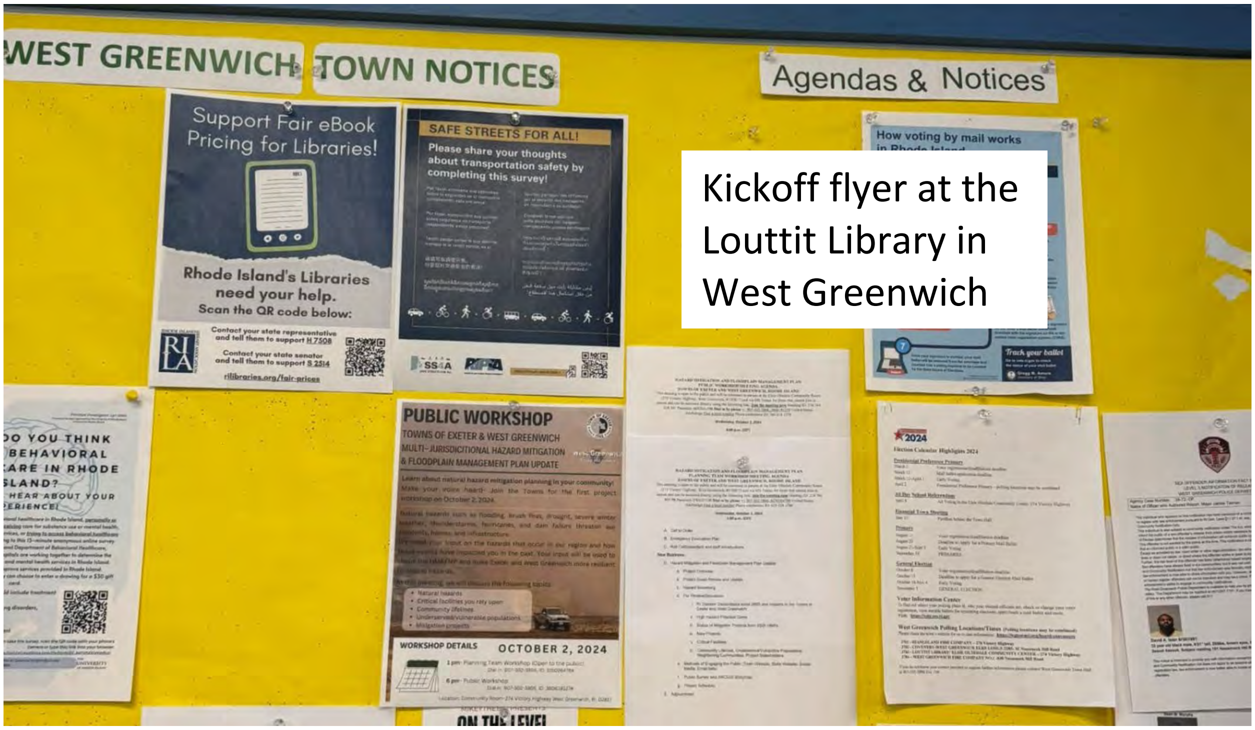
The public was notified of and invited to participate in all project meetings through postings on the Towns' Facebook pages, websites, and paper notices at key community locations (libraries).

Kickoff Meeting (October 2, 2024):

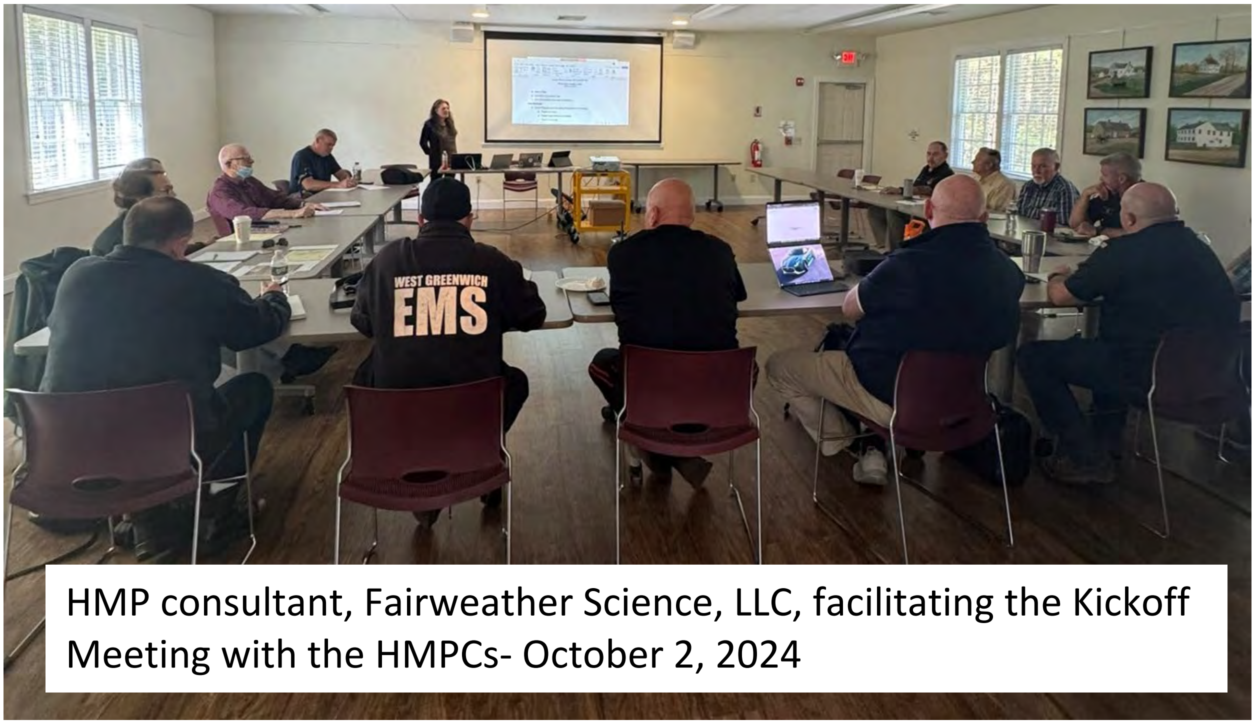




Kickoff flyer at the Exeter Public Library



Kickoff flyer at the Louttit Library in West Greenwich



HMP consultant, Fairweather Science, LLC, facilitating the Kickoff Meeting with the HMPCs- October 2, 2024

Availability of the Draft Risk Assessment; Draft Risk Assessment and Mitigation Strategy Public Workshop (January 21, 2025):

West Greenwich Emergency Management Agency
January 17 ·

The Towns of Exeter and West Greenwich are pleased to announce that the Draft Risk Assessment portion of our 2025 Multi-Jurisdictional Hazard Mitigation and Floodplain Management Plan is available for public review and comment. It can be accessed on the Town websites or by following this link: https://www.exeterri.gov/media/4686Towns

Exeter and West Greenwich, RI 2025 Hazard Mitigation and Floodplain Management Plan Update- Draft Risk Assessment

We ask that you provide your comments to our contractor, Fairweather Science, LLC at laura.young@fairweather.com by February 14, 2025 so we can incorporate your comments into the plan.

We are holding a public meeting at 5:30 pm on Tuesday, January 21, 2025 at the Community Room (274 Victory Highway, West Greenwich, RI 02817) and via MS Teams for those that cannot join in person to present the findings of the Draft Risk Assessment, discuss mitigation projects, and provide a project update.

The meeting link is available here: Join the meeting now Meeting ID: 262 047 473 481 Passcode: 8vB658aj OR Dial in by phone +1 907-302-3866,,579915772# United States, Anchorage Find a local number Phone conference ID: 579 915 772#

If you have questions regarding this project, please email our project contacts:

Town of Exeter
Emergency Management Agency
Dorian Boardman, EMA Director
Dori.boardman@exeterri.gov

Town of West Greenwich
Emergency Management Agency
Brooke Lawrence, EMA Director
blawrence@rimrc.org

Town of West Greenwich
W. Greenwich Police Dept
Richard Ramsay, Chief of Police
rramsay@wgpdri.com

West Greenwich Police Department
West Greenwich EMS
West Greenwich Vol Fire Co No 1
Lake Mishnock Fire/Rescue
Hianloland Volunteer Fire Company
West Greenwich Land Trust
West Greenwich Animal Control
Rhode Island Emergency Management Agency
Coventry RI Emergency Management Agency - CEMA
Exeter Volunteer Fire Co No 1
@followers


West Greenwich Emergency Management Agency
January 17 ·
The Towns of Exeter and West Greenwich are pleased to announce that the Draft Risk Assessment portion of our 2025 Multi-Jurisdictional Hazard Mitigation and Floodplain ... See more
PUBLIC WORKSHOP #2
TOWNS OF EXETER & WEST GREENWICH
MULTI-JURISDICITIONAL HAZARD MITIGATION
& FLOODPLAIN MANAGEMENT PLAN UPDATE
Learn about natural hazard mitigation planning in your community!
Make your voice heard- Join the Towns for the second project workshop on January 21, 2025.
Natural hazards such as flooding, brushfires, drought, severe winter weather, thunderstorms, hurricanes, and dam failure threaten our residents, homes, and infrastructure.
We need your input on mitigation projects to make Exeter and West Greenwich more resilient to natural hazards.
At this meeting, we will discuss the following topics:
Project overview
Draft Risk Assessment results
Mitigation projects
Public comments on Draft Risk Assessment
Project Survey
https://www.surveymonkey.com/r/Exeter_WestGreenwichHMP
WORKSHOP DETAILS
JANUARY 21, 2025
1 pm- Planning Team Workshop (Open to the public)
Dial in: 907-302-3866, ID: 906 402 018#
5:30 pm- Public Workshop
Dial in: 907-302-3866, ID: 579 915 772#
Location: Community Room- 274 Victory Highway West Greenwich, RI, 02817

Exeter Public Library, Exeter RI
January 21 ·

Public meeting tonight about the latest in Exeter-West Greenwich hazard mitigation planning. Learn about natural hazard risks for the town, and what mitigation projects are being proposed.

1

4 shares

<u>Availability of the Draft HM&FMP, Scavenger Hunt; Draft HM&FMP Public Review and Scavenger Hunt Meeting (May 14, 2025):</u>

West Greenwich Emergency Management Agency
39m ·

We are pleased to announce the availability of the Draft 2025 Towns of Exeter and West Greenwich Hazard Mitigation and Floodplain Management Plan Update for Public Review and Comment.

The Draft Plan can be viewed online at the following links:

https://www.exeterri.gov/.../2025-draft-hazard-mitigation...

https://doyon.app.box.com/.../y83ospu6.../file/1822501091893

This document represents the research and discussions with the planning teams; planning team input received during planning team and public meetings; and comments received from the public to identify the hazards that impact your jurisdiction; how they impact residents and infrastructure; ideas for mitigation projects, as well as the number of people, residences, and critical facilities at risk.

We ask that you review the Draft Plan and provide comments to our contractor via email (laura.young@fairweather.com) by May 20, 2025 to enable the team to respond and incorporate any changes into the document before finalizing the plan. The plan will be recommended for adoption by each Town Council in early June and then submitted to RIEMA and FEMA for formal review and approval.

We will be holding a public meeting May 14, 2025 to present the Draft Plan and take public comments. Please watch for public meeting location and time details.

West Greenwich Police Department
West Greenwich EMS
West Greenwich Animal Control
West Greenwich Vol Fire Co No 1
Lake Mishnock Fire/Rescue
Hianloland Volunteer Fire Company
West Greenwich Land Trust
Rhode Island Emergency Management Agency1
West Greenwich, Rhode Island

EXETERRI.GOV
2025 Draft Hazard Mitigation Plan
We are pleased to announce the availability of the Draft 2025 Towns of Exeter and West Greenwich Hazard Mitigation and Floodplain Management Plan Update for Public Review and Comment. This document represents the research and discussions with the planning teams; planning team input received during p...

Exeter Public Library, Exeter RI
May 5 at 6:00 AM ·

We are pleased to announce the availability of the Draft 2025 Towns of Exeter and West Greenwich Hazard Mitigation and Floodplain Management Plan Update for Public Review and Comment.

The Draft Plan can be viewed online at the following links:

https://www.exeterri.gov/.../2025-draft-hazard-mitigation...
\https://doyon.app.box.com/.../y83ospu6.../file/1822501091893

This document represents the research and discussions with the planning teams; planning team input received during planning team and public meetings; and comments received from the public to identify the hazards that impact your jurisdiction; how they impact residents and infrastructure; ideas for mitigation projects, as well as the number of people, residences, and critical facilities at risk.

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We will be holding a public meeting May 14, 2025 to present the Draft Plan and take public comments. The meeting is open to the public and will be convened in person at the Community Room (274 Victory Highway, West Greenwich RI) from 5-7:30 pm

EXETERRI.GOV
2025 Draft Hazard Mitigation Plan
We are pleased to announce the availability of the Draft 2025 Towns of Exeter and West Greenwich Hazard Mitigation and Floodplain Management Plan Update for Public Review and Comment. This document represents the research and discussions with the planning teams; planning team input received during p...

1

Exeter Department of Social Services
April 30 at 10:37 AM ·

Please read below to learn more about the EWG Hazard Mitigation and Floodplain Managment Plan..

We are pleased to announce the availability of the Draft 2025 Towns of Exeter and West Greenwich Hazard Mitigation and Floodplain Management Plan Update for Public Review and Comment.
The Draft Plan can be viewed online at the following links:
2025 Draft Hazard Mitigation Plan | Exeter, RI
!!2025 Exeter and West Greenwich HMP Update Draft for Public Review.pdf | Powered by Box
This document represents the research and discussions with the planning teams; planning team input received during planning team and public meetings; and comments received from the public to identify the hazards that impact your jurisdiction; how they impact residents and infrastructure; ideas for mitigation projects, as well as the number of people, residences, and critical facilities at risk.

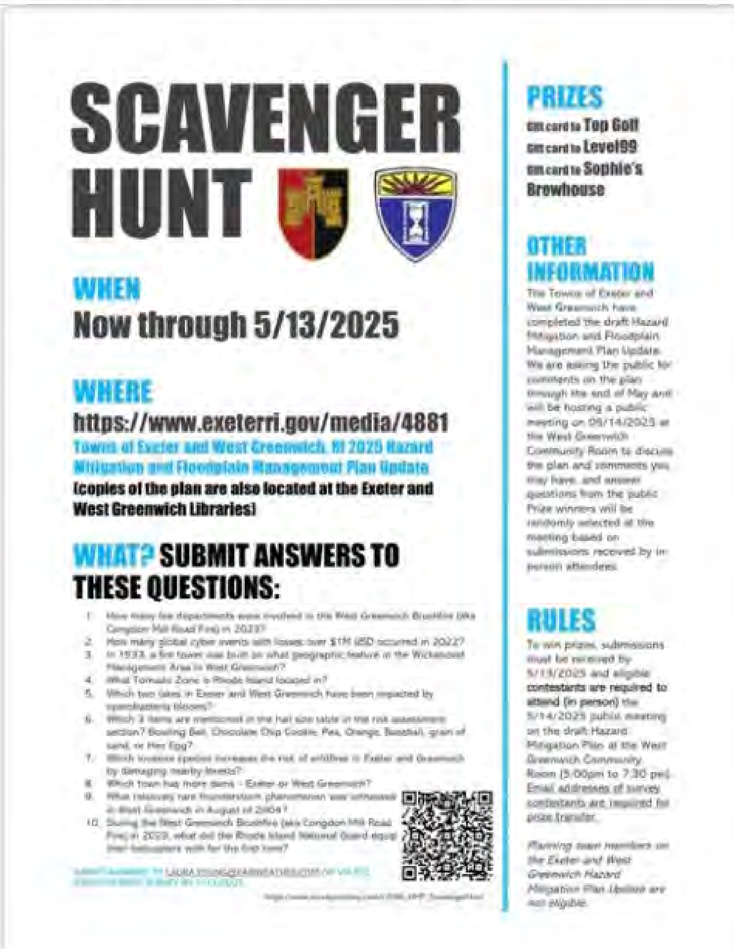
We ask that you review the Draft Plan and provide comments to our contractor via email (laura.young@fairweather.com) by May 20, 2025 to enable the team to respond and incorporate any changes into the document before finalizing the plan. The plan will be recommended for adoption by each Town Council in early June and then submitted to RIEMA and FEMA for formal review and approval.

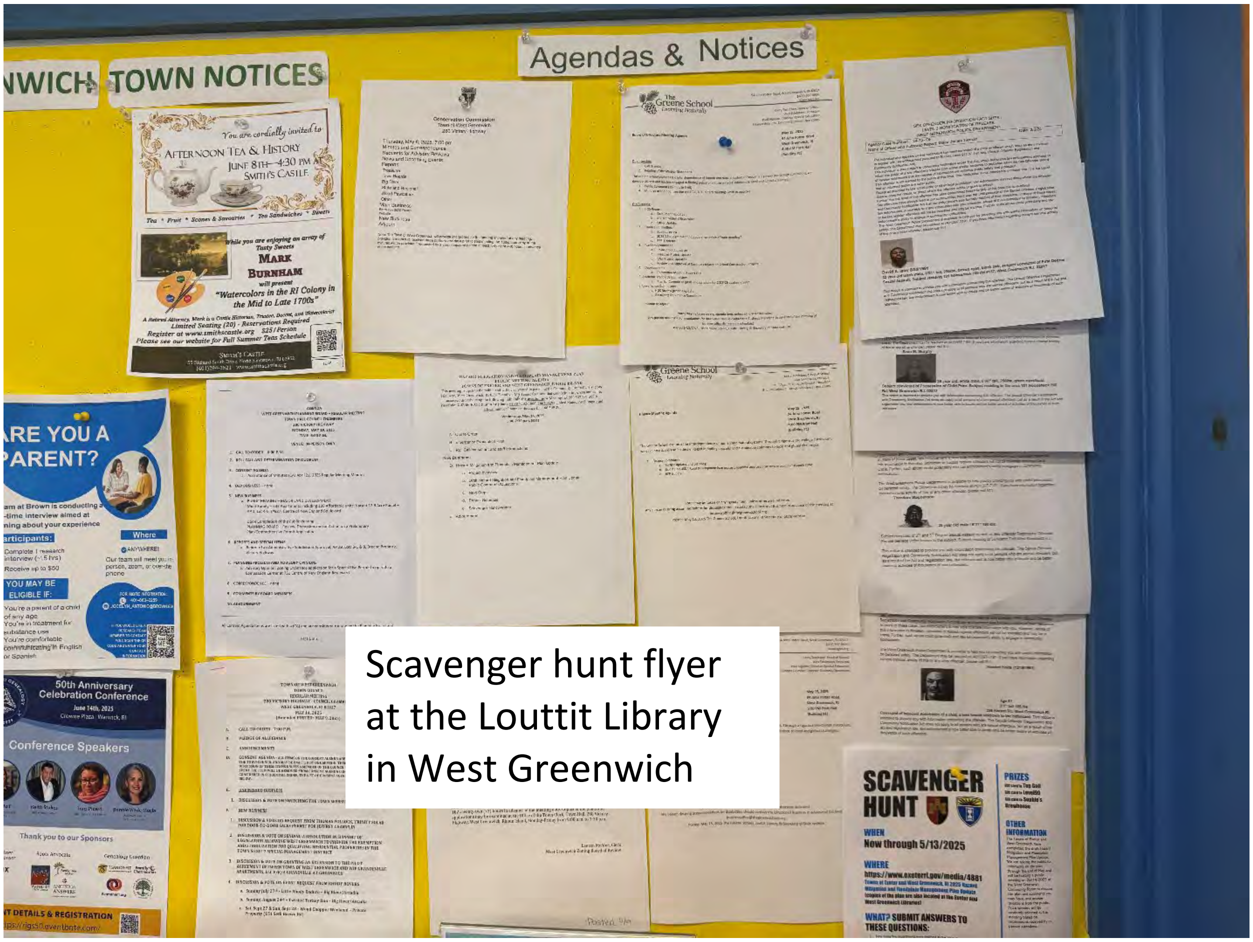
We will be holding a public meeting May 14, 2025 to present the Draft Plan and take public comments. Please watch for public meeting location and time details.

Fairweather Science LLC 1 share

Exeter Department of Social Services
April 30 at 6:08 AM ·

EWG residents: Check out this opportunity to win prizes by participating in the Exeter/West Greenwich Hazard Mitigation and Floodplain Management Plan Scavenger Hunt!





Scavenger hunt flyer at the Louttit Library in West Greenwich

Exeter RI; Events, News, Information, and more

Fairweather Science LLC
May 8 at 6:17 AM

Do you want to learn more about the natural hazards that impact your community AND win a prize? The Town's of Exeter and West Greenwich have completed their Hazard Mitigation Plan Update and CHALLENGE YOU to a Scavenger Hunt!

- If you can find the answers to the following questions in the Hazard Mitigation Plan that is out for public comment;

- AND submit the answers by 5/13;

- AND come in person to the Public Meeting being held at the West Greenwich Community Room (274 Victory Highway, May 14, 5-7:30 pm);

- YOU could win a prize (Top Golf, Level99, Sophie's Brewhouse) and be celebrated by your Town's Planning Teams!

The Hazard Mitigation Plan can be viewed at the Exeter and West Greenwich Libraries and here: Towns of Exeter and West Greenwich, RI 2025 Hazard Mitigation and Floodplain Management Plan Update (https://www.exeterri.gov/media/4881).

The Questions:

1. How many fire departments were involved in the West Greenwich Brushfire (aka Congdon Mill Road Fire) in 2023?

2. How many global cyber events with losses over $1M USD occurred in 2022?

3. In 1933, a fire tower was built on what geographic feature in the Wickaboxet Management Area in West Greenwich?

4. What Tornado Zone is Rhode Island located in?

5. Which two lakes in Exeter and West Greenwich have been impacted by cyanobacteria blooms?

6. Which 3 items are mentioned in the hail size table in the risk assessment section? Bowling Ball, Chocolate Chip Cookie, Pea, Orange, Baseball, grain of sand, or Hen Egg?

7. Which invasive species increases the risk of wildfires in Exeter and Greenwich by damaging nearby forests?

8. Which town has more dams – Exeter or West Greenwich?

9. What relatively rare thunderstorm phenomenon was witnessed in West Greenwich in August of 2004?

10. During the West Greenwich Brushfire (aka Congdon Mill Road Fire) in 2023, what did the Rhode Island National Guard equip their helicopters with for the first time?

Submit answers to laura.young@fairweather.com OR via the

surveymonkey survey (https://www.surveymonkey.com/r/EWG_HMP_ScavengerHunt) by 5/13/2025.

The Towns of Exeter and West Greenwich have completed the draft Hazard Mitigation and Floodplain Management Plan Update. We are asking the public for comments on the plan through the end of May and will be hosting a public meeting on 05/14/2025 at the West Greenwich Community Room to discuss the plan and comments you may have, and answer questions from the public.

Prize winners will be randomly selected at the meeting based on submissions received by in-person attendees. To win prizes, submissions must be received by 5/13/2025 and eligible contestants are required to attend (in person) the 5/14/2025 public meeting on the draft Hazard Mitigation Plan at the West Greenwich Community Room (5:00pm to 7:30 pm). Email addresses of survey contestants are required for prize transfer.

Planning team members on the Exeter and West Greenwich Hazard Mitigation Plan Update are not eligible.

HMP consultant, Fairweather Science, LLC, facilitating the final public meeting (Draft HM&FMP review, scavenger hunt)- May 14, 2025

Scavenger Hunt Results

Towns of Exeter and West Greenwich 2025 Hazard Mitigation & Floodplain Management Plan-Scavenger Hunt

Q1 How many fire departments were involved in the West Greenwich Brushfire (aka Congdon Mill Road Fire) in 2023?

Answered: 4 Skipped: 0

#	RESPONSES	DATE
1	45	5/13/2025 4:32 PM
2	over 45	5/8/2025 8:39 AM
3	45	5/8/2025 6:11 AM
4	45	5/6/2025 8:43 AM

Correct answer: 45

Towns of Exeter and West Greenwich 2025 Hazard Mitigation & Floodplain Management Plan-Scavenger Hunt

Q2 How many global cyber events with losses over $1M USD occurred in 2022?

Answered: 4 Skipped: 0

#	RESPONSES	DATE
1	490.000	5/13/2025 4:32 PM
2	137	5/8/2025 8:39 AM
3	137	5/8/2025 6:11 AM
4	137	5/6/2025 8:43 AM

Correct answer: 137

Towns of Exeter and West Greenwich 2025 Hazard Mitigation & Floodplain Management Plan-Scavenger Hunt

Q3 In 1933, a fire tower was built on what geographic feature in the Wickaboxet Management Area in West Greenwich?

Answered: 4 Skipped: 0

#	RESPONSES	DATE
1	Wickaboxet Rock	5/13/2025 4:32 PM
2	Rattlesnake Ledge	5/8/2025 8:39 AM
3	Rattlesnake Ledge	5/8/2025 6:11 AM
4	rattlesnake ledge	5/6/2025 8:43 AM

Correct answer: Rattlesnake Ledge

Towns of Exeter and West Greenwich 2025 Hazard Mitigation & Floodplain Management Plan-Scavenger Hunt

Q4 What Tornado Zone is Rhode Island located in?

Answered: 4 Skipped: 0

#	RESPONSES	DATE
1	Providence County is Relatively Moderate, Bristol County is Very Low and the rest of the state is Relatively Low, according to FEMA	5/13/2025 4:32 PM
2	Zone 2	5/8/2025 8:39 AM
3	zone II	5/8/2025 6:11 AM
4	zone 2	5/6/2025 8:43 AM

Correct answer: Zone 2

Towns of Exeter and West Greenwich 2025 Hazard Mitigation & Floodplain Management Plan-Scavenger Hunt

Q5 Which two lakes in Exeter and West Greenwich have been impacted by cyanobacteria blooms?

Answered: 4 Skipped: 0

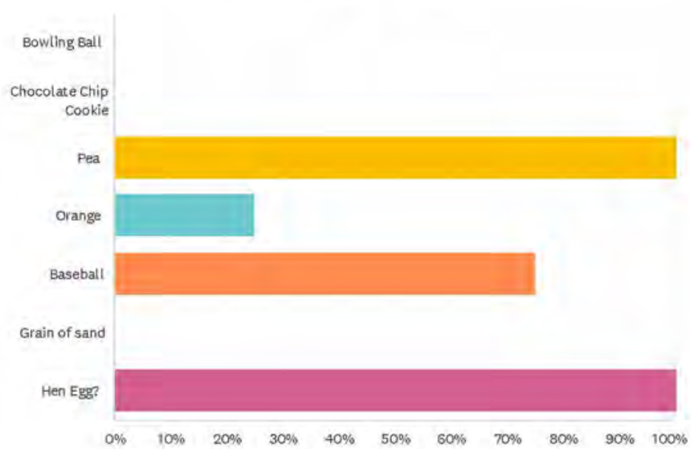
#	RESPONSES	DATE
1	Boone Lake and Mishnock Lake	5/13/2025 4:32 PM
2	Lake Michnock and Boone Lake	5/8/2025 8:39 AM
3	Boone Lake & Lake Mishnock	5/8/2025 6:11 AM
4	lake Mishnock and boon lake	5/6/2025 8:43 AM

Correct answer: Boone Lake and Lake Mishnock

Towns of Exeter and West Greenwich 2025 Hazard Mitigation & Floodplain Management Plan-Scavenger Hunt

Q6 Which 3 items are mentioned in the hail size table in the risk assessment section?

Answered: 4 Skipped: 0



ANSWER CHOICES	RESPONSES	
Bowling Ball	0.00%	0
Chocolate Chip Cookie	0.00%	0
Pea	100.00%	4
Orange	25.00%	1
Baseball	75.00%	3
Grain of sand	0.00%	0
Hen Egg	100.00%	4
Total Respondents: 4		

Correct answer: Pea, Baseball, Hen Egg

Towns of Exeter and West Greenwich 2025 Hazard Mitigation & Floodplain Management Plan-Scavenger Hunt

Q7 Which invasive species increases the risk of wildfires in Exeter and Greenwich by damaging nearby forests?

Answered: 4 Skipped: 0

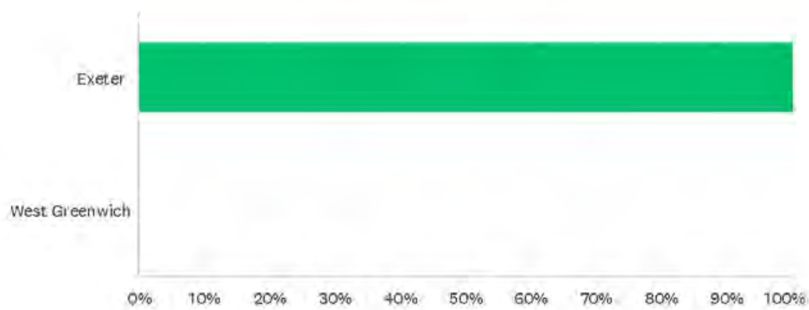
#	RESPONSES	DATE
1	Gypsy moth	5/13/2025 4:32 PM
2	Gypsy moth	5/8/2025 8:39 AM
3	spongy (gypsy) moth caterpillar	5/8/2025 6:11 AM
4	spongy (gypsy) Moth Caterpillar	5/6/2025 8:43 AM

Correct answer: spongy (gypsy) moth caterpillar

Towns of Exeter and West Greenwich 2025 Hazard Mitigation & Floodplain Management Plan-Scavenger Hunt

Q8 Which town has more dams – Exeter or West Greenwich?

Answered: 4 Skipped: 0



ANSWER CHOICES	RESPONSES	
Exeter	100.00%	4
West Greenwich	0.00%	0
TOTAL		4

Correct: Exeter

Towns of Exeter and West Greenwich 2025 Hazard Mitigation & Floodplain Management Plan- Scavenger Hunt

Q9 What relatively rare thunderstorm phenomenon was witnessed in West Greenwich in August of 2004?

Answered: 4 Skipped: 0

#	RESPONSES	DATE
1	Derecho	5/13/2025 4:32 PM
2	Funnel Cloud	5/8/2025 8:39 AM
3	Funnel Cloud	5/8/2025 6:11 AM
4	funnel cloud	5/6/2025 8:43 AM

Correct answer: Funnel Cloud

Towns of Exeter and West Greenwich 2025 Hazard Mitigation & Floodplain Management Plan- Scavenger Hunt

Q10 During the West Greenwich Brushfire (aka Congdon Mill Road Fire) in 2023, what did the Rhode Island National Guard equip their helicopters with for the first time?

Answered: 4 Skipped: 0

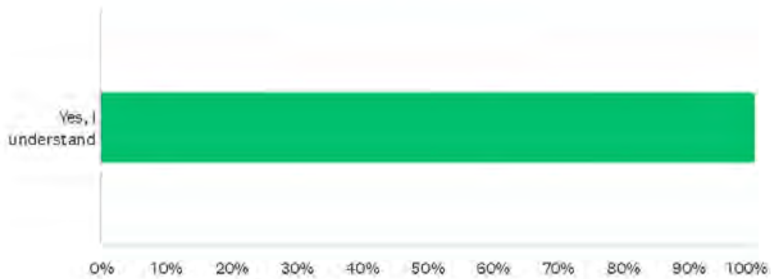
#	RESPONSES	DATE
1	Bambi Buckets	5/13/2025 4:32 PM
2	Bambi Buckets	5/8/2025 8:39 AM
3	Bambi Buckets	5/8/2025 6:11 AM
4	Bambi bucket	5/6/2025 8:43 AM

Correct answer: Bambi Buckets

Towns of Exeter and West Greenwich 2025 Hazard Mitigation & Floodplain Management Plan-Scavenger Hunt

Q11 By checking this box, you understand that in order to win a prize, you are required to attend (in person) the 5/14/2025 public meeting on the draft Hazard Mitigation Plan at the West Greenwich Community Room (5:00pm to 7:30 pm) and that you have to provide your email address below so that we can transfer prizes to you (electronic gift certificates).

Answered: 4 Skipped: 0



ANSWER CHOICES	RESPONSES	
Yes, I understand	100.00%	4
Total Respondents: 4		

Appendix E- HMP Annual Progress Report

HMP Annual Review Checklist- To be completed in January every year

Year	2026	2027	2028	2029	2030
Monitoring the HM&FMP (this information will feed into the 2029 Plan Update					
Disaster/significant hazard events					
Injuries/fatalities					
Mitigation projects completed Final project cost Hazards mitigated Lessons learned (success, benefits, outcomes)					
New infrastructure or critical facilities (added, removed/replaced)					
New hazards, mapping, engineering, or planning documents to include in next update					
Community events that hazards or mitigation was discussed (identify upcoming events to discuss)					
New Planning Team/Stakeholder members					
New mitigation projects “wish list”					
New land use development					
Evaluating the HM&FMP					
Has the Plan increased public awareness/ education? If no, provide why, and ideas for improvement					
Has the Plan resulted in a reduction in hazard damage? If no, provide why, and ideas for					

Year	2026	2027	2028	2029	2030
improvement					
Are the identified mitigation actions being implemented in the designated time frames, and staying within the cost estimate? If no, provide why, and ideas for improvement					
Updating the HM&FMP					
Annual CRS recertification	X	X	X	X	X
Apply for grant funding to update HM&FMP (24 months from expiration)			X		
Update HM&FMP (start 12 months from expiration)				X	

Element H: Additional State Requirements

Provide 1 month out of the year that you will hold a Hazard Mitigation meeting per the requirements below (2 times per year is preferred, but a minimum of 1 is required).

1. Hold 1 meeting per year to discuss mitigation goal progress (twice per year is preferred)
2. Invitation to the meeting(s) sent to RIEMA (RIEMA will attend if schedule permits).
3. Meeting minutes are sent to RIEMA within 30 days of meeting being held outlining progress of goals
4. The following stakeholders should attend: (if applicable to your city/town):
    - Mayor or Town Administrator (or designee)
    - Emergency Manager
    - Director of DPW
    - Fire Chief
    - Police Chief
    - Planning Department
    - Finance Department
    - Floodplain Manager
    - Building Official
5. The meeting should be open to the public and posted in several places for their awareness.

Appendix F- CRS Activity 510 Annual Progress Report

Community Rating System
Activity 510 (Floodplain Management Planning)

Progress Report on Implementation of Credited Plan

Date this Report was Prepared:

Name of Community:

Name of Plan:

Date of Adoption of Plan:

5 Year CRS Expiration Date:

1. How can a copy of the original plan or area analysis report be obtained:

2. Describe how this progress report was prepared and how it was submitted to the governing body, released to the media, and made available to the public:

3. Provide a description of the implementation of each recommendation or action item in the action plan or area analysis report, including a statement on how the project was implemented or not implemented during the previous year:

See Attached

4. Discuss why any objectives were not reached or why implementation is behind schedule:

5. What are the recommendations for new projects or revised recommendations?

Appendix G- Funding Resources for Mitigation Projects

Identifying appropriate trainings, data, funding, and other resources is critical to the successful implementation of hazard mitigation efforts. This appendix provides information on federal, Tribal, state, and other resources and is organized as follows:

1) Mitigation Resources (non-monetary), and
2) Mitigation Funding Resources

Section 1: Mitigation Resources (non-monetary)

The table below includes information provided by federal, state, local, and nongovernment entities to support hazard mitigation efforts through training, helpful resources, data, and technical assistance programs. The following entities are a useful place to start.

The Federal Emergency Management Agency (FEMA) is the federal one-stop-shop for hazard mitigation training and technical assistance.

The State of Rhode Island Emergency Management Agency (RIEMA) is the State's hub for mitigation planning support and administers FEMA mitigation grants.

Please note that the table below is not exhaustive. It attempts to provide direction as staff and stakeholders begin implementing this HMP. Please note that Section 7.13 of the 2024 State of Rhode Island Hazard Mitigation Plan includes a list of state and federal funding programs for hazard mitigation.

Mitigation Resources (non-monetary)			
Entity	**Name**	**Category**	**Description**
Federal			
Federal Emergency Management Agency (FEMA)	Emergency Management Institute (EMI)	Training	EMI offers free emergency management and hazard mitigation training to help state, local, and tribal government employees create and implement effective hazard mitigation plans.
	FEMA Hazard Mitigation Planning Website / Distribution Warehouse	Helpful Resources	FEMA has developed many resources to support local hazard mitigation planning and implementation. Many of these documents are available online. They can also be ordered using the Distribution Warehouse's online order form or by calling 1-800-480-2520. Key resources include: • Mitigation Best Practices: These include stories, articles, and case studies that highlight successful efforts to reduce disaster risks. The *Mitigation Action Portfolio* is updated annually and provides documentation on mitigation activities that are eligible for funding. *Building Community Resilience with Nature-Based Solutions* provides guidance on designing and funding nature-based solutions to minimize hazard risk. • Mitigation Planning and Grants: FEMA's funding resources specify whether a hazard mitigation plan is required to be eligible. • Regulation and Guidance: This includes State, Tribal, Local, and Additional Mitigation Planning Policies which constitute FEMA's planning guidance for hazard mitigation.

Mitigation Resources (non-monetary)			
Entity	**Name**	**Category**	**Description**
National Park Service	Rivers, Trails, and Conservation Assistance Program	Technical Assistance	NPS-RTCA provides technical assistance planning to support community-led outdoor recreation and conservation projects outside of National Park Units. There is no cost to apply. *Local example: NPS-RTCA is assisting trail restoration and development on Narragansett Trail in Hopkinton, RI.*
Environmental Protection Agency	Equitable Resilience Technical Assistance	Technical Assistance	ERTA provides communities with no-cost design and project development assistance, community engagement, and partnership development support.
Department of Housing and Urban Development (HUD)	Office of Native American Programs	Technical Assistance	HUD's Office of Native American Programs sponsors tuition free trainings and workshops for Tribal Leaders, Tribal housing staff, housing professionals, and nonprofit partners by request.
U.S. Army Corps of Engineers (USACE)		Technical Assistance	Responsible for managing civil works responsibilities in the New England District, including flood risk management, streambank and shoreline protection, disaster and emergency assistance, and engineering support.
Cybersecurity & Infrastructure Security Agency (CISA)		Training and Helpful Resources	Provides resources, tools and training related to critical infrastructure security and resilience, for example the Dams Sector Crisis Management Handbook (2025).
State of Rhode Island			
Emergency Management Agency (RIEMA)		Helpful Resources & Technical Assistance	RIEMA strives to reduce the loss of life and property for the whole community while building, sustaining, and improving the state's capability to prepare for, protect against, respond to, recover from, and mitigate all natural, human-caused, and technological hazards. planning, analysis, and mitigation in RI. Visit their website to access planning support and resources for grants and finance, hazard mitigation planning, floodplain management, etc. Staff can help navigate hazard mitigation grant requirement questions.
University of Rhode Island	Coastal Resources Center (CRC)	Helpful Resources & Data	CRC helps communities become more effective stewards of their coastal and marine resources by partnering with stakeholders to apply science and find solutions to societal issues.
Rhode Island Office of Healthy Aging		Helpful Resources	Provides resources and information to empower older Rhode Islanders (55+) and adults living with disabilities to age strong.
Department of Business Regulation		Helpful Resources	Provides resources to make informed decisions about insurance coverage.
Department of Transportation and Public Facilities (RIDOT)		Technical Assistance & Data	RIDOT provides critical infrastructure data and oversees transportation planning and investment within the state. The RI Local Technical Assistance Program (LTAP) supports training and technical assistance to local city, county, and municipal road agencies throughout the state. RIDOT published a Resilience Improvement Plan in 2024.

Mitigation Resources (non-monetary)			
Entity	**Name**	**Category**	**Description**
Department of Environmental Management (RIDEM)		Helpful Resources, Technical Assistance & Data	RIDEM stewards the state's natural resources. It provides resources, training, and data in support of a wide range of mitigation-related activities such as dam safety, hazardous materials, and site remediation. RIDEM hosts the Dam Safety Program.
Department of Health (RIDOH)		Helpful Resources & Data	RIDOH supports public health and safety, including monitoring drinking water quality. RIDOH would support public health needs in the aftermath of emergencies such as dam failures or flooding.
Rhode Island Geographical Information System		Data	RIGIS distributes open geographically-referenced datasets for a wide range of topics including transportation, infrastructure, and the environment.
Local			
Town of West Greenwich	Planning Department	Helpful Resources	The Town of West Greenwich's Planning Department website provides information related to flood zone information, comprehensive planning, hazard mitigation planning, zoning, and storm water management and water quality.
Town of Exeter	Emergency Management Department	Helpful Resources	The Town of Exeter website provides relevant information on local plans, maps, hazard guides, and other resources.
Other			
The Center for Rural Development (RDPC)	Rural Domestic Preparedness Consortium	Training	RDPC is part of FEMA's National Training and Education System. It is focused on providing Department of Homeland Security-certified training and resources to support rural and tribal emergency management practitioners.
American Planning Association	Hazard Mitigation and Disaster Recovery Planning Division	Planning	A non-profit professional association that serves as a resource for planners, elected officials, and citizens concerned with planning and growth initiatives.
Community Planning Assistance for Wildfire (CPAW)		Technical Assistance & Data	Land use planning, communications, and research and science to support communities in fire-prone areas. CPAW is funded by the U.S. Forest Service and private foundations.
Earthquake Engineering Research Institute (EERI)		Training & Data	EERI provides members with the technical knowledge, leadership and advocacy skills and collaborative networks to improve earthquake resilience.

Section 2: Mitigation Funding Resources

The table below includes federal, state, and nongovernmental funding sources that may be relevant for mitigation projects and related efforts. Funding sources that require a Hazard Mitigation Plans are indicated as such.

Local examples of successful grant awards are underlined and italicized.

Mitigation Resources (funding)			
Entity	**Resource Name**	**Category**	**Accessible or Eligible to Use for Mitigation or Other Activities**
Federal			
Congressionally Directed Spending (CDS) Projects	Congressionally Directed Spending (CDS), included in the federal appropriations and budgeting process, provides a unique opportunity to invest in critical community projects across Rhode Island. Only projects based in Rhode Island and submitted by Rhode Island applicants will be considered. Eligible applicants include units of local and state government, nonprofit organizations and institutions of higher education.		
Federal Emergency Management Agency (FEMA) **Hazard Mitigation Assistance (HMA) Grants**	Hazard Mitigation Grant Program (HMGP)	Hazard Mitigation	HMGP is pass-through grant program that supports pre- and post-disaster mitigation plans and projects for state and local agencies and federally recognized Tribal governments. A Presidential Major Disaster Declaration **is required** to authorize HMGP funding.
	Hazard Mitigation Grant Program Post Fire (HMGP-Post Fire)	Hazard Mitigation	HMGP–Post Fire is a pass-through grant program that provides funding for state and local agencies and federally recognized Tribal governments to reduce wildfire risks. Funded projects include (but are not limited to) defensible space initiatives, ignition-resistant construction, hazardous fuels reduction, erosion control measures, slope failure prevention measures, and flash flooding prevention. HMGP–Post Fire grants are available to eligible states and territories that receive Fire Management Assistance declarations and to federally recognized Tribal governments that have land burned within a designated area. A Post Fire Presidential Disaster Declaration **is not required** to activate funding.
	Flood Mitigation Assistance (FMA)	Hazard Mitigation	FMA is a competitive program that provides funding to states, local communities, federally recognized tribes and territories. Funds can be used for projects that reduce or eliminate the risk of flood damage to structures insured by the National Flood Insurance Program (NFIP). FMA funding is available through the National Flood Insurance Fund for flood hazard mitigation activities and plan development to states, territories, and federally recognized tribes. NFIP participation is required to be eligible for funding. Local governments and non-federally recognized tribes are eligible as subapplicants and must be in “good standing” with the NFIP. All applicants and subapplicants must have a FEMA-approved and locally adopted HMP.

<table>
<tr><th colspan="5">Mitigation Resources (funding)</th></tr>
<tr><th>Entity</th><th>Resource Name</th><th>Category</th><th colspan="2">Accessible or Eligible to Use for Mitigation or Other Activities</th></tr>
<tr><td rowspan="2">FEMA
(Other)</td><td>Assistance to Firefighters Grant (AFG) Program</td><td>Fire</td><td>FEMA's AFG Program is a direct annual competitive grant program that focuses on enhancing the safety of the public and firefighters with respect to fire and fire-related hazards. Funding can be used to purchase equipment, protective gear, and emergency vehicles and provide training and other resources related to fire hazards. The AFG Program provides financial assistance directly to eligible fire departments, non-affiliated emergency medical service organizations, and state fire training academies.</td><td><u>Local Example: Exeter Volunteer Fire Department and Hianloland Fire Co in West Greenwich were awarded funding through the Assistance to Firefighters Grant.</u></td></tr>
<tr><td>Safeguarding Tomorrow Revolving Loan Fund Program</td><td>Hazard Mitigation Projects</td><td colspan="2">Funding will enable eligible state, local, and tribal jurisdictions to create a revolving loan fund for hazard mitigation projects, cost match, nature-based solutions, upfront project design costs, or for smaller projects that may not qualify for other Hazard Mitigation Assistance Grant Programs.</td></tr>
<tr><td>Department of Energy (DOE) Office of Energy Efficiency and Renewable Energy</td><td>Weatherization Assistance Program (WAP)</td><td>Weatherization</td><td colspan="2">WAP reduces energy costs for low-income households through education and weatherization services. Qualifying households must be at or below 200% of the poverty income guidelines or receive Supplemental Security Income. Homeowners and renters are eligible.</td></tr>
<tr><td rowspan="2">Environmental Protection Agency (EPA)</td><td>Clean and Drinking Water State Revolving Loan Fund (SRF)</td><td>Water Infrastructure</td><td colspan="2">Provides financial assistance for a range of water infrastructure projects, including stormwater management, estuary management, and nonpoint source pollution management. Financial assistance includes loans, purchase of debt, and insurance guarantees.</td></tr>
<tr><td>Water Infrastructure Finance and Innovation Act (WIFIA)</td><td>Water Infrastructure</td><td colspan="2">Funds development and implementation activities for a wide variety of drinking water, wastewater, and stormwater infrastructure projects, including stormwater management and green infrastructure projects.</td></tr>
<tr><td rowspan="2">United States Department of Agriculture (USDA)</td><td>Natural Resources Conservation Service (NRCS) Emergency Watershed Protection (EWP) Program</td><td>Watershed Projects</td><td colspan="2">The EWP Program offers technical and financial assistance to help relieve imminent threats to life and property caused by floods, fires, windstorms, and other natural disasters that impair a watershed.
EWP grants are available to local agencies, conservation districts, federally recognized Tribal governments, and interested public and private landowners that have a sponsor.
EWP <u>does not</u> require a disaster declaration by the federal or state government.</td></tr>
<tr><td>NRCS Watershed Protection and Flood</td><td></td><td colspan="2">The WFPO Program provides technical and financial assistance to help plan and implement watershed programs, including flood prevention. It is available to state and local agencies and federally</td></tr>
</table>

Mitigation Resources (funding)			
Entity	**Resource Name**	**Category**	**Accessible or Eligible to Use for Mitigation or Other Activities**
	Prevention Operations (WFPO) Program	Watershed Projects	recognized Tribal governments and for watersheds that are 250,000 acres and smaller.
	NRCS Watershed Rehabilitation Program (REHAB)	Watershed Projects	The REHAB Program helps project sponsors rehabilitate aging dams that are reaching the end of their design life and/or no longer meet federal or state safety criteria or performance standards. Watershed Rehabilitation Programs receive funding from Congress through discretionary appropriations and additional funds provided by the Farm Bill.
	Farm Service Agency (FSA)	Agriculture	The FSA provides services related to loans and disaster assistance programs for agricultural producers, such as the Emergency Conservation Program, which offers financial and technical assistance to repair and restore farmland affected by natural disasters such as floods, hurricanes, wildfires, drought, and other calamities. The closest field office for the FSA is located in Warwick, RI. *Local Example: USDA offered disaster assistance to RI farmers and forest managers impacted by flooding and hail in August, 2024.*
	Rural Development (USDA-RD)	Rural Development	USDA-RD provides federal assistance resources throughout rural Southern New England. There are a number of state programs of relevance to hazard mitigation, including: • Emergency Community Water Assistance Grants: This program helps communities prepare, or recover from, an emergency that threatens the availability of safe, reliable drinking water. • Rural Utilities Service: Provides financing for rural infrastructure improvements including water and waste treatment, electric power, telecommunication, and broadband services.
	Other Grant Programs		*Roch's Fresh Food West Greenwich, Inc. was awarded grant funding through the Local Food Promotion Program in 2015.*
Department of Health and Human Services	Office of Community Services	Community Services	Provides a number of programs and resources, including: • Low Income Home Energy Assistance Program (LIHEAP): Provides federally funded assistance to reduce the costs associated with home energy bills, energy crises, weatherization, and minor energy-related home repairs. • Low Income Household Water Assistance Program (LIHWAP): Provides funds to assist low income households with water and wastewater bills.
		Hospital preparedness	Supports regional collaboration and health care preparedness and response to improve the capacity of the health care system to plan for and respond to large-scale emergencies and disasters.

Mitigation Resources (funding)			
Entity	**Resource Name**	**Category**	**Accessible or Eligible to Use for Mitigation or Other Activities**
	Hospital Preparedness Program		Provides funding for health care preparedness and response and offers guidance and technical assistance.
Department of Housing and Urban Development (HUD)	Community Development Block Grant–Disaster Recovery (CDBG-DR)	Recovery from Presidentially-declared disasters	Allocated to rebuild disaster-impacted areas and provide crucial seed money to start the long-term recovery process. Available to state and local agencies and federally recognized Tribes to help recover from Presidentially declared disasters, especially in low-income areas. Grantees must ensure that their activities align with the mitigation strategy of their State Hazard Mitigation Plan (SHMP).
	Community Development Block Grant–Mitigation (CDBG-MIT)	Hazard Mitigation	CDBG-MIT provides funding for mitigation activities that increase resilience to disasters and reduce or eliminate the long-term risk of loss of life, injury, damage to and loss of property, and suffering and hardship, by lessening the impact of future disasters.
	Healthy Homes Programs	Housing	These programs include supporting safe homes during disasters and remediation efforts after disasters. Grant opportunities are posted as they are available.
Department of Labor	Employment and Training Administration	Unemployment Assistance	Provides temporary benefits to individuals whose employment or self-employment has been lost or interrupted as a direct result of a major disaster declared by the President and who are not eligible for regular unemployment insurance benefits.
Department of Transportation Federal Highway Administration	Recreational Trails Program	Transportation Infrastructure	Annual grant program that allocates funds to States to develop and maintain recreational trails and trail-related facilities. These are administered by the Department of Environmental Management in cooperation with the RI Department of Transportation.
	Federal Lands Access Program	Transportation Infrastructure	Provides funding to improve transportation facilities that provide access to, are adjacent to, or are located within Federal lands. The FLAP supplements State and local resources for public roads, parking areas that serve as trail heads, trails, transit systems, and other transportation facilities, with an emphasis on high-use recreation sites and economic generators.
Small Business Administration	Disaster Loans	Mitigation Assistance	SBA Offers low-interest disaster loans to homeowners and small business impacted by declared natural and other disasters and to help mitigate against future disasters. Projects may include wind, flood, wildfire, and earthquake mitigation. The District Office is located in Providence, RI.
U.S. Army Corps of Engineers (USACE)	Planning Assistance to States and Tribes	Water Resources	Allows the USACE to assist States, local governments, Tribes, and other non-Federal entities with comprehensive planning and technical assistance related to water resource needs. Cost-sharing varies across USACE programs. PAS programs are generally cost shared 50% with the study partner.
	National Park Service (NPS) Historic	Historic Preservation	Offers technical and financial assistance to communities related to historic preservation. These are administered through the Rhode *Funding was awarded to support a National Resister*

Mitigation Resources (funding)			
Entity	**Resource Name**	**Category**	**Accessible or Eligible to Use for Mitigation or Other Activities**
Department of the Interior	Preservation Fund		Island Historical Preservation & Heritage Commission (RIHPHC). *<u>nomination for the ILZRO House in Foster, RI.</u>*
	NPS Tribal Heritage Grant	Cultural Heritage	Eligible to federally-recognized Tribes for a range of cultural resources surveys, inventories, planning, design, and repair work on historic sites.
	NPS Land, Water, and Conservation Fund (LWCF)	Outdoor Recreation	The LWCF provides matching grants to states and local governments for the acquisition and development of public outdoor recreation areas and facilities. States must have a Statewide Comprehensive Outdoor Recreation Plan (SCORP) in place to be eligible. RIDEM administers this grant. *<u>RIDEM was awarded $135,249 for the development of Arcadia Management Area bridges in 2011.</u>*
	NPS Challenge Cost Share	Stewardship	Applications are submitted by NPS staff in partnership with educational institutions, private for-profit entities, or non-profit organizations. Projects should promote improved access and opportunities for outdoor recreation, environmental stewardship, and education in the National Parks, National Trails and / or Wild and Scenic Rivers.
	US Fish and Wildlife Service (USFWS) Pittman-Robertson	Hunting Access	Allocates funds for hunting, wildlife viewing and management, and habitat conservation. Pittman-Robertson funds will reimburse 65% of the cost of an eligible Hunter Access proposal and requires a 25% non-federal match.
	USFWS Dingell-Johnson	Fishing Access	Allocates funding to improve recreational power boating and sport fishing access. This program is managed by the Rhode Island Department of Fish & Game who does not put out calls for proposals but instead received input through area management biologists for project proposals.
	USFWS National Fish Passage Program	Fish Passage	Provides financial and technical assistance for projects that improve fish passage. *<u>Local example: Rhode Island Chapter of Tour Unlimited was obligated $100,000 through the National Fish Passage Program in 2024 for work on the Capwell Mill Pond in West Greenwich.</u>*
Cybersecurity & Infrastructure Security Agency (CISA)	State and Local Cybersecurity Grant Program	Cybersecurity	Helps eligible entities address cybersecurity risks and threats to information systems owned or operated by (or on behalf of) state, local, and territorial governments. Administered by CISA and FEMA.
National Fish and Wildlife Foundation	America's Ecosystem Restoration Initiative (AERI)	Ecosystem Restoration	AERIA supports locally led projects that invest in fish and wildlife habitat restoration, ecosystem and community resilience, access to nature, habitat corridors and connectivity. Projects that address resilience to flooding, drought, and other threats may be eligible.

Mitigation Resources (funding)			
Entity	**Resource Name**	**Category**	**Accessible or Eligible to Use for Mitigation or Other Activities**
	National Coastal Resilience Fund (NCRF)	Coastal Resilience	Supports the implementation of nature-based solutions to strengthen resilience of coastal communities and ecosystems to these threats.
State of Rhode Island			
Rhode Island Investment Bank	Municipal Resilience Program	Resilience	Provides direct support to cities and towns to complete a municipal-driven workshop process to identify projects and strategies to improve resilience. Upon completion of a workshop, projects can be eligible to receive grant funding with a 25% local project cost share.
Department of Health (RIDOH)	Preventative Health and Health Services Block Grant	Public Health	Allocates funding from the Centers for Disease Control and Prevention to address health promotion, community interventions, and public health information.
Department of Environmental Management (RIDEM)	Office of Emergency Response	Emergency Response	The Office of Emergency Response is RI's first line of defense protecting public health, safety, and welfare in an environmental emergency. Funding mechanisms include the Oil Spill Prevention, Administration & Response (OSPAR) Fund, which provides funding for response, containment, remediation, trainings, equipment acquisition, emergency loans, etc.
	Volunteer Fire Assistance Grant Program	Fire	Funded through the USDA, this program improves the capacity and capability of fire departments in rural areas to prevent and suppress wildfires. Applicants can request from $1000-$2500 in grant funds with a 50/50 match requirement. RIDEM provides a number of other funding programs, including the Forest Health Program, the Urban & Community Forestry Program, and many more.
	Climate Resilience Fund	Climate Resilience	Supports climate resilience projects for climate-driven challenges facing Rhode Island communities. Grant recipients are required to match grants with a 25% local project cost share.
	Wastewater Treatment Facility Resilience Fund	Wastewater Infrastructure	Provides funding to municipalities and/or quasi-state entities to protect government-owned wastewater collection systems and treatment facilities against the effects of climate change and flooding.
Department of Transportation (RIDOT)	Statewide Transportation Improvement Program (STIP)	Transportation Infrastructure	The STIP is a list of transportation projects the State intends to implement using U.S. DOT funds. The STIP presents a 10-year program of over $6,000,000,000 in funding for transportation projects from federal fiscal year 2022 to 2031.
Department of Natural Resources (DNR)	Division of Forestry	Wildfire	The Volunteer Fire Capacity (VFC) grant provides funding assistance for training, supplies, equipment purchases, and prevention activities on a cost share basis.

Mitigation Resources (funding)			
Entity	**Resource Name**	**Category**	**Accessible or Eligible to Use for Mitigation or Other Activities**
Other			
Rhode Island Foundation		Community Support	The Rhode Island Foundation has a number of relevant grant programs, including: • <u>Emergency Response and Recovery Fund:</u> Provides financial resources to support immediate and long-term, local disaster relief and recover needs in the event of a disaster or emergency impacting Rhode Islanders. • <u>Catalyst Grants:</u> Larger and multi-year grants to support catalyzing change. • <u>Community Priority Grants:</u> Awarded for programmatic or general operating support to 501c(3) nonprofit organizations.
Rhode Island Infrastructure Bank (RIIB)		Infrastructure	Supports and finances investments in the State's infrastructure through the issuance of bonds, originating loans, making grants, mobilizing public and private capital, and other innovative financing. *<u>Local Example: Rhode Island Infrastructure Bank announced financing for a 25-acre Rhode Island Grows greenhouse facility in Exeter (2025).</u>*
Rhode Island Energy Foundation		Community Support	The Rhode Island Energy Foundation's Empowering Communities Grants provide support to nonprofits in Rhode Island for education initiatives and strengthening community resources.
Rhode Island Humanities		Arts & Humanities	Invests in the community through financial support and assistance to individuals and organizations to stimulate new research in the humanities and spark thoughtful community exchange.
Rhode Island Small Business Development Center		Business Development	Provides resources, advice, and assistance that help small for-profit businesses grow.
Rhode Island Sea Grant		Research	Provides funding for scientific research in the natural and social sciences to improvement understanding and management of RI's coastal and marine ecosystems.
American Red Cross		Recovery	Provides for the critical needs of individuals such as food, clothing, shelter, and supplemental medical needs. Provides recovery needs such as furniture, home repair, home purchasing, essential tools, and some bill payment may be provided.
Crisis Counseling Program		Mental Health	Provides grants to State and Borough Mental Health Departments, which in turn provide training for screening, diagnosing, and counseling techniques. Also provides funds for counseling, outreach, and consultation for those affected by disaster.
Institute for Business and Home Safety		Safety	An initiative of the insurance industry to reduce deaths, injuries, property damage, economic losses, and human suffering caused by natural disasters. Offers free disaster guides for homes and businesses.

Appendix H- Exeter MRP August 2024 Summary of Findings

EXETER





Photo Credit: Exeter Public Library, Only In Your State, Town of Exeter, Adventures in New England

Municipal Resilience Program

Community Resilience Building

Summary of Findings

August 2024

Town of Exeter, Rhode Island
Community Resilience Building
Summary of Findings

Overview

The need for municipalities, corporations, states, and federal agencies to increase resilience to extreme weather events and a changing climate is strikingly evident amongst the communities across the state of Rhode Island. Recent events such as Tropical Storm Irene, Super Storm Sandy, severe winter storms (2013 & 2015), and even the recent severe flooding during the summer and fall of 2022, 2023 and 2024 have reinforced this urgency and compelled leading communities like the Town of Exeter to proactively collaborate on planning and mitigating risks. Ultimately, this type of leadership is to be commended because it will reduce vulnerability and reinforce the strengths of people, infrastructure, and ecosystems and serve as a model for other communities in Rhode Island.

In the summer of 2024, the Town of Exeter embarked on certification within the state of Rhode Island's Municipal Resilience Program (MRP), a partnership between the Rhode Island Infrastructure Bank (RIIB), Rhode Island Department of Environmental Management (RI-DEM), and The Nature Conservancy. As a prerequisite to certification, the Rhode Island Infrastructure Bank (RIIB) and The Nature Conservancy (TNC) provided the Town with a community-driven process to assess current hazard and climate change impacts and to surface projects, plans, and policies for improved resilience. In August 2024, Exeter's Core Team helped organize their Community Resilience Building process and workshop facilitated by TNC in partnership with RIIB. The core directive of this effort was the engagement with and between community members to define strengths and vulnerabilities and the development of priority resilience and sustainability actions for the Town of Exeter.

The Exeter Community Resilience Building Workshop's central objectives were to:

- Define top local natural and climate-related hazards of concern.
- Identify existing and future strengths and vulnerabilities.
- Identify and prioritize actions for the Town.
- Identify opportunities to collaboratively advance actions to increase resilience alongside residents and organizations from across the Town and beyond.

The Town of Exeter employed an "anywhere at any scale", community-driven process called Community Resilience Building (CRB) (www.CommunityResilienceBuilding.org). The CRB's tools, reports, other relevant planning documents, and local maps were integrated into the workshop process to provide both decision-support and visualization around shared issues and existing priorities across Exeter. The Twenty-Year Comprehensive Plan For Exeter, RI (2024) and the Exeter Multijurisdictional Hazard Mitigation Plan (2005) (currently being updated (2024)) were particularly instructive as references. Using the CRB process, rich with information, experience, and dialogue, the participants produced the findings presented in this summary report. This includes an overview of the top hazards, current concerns and challenges, existing strengths, and proposed actions to improve Exeter's resilience to hazards and climate change today, and in the future.

The summary of findings transcribed in this report, like any that concern the evolving nature of risk assessment and associated action, is proffered for comments, corrections and updates from workshop attendees and other stakeholders alike. The leadership displayed by the Town of Exeter on community resilience building will benefit from the continuous participation of all those concerned.

The Rhode Island Infrastructure Bank is a quasi-state agency focused on financing infrastructure improvements, particularly those addressing climate resilience, environmental sustainability, and public health. The MRP operates under the framework of state and federal environmental policies, including the Resilient Rhody plan, which serves as Rhode Island's overarching climate resilience strategy. In addition, RIIB's initiatives fall within the legal authorities granted by the Rhode Island General Assembly, including the Climate Change Coordinating Council Act and related environmental protection laws. By participating in the MRP, Exeter continues to build resilient infrastructure that not only safeguards the community but also enhances its long-term sustainability in the face of evolving environmental challenges.

Summary of Findings

Top Hazards and Vulnerable Areas for the Community

Prior to the CRB Workshop, the Exeter Core Team identified the top hazards for the Town. The hazards of greatest concern included flooding of rivers and streams, wildfires and brush fires, and tropical storms. Additional hazards highlighted by participants during the CRB Workshop included hurricanes and major storms as well as Nor'easters and blizzards. These hazards have direct and increasing impacts on the infrastructure, environment, and residents of and visitors to Exeter. These effects are seen in residential homes, natural areas (wetlands, rivers, forests, preserves, parks), road infrastructure, dams, businesses, transportation systems, municipal facilities, social support services, and other critical infrastructure and community assets within Exeter.

Current Concerns and Challenges Presented by Hazards

The Town of Exeter has several concerns and faces multiple challenges related to the impacts of natural hazards and climate change. In recent years, Exeter has experienced a series of highly disruptive and damaging weather events including severe flooding (March 2010, 2023, and 2024), Tropical Storm Irene (August 2011), Superstorm Sandy (October 2012), Nor'easter Nemo (February 2013), and Blizzard Juno (January 2015), severe drought (2016), significant blizzard (2022) and wildfire (2023). Impacts from Irene and Sandy included widespread inland flooding along with tree damage and associated power outages. The winter storms Nemo and Juno dropped 2-3 feet of snow with 2-3 inches per hour of accumulation at their peak. The magnitude and intensity of these events and others across Rhode Island have increased awareness of natural hazards and climate change, while motivating communities such as Exeter to proactively improve their resilience.

As is predicted with climate change, the impacts from these severe weather events have been varied and diverse. In Exeter, this has included riverine flooding of critical infrastructure, roads, bridges, and low-lying areas; localized flooding from stormwater runoff during intense storms and heavy precipitation events; and property damage and utility outages (lasting several days or more) from wind, snow, and ice. Longer periods of elevated heat, particularly in July and August, have raised concerns about vulnerable segments of the population, including elderly and disabled residents who are homebound, residents living in older housing stock without air conditioning, lower-income residents who may have difficulty with utility bills for temperature control in their homes, and the residents living in proximity to areas with increased potential for wildfires. The combination of these issues presents a challenge to preparedness and mitigation priorities and requires comprehensive, yet locally specific actions in Exeter.

The workshop participants were generally in agreement that Exeter is experiencing more intense and frequent storm events, wildfires, heat waves, and cold snaps. Additionally, there was a general concern about the increasing challenges of being prepared for the worst-case scenarios (e.g., major thunderstorms and hurricanes (Cat-3 or above)) particularly in the late summer and in the fall/winter months when more intense storms coincide with colder weather (i.e., Nor'easters, blizzards). Workshop participants also highlighted the impact of the recent COVID-19 pandemic on their community.

Credit: Only In Your State

Specific Categories of Concerns and Challenges

As in any community, Exeter is not uniformly vulnerable to hazards and climate change. Certain locations, assets, and populations have been and will be affected to a greater degree than others. Workshop participants identified the following items as their community's key areas of concern and challenges across several broad categories.

Municipal Functions, Operations, & Growth:

- Limited potential for additional economic development makes increases in municipal budgets to accommodate new services and resources difficult to envision in the future.
- Primarily a residential community with limited commercial/retail development, which limits revenue towards the Town's tax base.
- Ongoing financial struggles to meet demands of municipality with limited control of expenses given that 80% of Exeter's annual budget is allocated to help run the regional school system.
- Limited funding available to advance new projects and programs and/or secure additional staff capacity.
- Most municipal departments are managed by a single individual, resulting in limited support and an inability to take time off ("always on call"). The demands of grant requirements leave staff overwhelmed, causing a backlog of daily tasks.
- Existing structure of an elected council and mostly single-employee departments presents challenges for the Town's resilience and day-to-day operations. With department heads often managing their own workload independently and without centralized support or guidance, the ability to prioritize tasks can be strained when the needs of residents exceed current capacity.
- Lack of coordination across departments can create additional burden on the Town Clerk, who may not have the authority or resources to address executive-level decisions that arise. Alterations of governance structure to enhance operational efficiency and resilience may face resistance from taxpayers or voters, particularly if it is perceived as increasing costs and/or status quo in Exeter.
- Communication within and across Town Hall and various departments are currently not optimally effective ("people don't talk enough to each other even within departments").
- Communication between municipal leadership and community residents was described as "non-existent" with a Town website that is often unreliable and outdated despite being the only place that currently posts municipal-related information for residents.

Specific Categories of Concerns and Challenges (cont'd)

- Longer-term residents can be resistant to the ideas and approaches of more newly arrived residents for managing on-going issues in Town. New residents have many ideas for change and are challenged by established residents that want to retain the status quo.
- Lack of public transportation system increases and reinforces dependence on privately owned automobiles.
- Ongoing and mounting costs associated with removing downed tree limbs and trees due to high wind events and winter ice storms.
- Installation of solar farms that result in increased runoff and erosion locally.
- Higher rates of school absenteeism during power outages because students remain at home to manage farm issues related to water wells being inoperable among other challenges with buildings, crops, and livestock.
- Currently, Exeter does not have a police department and relies on the Rhode Island State Police to handle local law enforcement issues. Exeter does have a Town Sergeant who is responsible for Concealed Carry Weapons Permits, Vehicle Identification Number verification, and vehicle odometer checks, road details, and house checks. The Town Sergeant also attends Town Council meetings.
- Establishment of a full-time Fire Department and Police Department is highly unlikely due to budget limitations. The Fire Departments rely solely on community volunteers. Note: The Exeter Fire District and Dispatch are not a part of the municipal government in Exeter.
- Elderly residents and young families are currently experiencing financial challenges at current tax levels.
- Space in Town Hall is limited and can present impediments to getting work completed.
- Exeter Public Library provides excellent resources for the community but has limited administrative capacity with limited additional time to pursue and submit grant proposals that could enhance available resources and programming for residents.
- Exeter does not have a dedicated grant writer which results in missed opportunities for much needed federal and state funding to bolster capacity (staff positions and/or consultants) and advance priority projects.

Emergency Management & Preparedness:

- Rapidly aging resident population who have limited mobility and are increasingly isolated during and after disasters.

Specific Categories of Concerns and Challenges (cont'd)

- Concerns about routine and longer-duration power outages after major storm events which can present problems for elderly and more isolated residents.
- Growing concerns about the frequency and impact of wildfires in Exeter with little awareness amongst residents of areas more vulnerable than others to loss of property from fire. This is of particularly concern to newer developments with higher housing densities in proximity to forested areas.
- Low density and distribution of homes across Exeter creates challenges for timely emergency response in the event of power outages, with the greatest concern being isolation of elderly and those with special/medical needs.
- Exeter Emergency Management Agency does not have a designated Emergency Operations Center which can present challenges to communication and coordination efforts in advance of major events.
- Concerns regarding access and blocked evacuation routes into more remote areas in Exeter in the event of wildfires or other disruptive natural hazard events.
- Aging population that prefers to remain in their homes or are homebound in residences located a distance from the nearest neighbor.
- Increasing threat of power outages lasting more than several days and up to a week which is of particular concern for residents relying on electric pumps for private drinking water wells.
- Ongoing challenges communicating information to residents who don't have or use web-based technology in their homes. During recent wildfires, residents without technology were unaware of the severity of the situation and therefore often refused to leave their homes despite the threat level.
- Declining numbers of volunteers amongst the ranks of the all-volunteer Exeter Volunteer Fire Department with additional training needed beyond structural fire responses to include wildfire fire suppression responses and techniques.
- Large land area coupled with a lack of fire suppression infrastructure such as dry hydrants and water tankers results in the inability of local fire fighters to effectively control wildfires that can then quickly reach overwhelming proportions placing people and property at greater risk.
- Lack of adequately distributed and maintain fire roads to enable better fire suppression operations in the event of a wildfire.
- Increased storm frequency, intensity, and duration can result in greater flooding impacts such as flooding of drinking water well pumps, basement flooding, and dam failures in Exeter.

Specific Categories of Concerns and Challenges (cont'd)

- Ongoing and increasing damage to trees due to insect and pathogen infestations leaving dead and standing trees which pose a health and safety threat if in proximity to homes or roadways.
- Concerns regarding the amount of paperwork and process via Rhode Island Emergency Management Agency and the Federal Emergency Management Agency to recover fully from last Presidentially Declared Disaster in January (2024).
- Exeter Public Library does not currently have a back-up generator and is considered a critical facility as the warming/cooling center for residents.
- Lack of an updated Natural Hazard Mitigation Plan (15 years since last update) has led to Exeter not being able to apply for emergency management related funding over the last decade.

Roads & Road Networks, Bridges, & Dams:

- Potential flooding issues during heavy precipitation events identified at the Boone Lake Dam.
- Damage to Mail Road coupled with increased erosion due to the transportation of equipment by large trucks for a new solar array installation in Exeter.
- Gravel or unpaved roads subjected to extreme weather events such as in January 2024 causes loose gravel to be washed into adjoining waterways which presents environmental concerns.
- Concerns about the safety of bridges built in the 1940s which offer singular access to remote areas of Town. If bridges were compromised by storm events these areas would be inaccessible.
- Roadways identified as at risk or currently experiencing impassable conditions during storms include Widow Sweets/Cobblestone Hill, Kingston Road, Liberty Church Road, Dolly Pond Road, Stony Lane, New London Turnpike, Raymond Potter Lane, Summit Road, Pardon Joslin Road, Skunk Hill Road, Queens Fort Road, Bates Schoolhouse Road, Sheffield Hill Road, Wolf Rock Road, and Austin Farm Road.
- Flooding along the Queens River causes damage and makes the adjoining transportation corridor untraversable at times.

Septic Systems, Drinking Water Supply, & Stormwater Systems:

- Ongoing and growing concerns amongst residents with private drinking water wells regarding the impacts of drought on water availability ("wells are drying up with one month of drought").

Specific Categories of Concerns and Challenges (cont'd)

- Potable water sources in Exeter are threatened by pre- and polyfluoroalkyl substances (PFAS).
- Concerns with contamination and availability of high-quality groundwater to supply all residents private drinking water wells. Two wells at Ladd Center tested positive for PFAS in spring 2024).
- Lack of public drinking water supply for residents on private wells, which is an issue when power outages occur unless private investments have been made in onsite backup generators.
- Culverts in many locations across Exeter are undersized and inadequate to manage the increased runoff volumes from precipitation events.

Watersheds, Wetlands, Rivers, Open Space, Forests, & Trees:

- Accumulation of impacts on forests due to repetitive outbreaks of various blights, pests, and diseases across Exeter and much of western Rhode Island.
- Forest invasive pests and pathogens have growing impacts on income derived from woodlots as well as increasing the forest fire risk.
- Increasing number of incidents with infectious disease from ticks and mosquitos.
- Large amounts of land in Exeter are owned and managed by the state of Rhode Island with limited opportunities for local residents and leadership to have a say in how those public lands are managed.
- Exeter also has large tracts of land that are conserved and owned and managed by non-governmental organizations that are currently not under municipal government control, which is of concern locally as it relates to coordination and response to fire suppression efforts.
- Privately owned lands in Exeter retained by small number of families, and if they decided to sell off the land it could result in a rapid amount of development.
- Stream, rivers, and water bodies are found all across Exeter resulting in extensive and widely dispersed flooding issues.
- Deforestation due to development presents a threat to essential forest habitat in Exeter and western Rhode Island.

Current Strengths and Assets

Just as certain locations, facilities, and populations in Exeter stand out as particularly vulnerable to the effects of hazards and climate change, other features are notable assets for Exeter's resilience building. Workshop participants identified the following items as their community's key strengths and expressed interest in centering them as the core of future resilience-building actions.

- Clearly, the responsive and committed engagement exhibited by leadership, staff, and residents is a very appreciated strength within and across Exeter. Ongoing collaboration between municipal staff, committee/commission volunteers, business owners, land trusts, faith-based organizations, non-government organizations, adjoining municipalities, and various state-level organizations, among others, on priorities identified herein will help advance comprehensive, cost-effective, community resilience building actions.
- Many residents and their families have lived in Exeter for many generations creating a deep interest in the community's long-term vitality.
- Culture of watching out for one another with a strong sense of community, which is shared by most residents.
- State Representatives for Exeter understand the importance of natural resources and environmental strengths that contribute to the overall resilience of the region.
- Due to the small size of the community, there is a direct connection between municipal leadership and staff and the residents of Exeter.
- Exeter has a new Twenty-Year Comprehensive Plan For Exeter, RI (2024) complete with meaningful action steps that were informed by extensive stakeholder engagement.
- Exeter is currently updating its Multijurisdictional Hazard Mitigation Plan (2025).
- Ongoing work to improve funding streams and staff capacity in hopes of making the Town function more effectively with more projects being completed.
- Municipality operates efficiently given the small number of staff who are dedicated to creating a better Exeter.

Current Strengths and Assets (cont'd)

- Town is fiscally disciplined and currently carries zero debt on its balance sheet coupled with accurate forecasting of routine and extraordinary expenses.
- Quick access to Interstate Route 95 with relatively short travel times to coastal amenities coupled with geographic housing advantages such as affordable housing. Exeter met the 10% affordable housing goals set by the state in 2023.
- Concerted effort by Town to attract young families with children, who hopefully will grow up within the community, by providing accessible housing.
- Dedicated social services staff that help care for community needs including the maintenance of a food pantry and programs for elderly residents.
- Highly responsive Public Works Department keeps roads clear of hazards and debris, which has been a challenge over the last decade due to the increased extent and intensity of flooding and storm events.
- Volunteer fire fighters and emergency medical technicians in Exeter are highly respected by residents due to their responsiveness.
- Exeter is a partner in the Rhode Island Statewide Mutual Aid Plan and coordinates fire apparatus sharing in response to local fires as well as with neighboring communities when there is an incident requiring more assistance than a local jurisdiction can provide.
- Town staff have identified many potential projects with co-benefits to the environment and community members.
- Active and engaged Exeter Public Library facility which serves as a community center or hub with outstanding programming especially for children within the community. Library is particularly important due to the lack of a community center in Exeter.
- Public buildings, including the School, Library, and new Town Hall, are all low maintenance.
- Town Council approved the "Village Common Concept" that links skilled residents (i.e., medical professionals, skilled labor (plumbing, etc.)) with those in need within the community, such as preventive medical attention for elderly residents and household plumbing needs.

Current Strengths and Assets (cont'd)

- Town leadership and residents are becoming more active about addressing issues associated with wildfire prevention and management.
- Exeter's Emergency Management Department has brought together a group of homeowners to discuss wildfire prevention and safety.
- Firewise Program provided by Rhode Island Department of Environmental Management's Forestry Division and Exeter's Emergency Management Director help residents in Exeter with best practices to reduce threat of wildfire given the extent of the forested areas across Town.
- Good response and collaboration of efforts amongst volunteers in the community during recent wildfires with support from neighboring municipalities including West Greenwich, among others.
- Strong collaboration between Red Cross and Exeter Public Library during last wildfire where people sought shelter at the library and received attention from Red Cross personnel.
- Schools are used as shelters and have generators to maintain power availability in the event of power outages.
- Exeter has a new software system that allows for more effective communication with residents on issues of timely importance.
- School system has communication system via live feed, telephone, and email to effectively reach parents of children within the system. Teachers also have an app that enables communication with parents of students who are fluent in languages other than English.
- Limited amount of impervious surface due to the limited amount of development and associated pollutants in stormwater runoff.
- Exeter has a large contiguous core forest and associated forest habitat that protects and cleans freshwater for residents and others.
- Private landowners with large tracts of forested lands care deeply about the land and proactively seek out advice on better "climate-smart" management practices from organizations such as Northern Rhode Island Conservation District.

Current Strengths and Assets (cont'd)

- Given the rural nature of Exeter, the community can think strategically about how to use space without the restrictions of built-out, urban municipalities.
- Residents of Exeter are conservation minded and seek to retain values associated with the Town's rural character.
- Large amounts of forested open space offers protection from extreme heat waves and other climate-related anomalies by helping to reduce ambient air temperatures.

Credit: Visit Rhode Island (Wicked Tulips Flower Farm)

Recommendations to Improve Resilience

A common theme among workshop participants was the need to continue community-based planning efforts focused on developing adaptive measures to reduce Exeter's vulnerability to extreme weather, climate change and other common concerns raised. To that end, the workshop participants helped to identify several priority topics requiring more immediate and/or ongoing attention including:

- **Long-term vision and growth** (i.e. responsible/sustainable growth, volunteerism, conservation & recreation, economic development, funding/tax base, water quality);
- **Infrastructure improvements** (i.e. road/bridge/dams, stormwater management systems, green stormwater infrastructure, private drinking water wells);
- **Quality of life improvements** (i.e. parks and recreation, open space & access, sustainability, health & safety, economic prosperity, water quality, education);
- **Emergency management** (i.e. communications, outreach, education, continuation of services, evacuation, vulnerable populations, wildfire).

In direct response, the Community Resilience Building workshop participants developed the following actions and identified, but did not rank, them as priority or as additional actions. Maps provided during the CRB Workshop gathered from the Twenty-Year Comprehensive Plan For Exeter, RI (2024) are provided in Appendix A.

Priority Actions

Capacity Building

- Prioritize efforts and funding to advance the establishment of an Emergency Operations Center for Exeter Emergency Management Agency complete with additional staff to proactively management disasters and other major events.

- Work with Rhode Island Emergency Management Agency to establish an emergency management training program for high school students while simultaneously setting up a Community Emergency Response Team in Exeter.

Priority Actions (cont'd)

- Identify an emergency response team amongst existing municipal staff and work to define what is needed to serve the community more effectively before, during, and after a natural disaster.

- Secure a grant writer for Exeter and work to cover associated staff costs via administrative allocations within awarded grants that will help implement projects.

- Seek out approaches and funding opportunities to increase administrative capacity in all Exeter's municipal departments.

Capital Projects

- Seek out federal funding to bring internet and associated technological devices to residents currently underserved, with special attention directed to families with children.

- Conduct engineering study and look to replace Mount Tom Bridge on the western side of Town which has fallen into a state of unsafe disrepair.

- Identify, assess, and repair antiquated and unsafe bridges in Exeter.

- Work towards securing funding to install a back-up generator at the Exeter Public Library.

- Look to acquire and install back-up generators where needed at all municipal buildings in Exeter.

Priority Actions (cont'd)

Plans/Preparedness/Studies/Outreach

- Identify, assess, and prioritize flood mitigation projects involving replacing/retrofitting undersized culverts and other inadequate flood/stormwater runoff infrastructure in Exeter.

- Create a plan and process for better communications with residents - for example, through a newsletter, emails, text alerts, Facebook page, Town website, etc.

- Complete Multijurisdictional Hazard Mitigation Plan update currently underway in partnership with West Greenwich as well as look to update Exeter's Emergency Operation Plan from 2004. An Emergency Operations Plan (EOP) serves as a comprehensive guide for how a municipality will respond to and recover from emergencies and disasters. Its primary purpose is to coordinate the actions of local government departments, emergency responders, and community organizations to ensure an efficient and effective response to various hazards. An Emergency Operations Center is where the EOP is implemented.

- Partner with environmental organizations (Save the Bay, Audubon, etc.) to provide educational training programs for community members and high school students on watershed and water quality management and best practices.

- Consider setting up state-wide training programs for students who are looking for careers in landscaping and outdoor labor skills (versus college education) and look to offer career paths for them within Exeter.

- Review existing regulations and policies and strengthen as needed to ensure drinking water resources are protected for residents.

Priority Actions (cont'd)

- Develop an emergency resource guide for residents that explains appropriate responses at the household scale and provides contact information to help ensure residents receive the care and services required before, during, and after major events (i.e., Rhode Island Department of Health Special Needs Registry).

- Convene a forum of large landowners (private property owners, land trusts, etc.) including the state of Rhode Island (Department of Environmental Management) to discuss ongoing fire mitigation operations as well as best preventive fire management practices across Exeter to help reduce the potential for catastrophic wildfires (i.e. Firewise). Firewise USA is a national program created by National Fire Protection Association (NFPA) that addresses the risks to homes and communities from wildfire in the Wildland/Urban Interface (WUI). It encourages local community-based solutions for wildfire safety, with the goal of reducing home ignitions due to wildfire.

- Review current ordinances and regulations pertaining to heavy construction and development as it relates to transportation on roads as well as stormwater management, erosion, and low impact development (LID) practices.

- Look to actively participate in the Natural Resources Conservation Services operations and flood mitigation program (PL 566 program) currently ongoing to model watersheds in Exeter for flood protection.

- Ensure that all culvert retrofits, repairs, and replacements are conducted in accordance with best management practices that allow for wildlife and fisheries passage, where appropriate.

- Look to add an implementation action list to the current Pavement Management Plan to include an additional stormwater management assessment and best management practices for bridge repairs.

Additional Actions

Capacity Building

- Examine Community Resilience Building Summary of Findings from neighboring municipalities to find areas of common interest, shared value, and capacity availability to begin creating regional partnerships and networks to collaboratively tackle issues.

- Explore in partnership with neighboring municipalities ways to help Exeter fill capacity gaps, share resources, and create more exchange amongst departments, leadership, and residents.

- Define approaches used in other communities to establish and maintain critical commissions and boards in Exeter, such as the current non-existent conservation commission.

- Identify a program coordinator for Exeter to coordinate with FireWise Program and look to roll out program in areas of Town that are particularly vulnerable to wildfire. A Firewise Program Coordinator is an individual who has expertise in community wildfire risk reduction and are knowledgeable about the Firewise USA® program guidelines, which include educating communities on fire-resistant landscaping, building practices, and other strategies to reduce the risk of wildfires.

- Coordinate assistance to those without access to cars to get to appointments through the establishment of a volunteer committee in collaboration with Rhode Island Village.

- Expand on the current capacity of the Exeter Public Library to increase resources and amenities for residents as the single most important community hub. Add solar panels to the facility.

Capital Projects

- Work to repair gravel roads subject to runoff and erosion during major storm events.

- Fund a state-of-the-art Emergency Operations Center in Exeter for the Exeter Emergency Management Agency.

Additional Actions (cont'd)

Plans/Preparedness/Studies/Outreach

- Work to improve municipal environmental review and oversight of development-related permitting given the lack of a conservation commission because of lack of volunteers.

- Town Council and Department Heads could benefit from reviewing current processes and potentially incorporating new technologies to improve processes and communication.

- Establish more outreach and educational forums to help better inform residents about how government operates in Exeter and what initiatives are being discussed and advanced in hopes of fostering greater involvement by the community.

- Look to provide training for residents on tree and forest management in hopes of proactively and collectively reducing risk of wildfire risk across Exeter.

- Connect with state Department of Environmental Management, Division of Forest Environment to determine the location and extent of tree clearing and other preventive forest fire management activities at the Arcadia Management Area in hopes of gaining a better understanding of fire risk across Exeter.

- Secure and disseminate information about pest and pathogen damage on tree species coupled with information on how to best control and manage the results of outbreaks.

- Explore whether there are federal programs that could support the purchase of generators for private drinking water well pumps in rural communities such as Exeter to help ensure availability of drinking water during power outages.

- Review any high-water flood assessments of bridges in Exeter (i.e., Natural Resource Conservation Service list) and generate an update with an emphasis on structures at highest risk of impacts from flood waters.

Additional Actions (cont'd)

- Create greater awareness and develop approaches to reduce the ability of PFASs getting into drinking water in Exeter.

- Look to acquire easements on properties in Exeter that can help to mitigate the immediate and long-term impacts of climate change including parcels with area adjacent to special flood hazard areas as well as intact forested areas to help ameliorate ambient air temperatures. Work with Rhode Island Department of Environmental Management on open space grants to proactively secure parcels.

- Seek out funding to assess water quality in private drinking water wells across Exeter as well as set up a voluntary reporting mechanism to gain a better understanding of how often and where private drinking water wells are drying up.

- Conduct a Geospatial Information Systems assessment of gravel roads, topography, and wetlands/waterbodies to help determine the best location for interventions to improve the safety and minimize runoff from gravel roads.

- Reach out to adjoining municipalities and state-wide organizations to find out what approaches are being taken to improve sustainability at the local level.

CRB Workshop Participants: Department/Organization

Town of Exeter – Office of the Town Council
Town of Exeter – Emergency Management Agency
Town of Exeter – Exeter #1 Volunteer Fire Department
Town of Exeter – Exeter #2 Volunteer Fire Department
Town of Exeter – Treasurer Office
Town of Exeter – Social Services Office
Town of Exeter – Assessor Office
Town of Exeter – Geospatial Information Systems Office
Town of Exeter – Town Clerks Office
Town of Exeter – Resident
Exeter Public Library
Exeter/West Greenwich School System
Wood/Pawcatuck Wild & Scenic Stewardship Council
The American Baptist Church
Save The Bay
Southern Rhode Island Conservation District
Fuss & O'Neil
Fairweather Science

Exeter Core Project Team

Dori Boardman – Director, Emergency Management Agency, Town of Exeter

Online CRB Workshop Facilitation Team

State of Rhode Island (DEM) - Kim Korioth (MRP Co-Lead)
Rhode Island Infrastructure Bank – Anthony Hebert (MRP Co-Lead)
The Nature Conservancy - Adam Whelchel, Ph.D. (Lead Facilitator)
The Nature Conservancy - Kai Lo Muscio (MRP Coordinator)
The Nature Conservancy – Sue AnderBois (Small Group Facilitator)
State of Rhode Island (DEM) – Jennifer West (Small Group Facilitator)
State of Rhode Island (DOA) – Roberta Groch (Small Group Facilitator)
Rhode Island Food Council – Isaac Bearg (Scribe)
State of Rhode Island (DEM) – Mary Schoell (Scribe)
The Nature Conservancy – Kevin Carter (Scribe)
The Nature Conservancy – Angela Tuoni (Scribe)

Recommended Citation

Town of Exeter Online Community Resilience Building Workshop - Summary of Findings Report. (2024). State of Rhode Island's Municipal Resilience Program. The Nature Conservancy and Rhode Island Infrastructure Bank. Exeter, Rhode Island.

Acknowledgements

Special thanks to the Town leadership, staff, and community members for their willingness to embrace the process in hopes of a more resilient future for Exeter. This online Community Resilience Building Workshop was made possible in large part through the dedicated contribution of the facilitation team members who skillfully conducted the Exeter Community Resilience Building workshop in close partnership with the Town's Core Project Team.

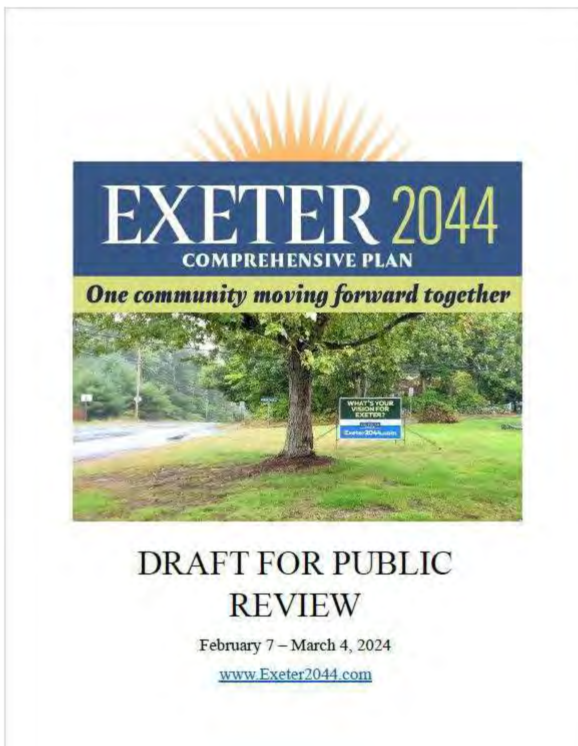
Appendix A

Town of Exeter

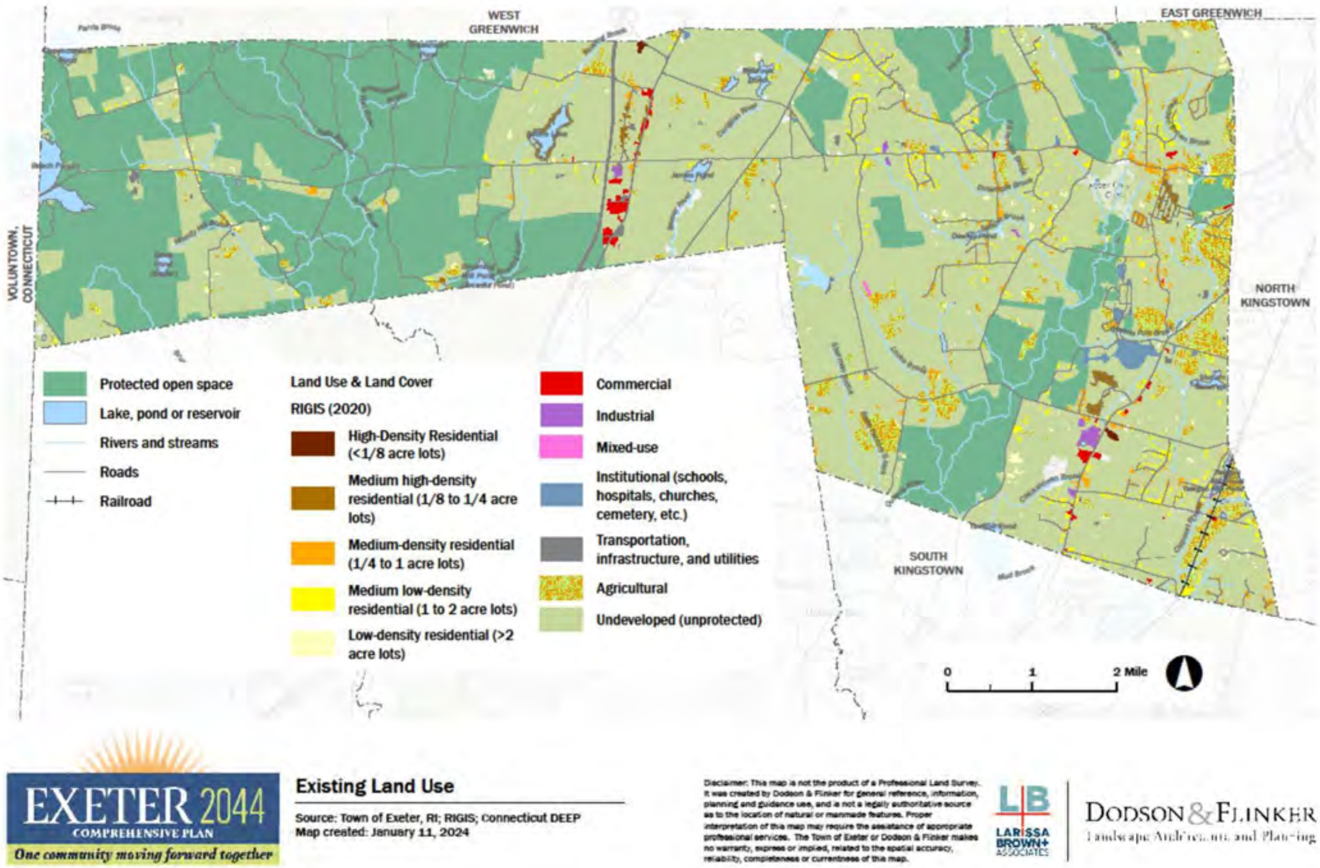
Map Resource Packet*

Used During

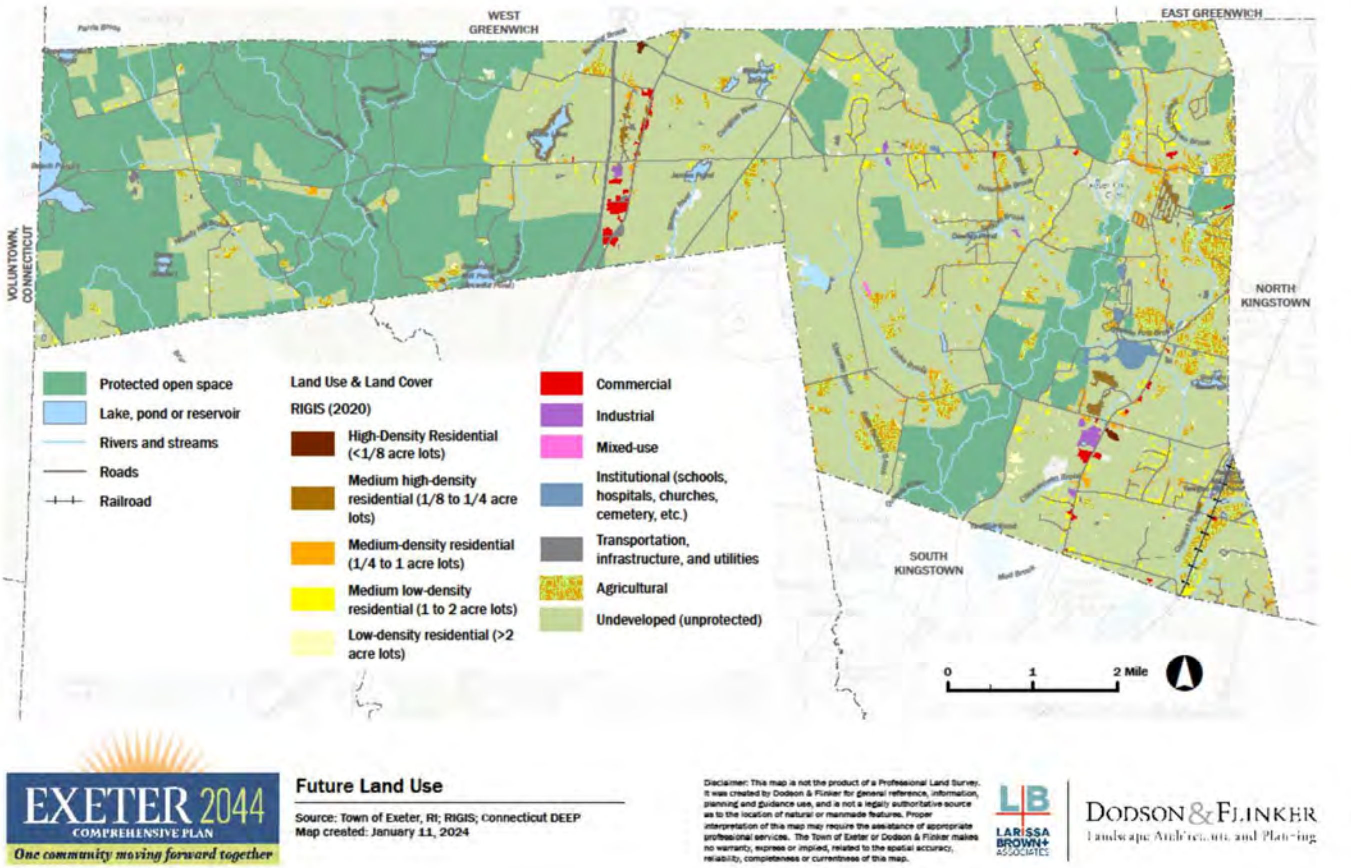
CRB Workshop



***Gathered from the Twenty-Year Comprehensive Plan For Exeter, RI (2024).**



WEST GREENWICH
EAST GREENWICH
VOLUNTOWN, CONNECTICUT
NORTH KINGSTOWN
SOUTH KINGSTOWN
Protected open space
Lake, pond or reservoir
Rivers and streams
Roads
Railroad
Land Use & Land Cover
RIGIS (2020)
High-Density Residential (<1/8 acre lots)
Medium high-density residential (1/8 to 1/4 acre lots)
Medium-density residential (1/4 to 1 acre lots)
Medium low-density residential (1 to 2 acre lots)
Low-density residential (>2 acre lots)
Commercial
Industrial
Mixed-use
Institutional (schools, hospitals, churches, cemetery, etc.)
Transportation, infrastructure, and utilities
Agricultural
Undeveloped (unprotected)
0
1
2 Mile
EXETER 2044
COMPREHENSIVE PLAN
One community moving forward together
Existing Land Use
Source: Town of Exeter, RI; RIGIS; Connecticut DEEP
Map created: January 11, 2024
LARISSA BROWN+ ASSOCIATES
DODSON & FLINKER


WEST GREENWICH
EAST GREENWICH
VOLUNTOWN, CONNECTICUT
NORTH KINGSTOWN
SOUTH KINGSTOWN
Protected open space
Lake, pond or reservoir
Rivers and streams
Roads
Railroad
Land Use & Land Cover
RIGIS (2020)
High-Density Residential (<1/8 acre lots)
Medium high-density residential (1/8 to 1/4 acre lots)
Medium-density residential (1/4 to 1 acre lots)
Medium low-density residential (1 to 2 acre lots)
Low-density residential (>2 acre lots)
Commercial
Industrial
Mixed-use
Institutional (schools, hospitals, churches, cemetery, etc.)
Transportation, infrastructure, and utilities
Agricultural
Undeveloped (unprotected)
0
1
2 Mile
EXETER 2044
COMPREHENSIVE PLAN
One community moving forward together
Future Land Use
Source: Town of Exeter, RI; RIGIS; Connecticut DEEP
Map created: January 11, 2024
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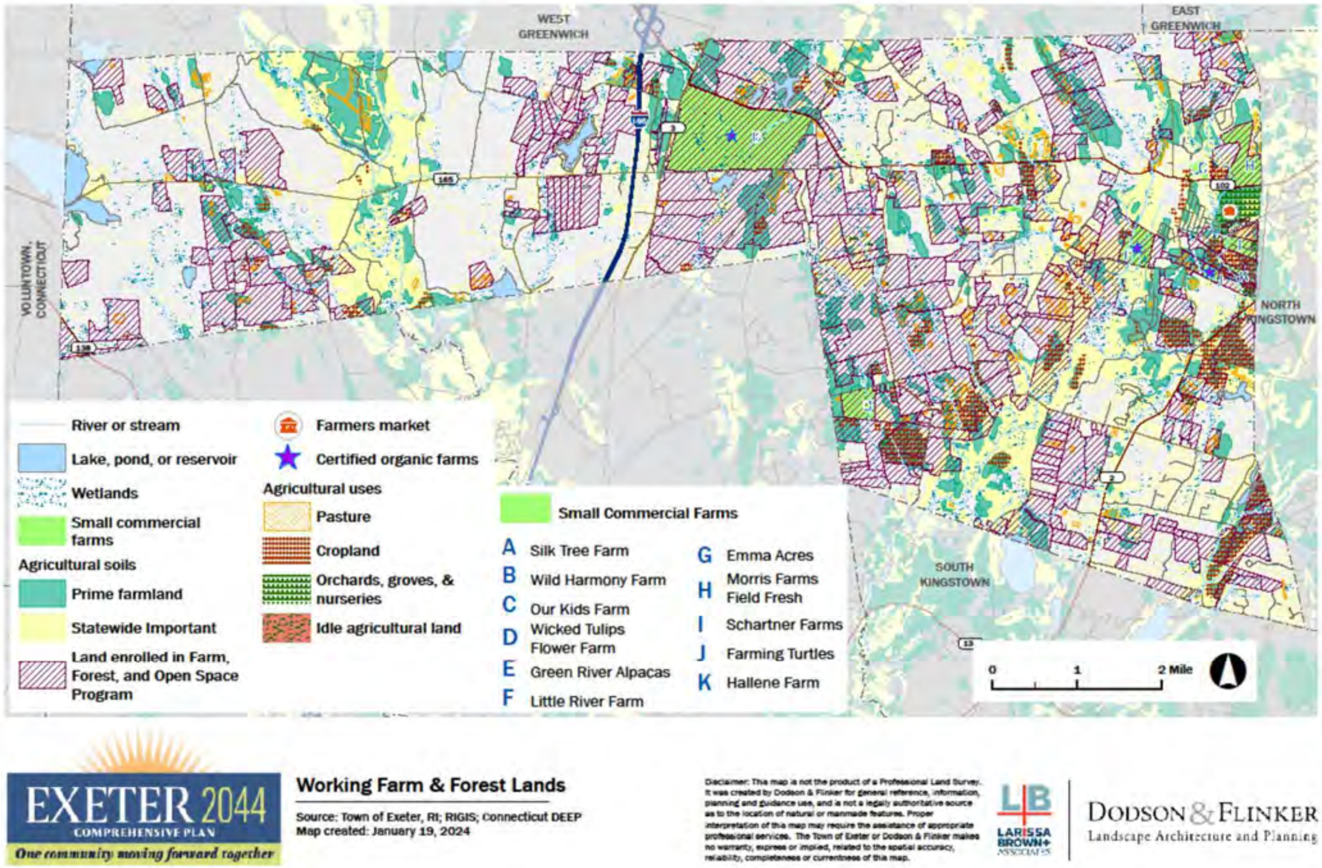
DODSON & FLINKER
Landscape Architecture and Planning


WEST GREENWICH
EAST GREENWICH
VOLUNTOWN, CONNECTICUT
NORTH KINGSTOWN
SOUTH KINGSTOWN
River or stream
Lake, pond, or reservoir
Wetlands
Small commercial farms
Agricultural soils
Prime farmland
Statewide Important
Land enrolled in Farm, Forest, and Open Space Program
Farmers market
Certified organic farms
Agricultural uses
Pasture
Cropland
Orchards, groves, & nurseries
Idle agricultural land
Small Commercial Farms
A Silk Tree Farm
B Wild Harmony Farm
C Our Kids Farm
D Wicked Tulips Flower Farm
E Green River Alpacas
F Little River Farm
G Emma Acres
H Morris Farms Field Fresh
I Schartner Farms
J Farming Turtles
K Hallene Farm
0
1
2 Mile
EXETER 2044
COMPREHENSIVE PLAN
One community moving forward together
Working Farm & Forest Lands
Source: Town of Exeter, RI; RIGIS; Connecticut DEEP
Map created: January 19, 2024
Disclaimer: This map is not the product of a Professional Land Survey. It was created by Dodson & Flinker for general reference, information, planning and guidance use, and is not a legally authoritative source as to the location of natural or manmade features. Proper interpretation of this map may require the assistance of appropriate professional services. The Town of Exeter or Dodson & Flinker makes no warranty, express or implied, related to the spatial accuracy, reliability, completeness or currentness of this map.
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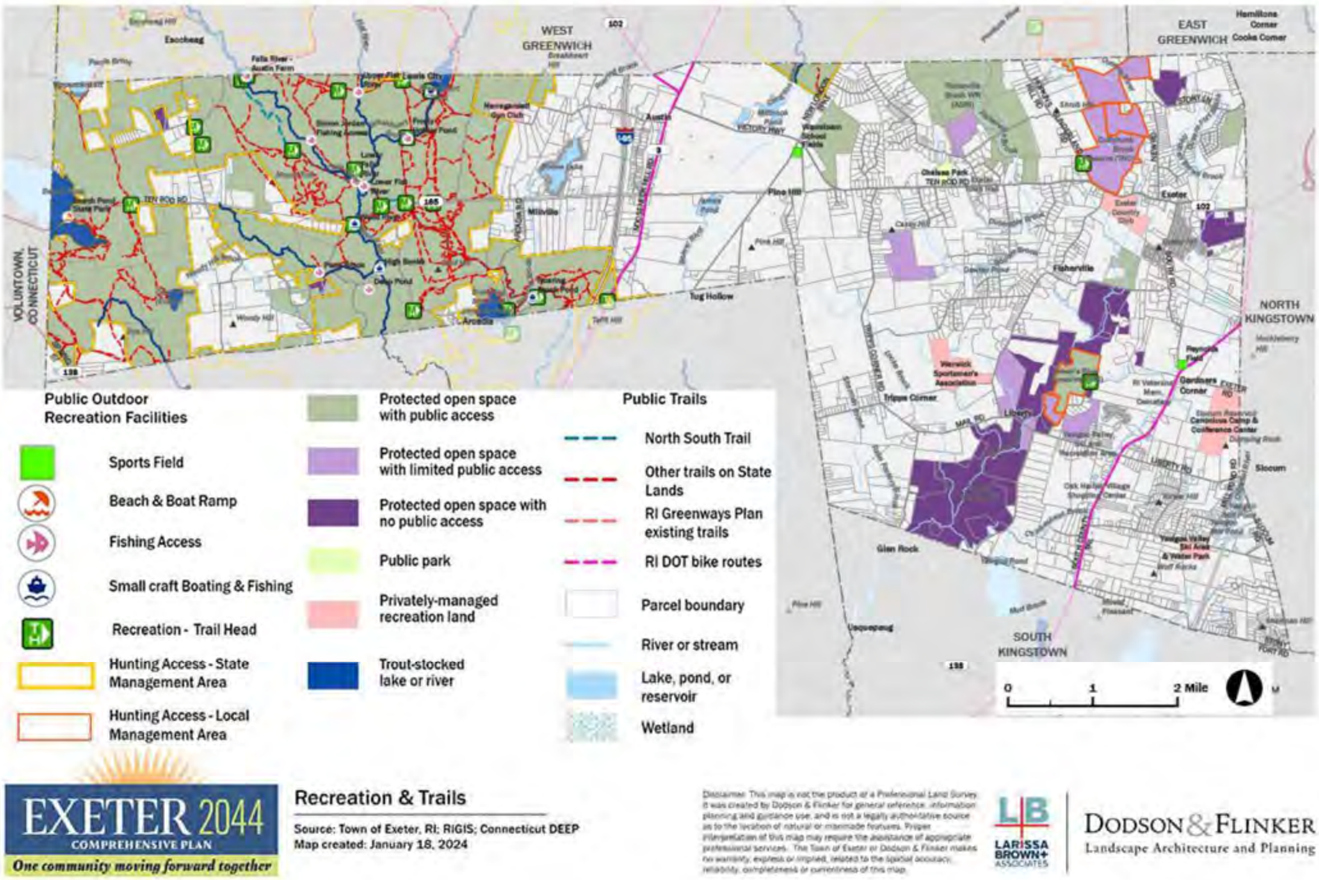
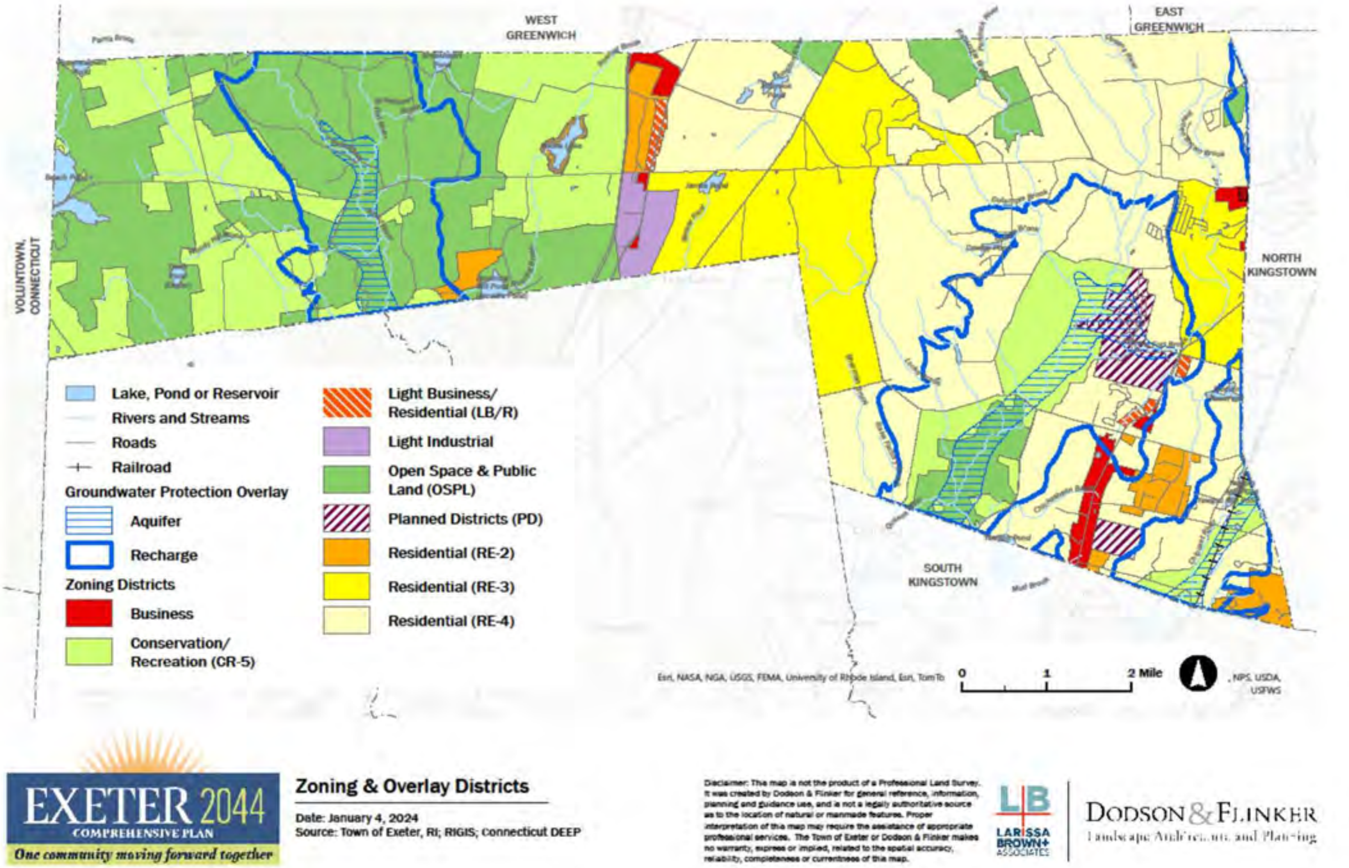
DODSON & FLINKER
Landscape Architecture and Planning


Public Outdoor Recreation Facilities
Sports Field
Beach & Boat Ramp
Fishing Access
Small craft Boating & Fishing
Recreation - Trail Head
Hunting Access - State Management Area
Hunting Access - Local Management Area
Protected open space with public access
Protected open space with limited public access
Protected open space with no public access
Public park
Privately-managed recreation land
Trout-stocked lake or river
Public Trails
North South Trail
Other trails on State Lands
RI Greenways Plan existing trails
RI DOT bike routes
Parcel boundary
River or stream
Lake, pond, or reservoir
Wetland
WEST GREENWICH
EAST GREENWICH
NORTH KINGSTOWN
SOUTH KINGSTOWN
VOLUNTOWN, CONNECTICUT
0
1
2 Mile
EXETER 2044
COMPREHENSIVE PLAN
One community moving forward together
Recreation & Trails
Source: Town of Exeter, RI; RIGIS; Connecticut DEEP
Map created: January 18, 2024
LARISSA BROWN+ ASSOCIATES
DODSON & FLINKER
Landscape Architecture and Planning


WEST GREENWICH
EAST GREENWICH
VOLUNTOWN, CONNECTICUT
NORTH KINGSTOWN
SOUTH KINGSTOWN
Lake, Pond or Reservoir
Rivers and Streams
Roads
Railroad
Groundwater Protection Overlay
Aquifer
Recharge
Zoning Districts
Business
Conservation/ Recreation (CR-5)
Light Business/ Residential (LB/R)
Light Industrial
Open Space & Public Land (OSPL)
Planned Districts (PD)
Residential (RE-2)
Residential (RE-3)
Residential (RE-4)
0 1 2 Mile
EXETER 2044
COMPREHENSIVE PLAN
One community moving forward together
Zoning & Overlay Districts
Date: January 4, 2024
Source: Town of Exeter, RI; RIGIS; connecticut DEEP
LARISSA BROWN+ ASSOCIATES
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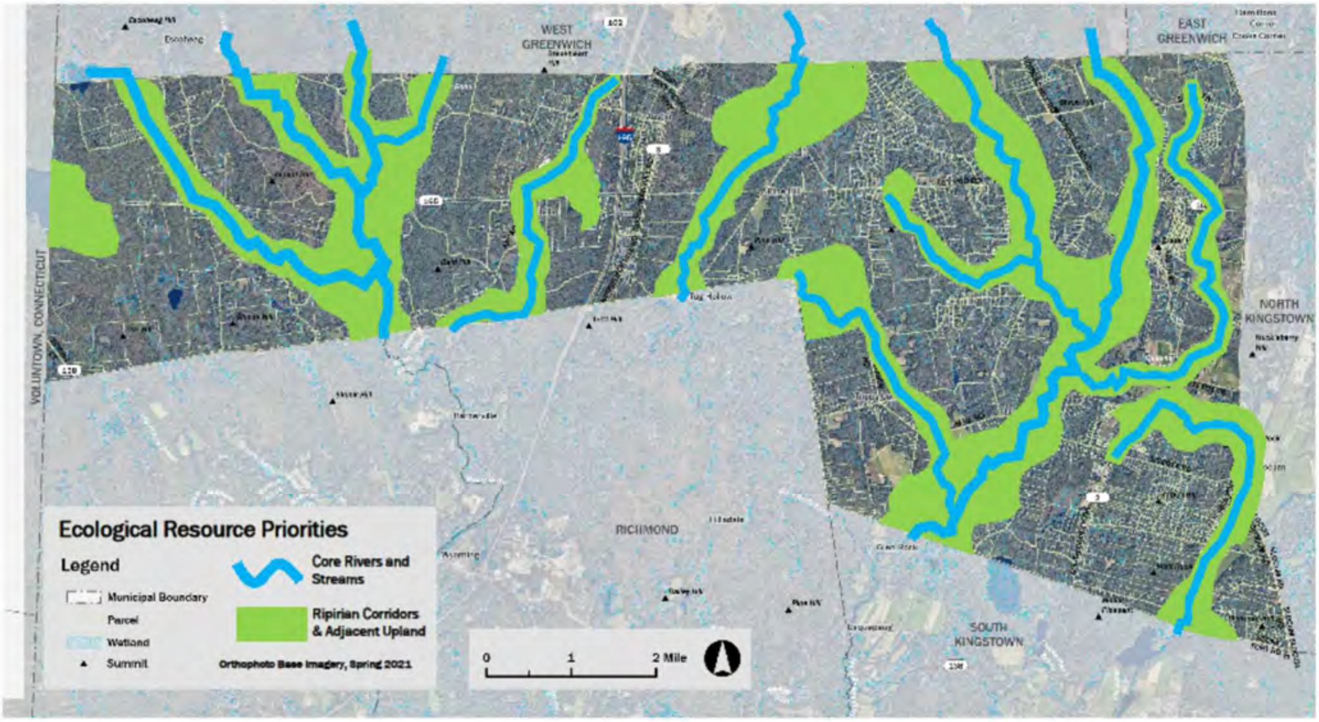
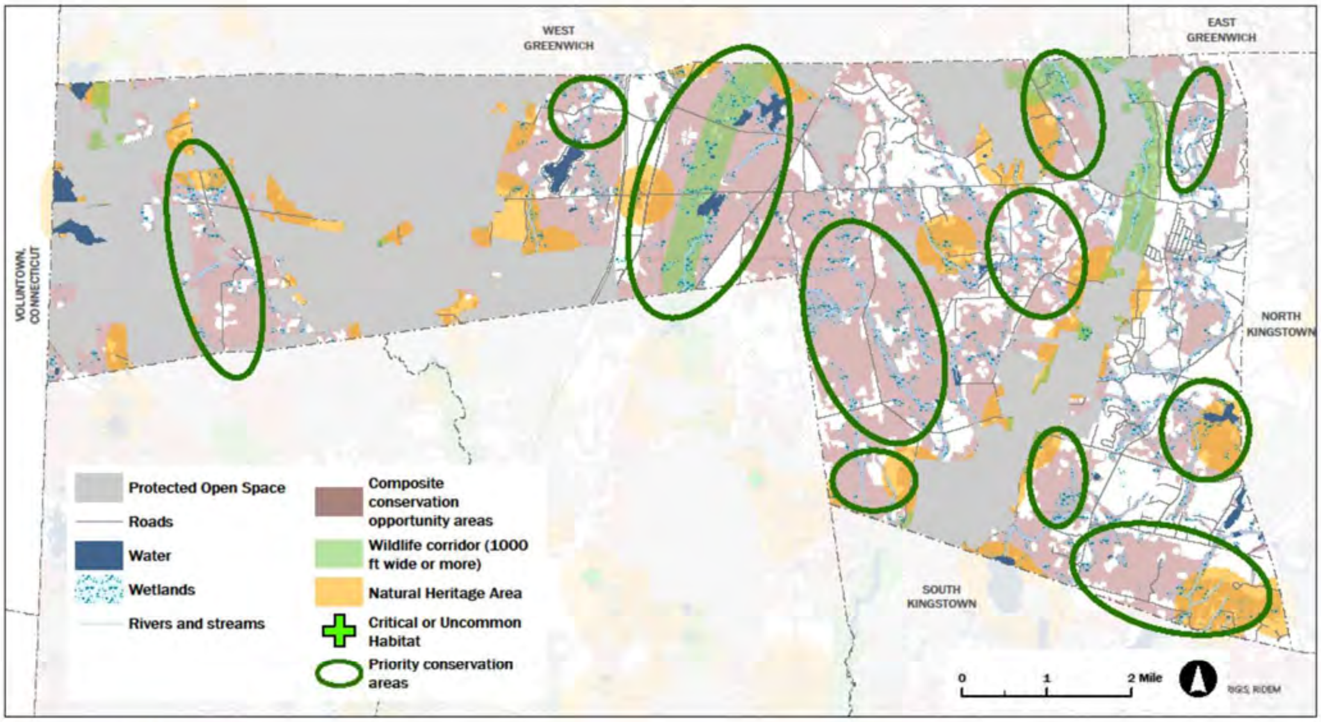
Landscape Architecture and Planning


Ecological Resource Priorities
Legend
Municipal Boundary
Parcel
Wetland
Summit
Core Rivers and Streams
Ripirian Corridors & Adjacent Upland
Orthophoto Base Imagery, Spring 2021
0
1
2 Mile
WEST GREENWICH
EAST GREENWICH
NORTH KINGSTOWN
SOUTH KINGSTOWN
RICHMOND
VOLUNTOWN, CONNECTICUT



EXETER 2044 COMPREHENSIVE PLAN
One community moving forward together

Priority Conservation Areas

Source: Town of Exeter, RI; RIGIS; Connecticut DEEP; URI Environmental Data Center
Map Created: January 4, 2024

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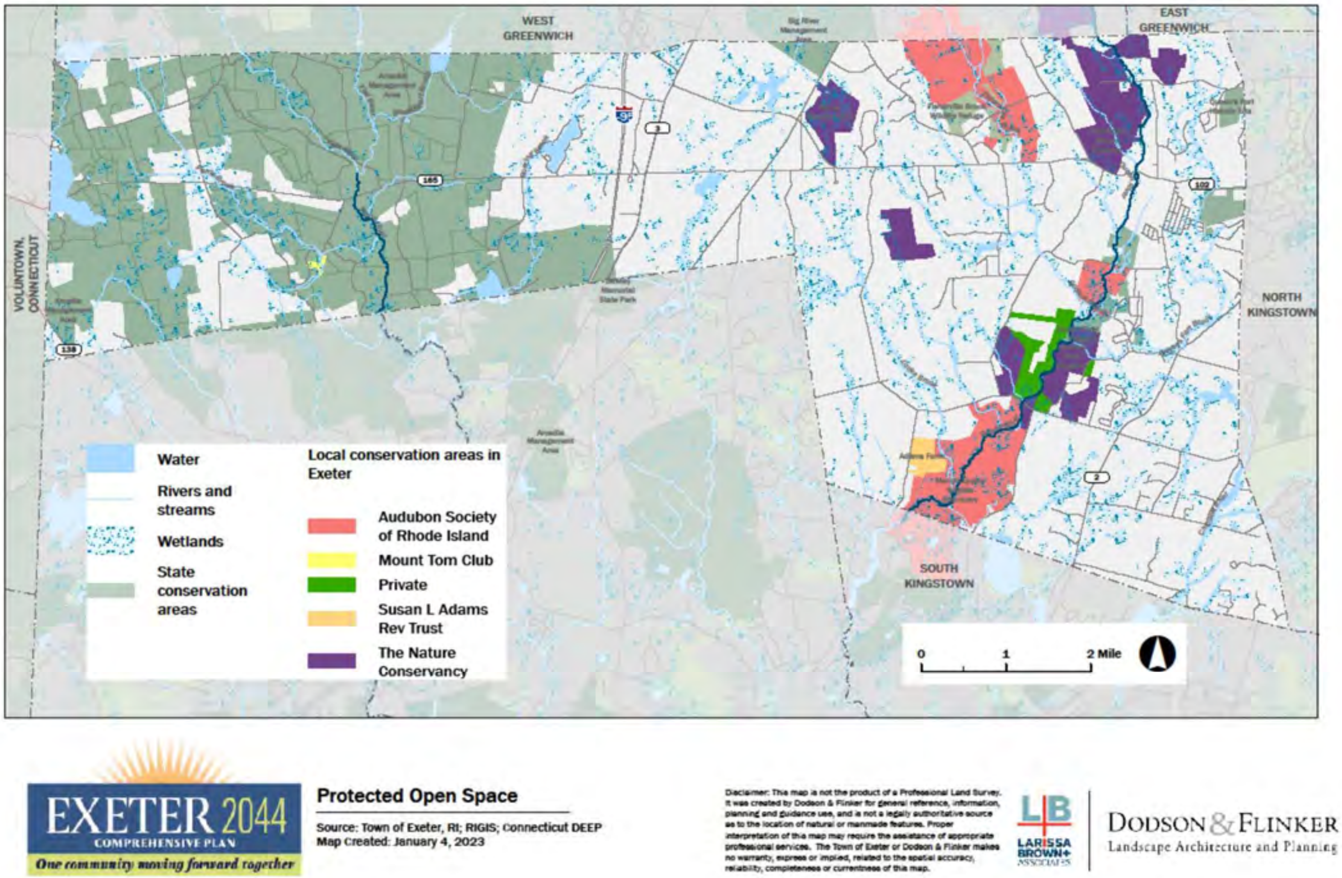
WEST GREENWICH
EAST GREENWICH
VOLUNTOWN, CONNECTICUT
NORTH KINGSTOWN
SOUTH KINGSTOWN
Water
Rivers and streams
Wetlands
State conservation areas
Local conservation areas in Exeter
Audubon Society of Rhode Island
Mount Tom Club
Private
Susan L Adams Rev Trust
The Nature Conservancy
0
1
2 Mile
EXETER 2044
COMPREHENSIVE PLAN
One community moving forward together
Protected Open Space
Source: Town of Exeter, RI; RIGIS; Connecticut DEEP
Map Created: January 4, 2023
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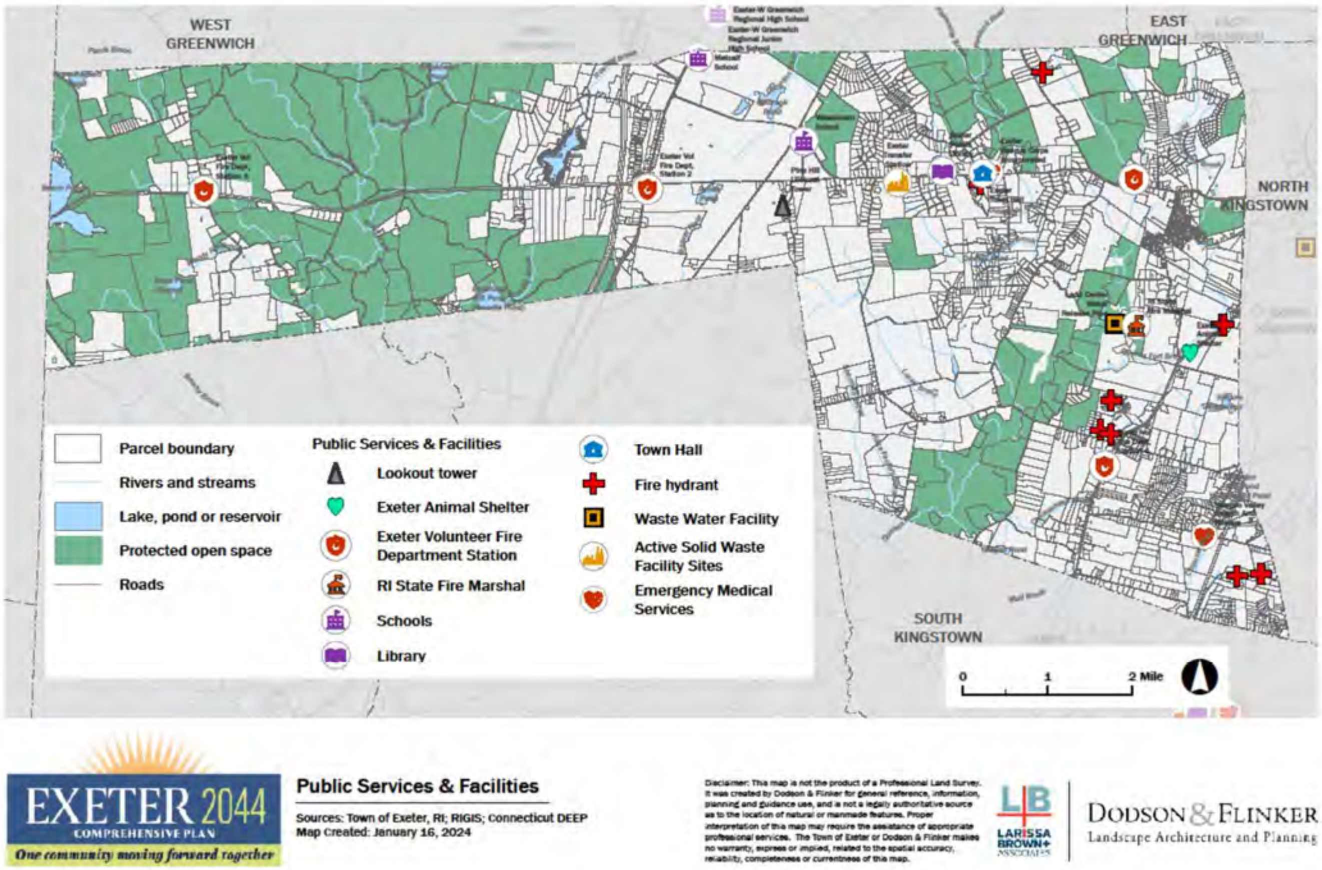
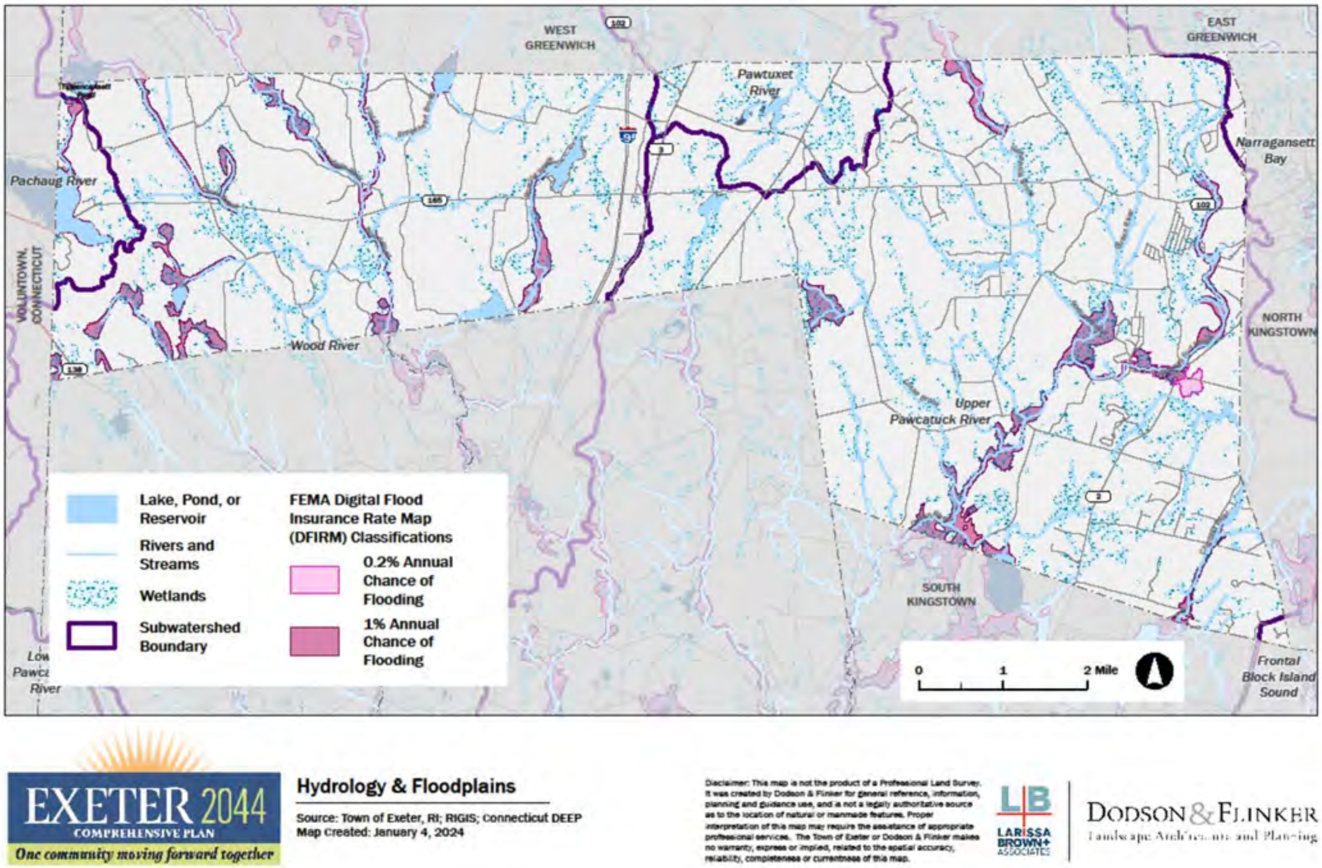


WEST GREENWICH
EAST GREENWICH
NORTH KINGSTOWN
SOUTH KINGSTOWN
Parcel boundary
Rivers and streams
Lake, pond or reservoir
Protected open space
Roads
Public Services & Facilities
Lookout tower
Exeter Animal Shelter
Exeter Volunteer Fire Department Station
RI State Fire Marshal
Schools
Library
Town Hall
Fire hydrant
Waste Water Facility
Active Solid Waste Facility Sites
Emergency Medical Services
0
1
2 Mile
EXETER 2044
COMPREHENSIVE PLAN
One community moving forward together
Public Services & Facilities
Sources: Town of Exeter, RI; RIGIS; Connecticut DEEP
Map Created: January 16, 2024
DODSON & FLINKER
Landscape Architecture and Planning



WEST GREENWICH
EAST GREENWICH
Pawtuxet River
Pachaug River
VOLUNTOWN, CONNECTICUT
Narragansett Bay
NORTH KINGSTOWN
Wood River
Upper Pawcatuck River
SOUTH KINGSTOWN
Frontal Block Island Sound
Lake, Pond, or Reservoir
Rivers and Streams
Wetlands
Subwatershed Boundary
FEMA Digital Flood Insurance Rate Map (DFIRM) Classifications
0.2% Annual Chance of Flooding
1% Annual Chance of Flooding
0
1
2 Mile
EXETER 2044
COMPREHENSIVE PLAN
One community moving forward together
Hydrology & Floodplains
Source: Town of Exeter, RI; RIGIS; Connecticut DEEP
Map Created: January 4, 2024
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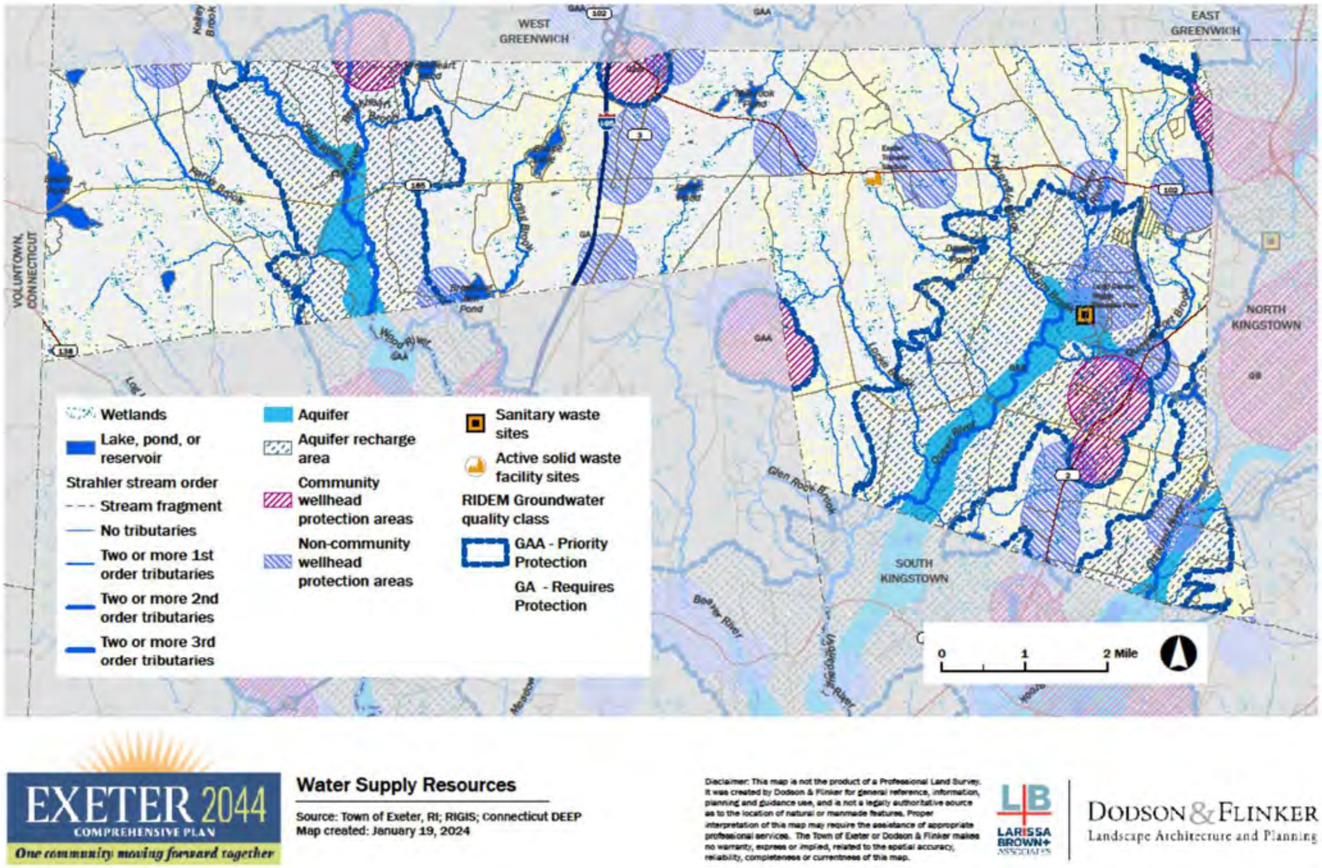
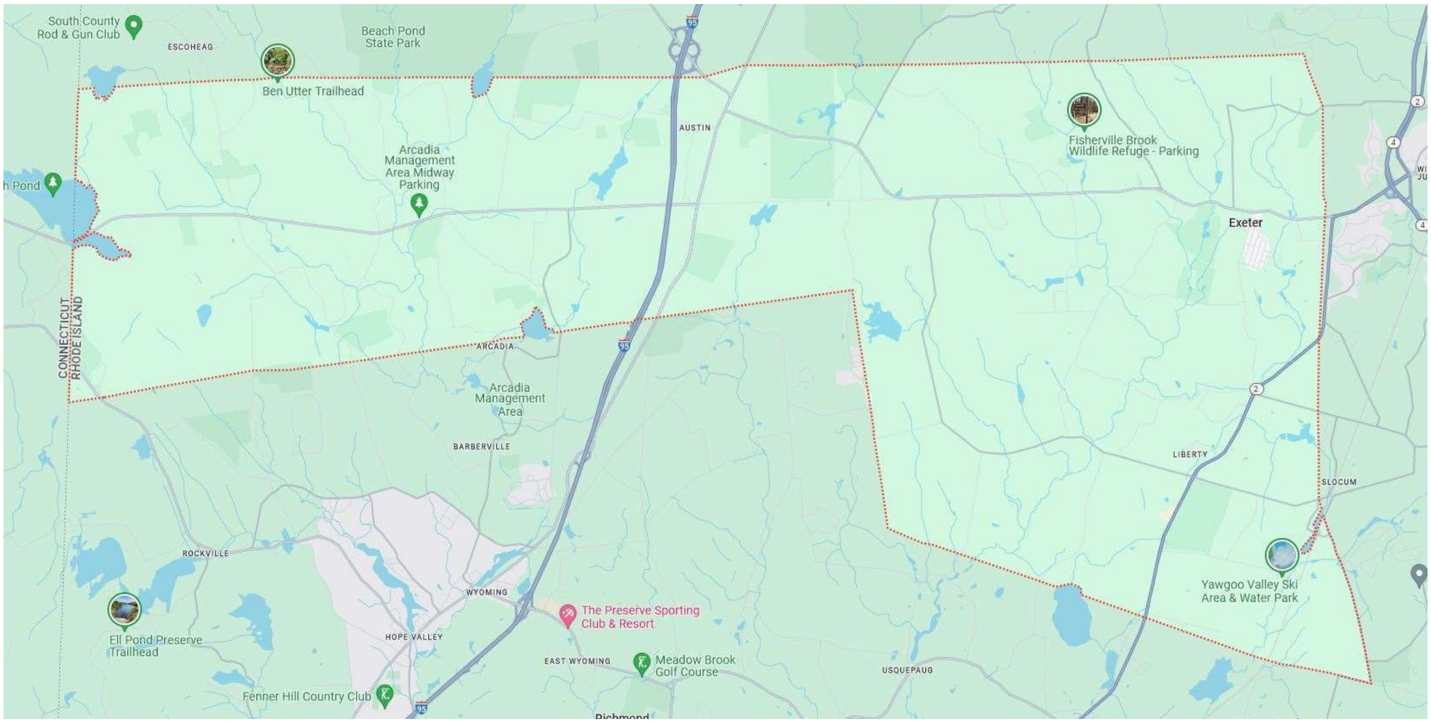

WEST GREENWICH
EAST GREENWICH
VOLUNTOWN, CONNECTICUT
NORTH KINGSTOWN
SOUTH KINGSTOWN
Wetlands
Lake, pond, or reservoir
Strahler stream order
Stream fragment
No tributaries
Two or more 1st order tributaries
Two or more 2nd order tributaries
Two or more 3rd order tributaries
Aquifer
Aquifer recharge area
Community wellhead protection areas
Non-community wellhead protection areas
Sanitary waste sites
Active solid waste facility sites
RIDEM Groundwater quality class
GAA - Priority Protection
GA - Requires Protection
0
1
2 Mile
EXETER 2044
COMPREHENSIVE PLAN
One community moving forward together
Water Supply Resources
Source: Town of Exeter, RI; RIGIS; connecticut DEEP
Map created: January 19, 2024
Disclaimer: This map is not the product of a Professional Land Survey. It was created by Dodson & Flinker for general reference, information, planning and guidance use, and is not a legally authoritative source as to the location of natural or manmade features. Proper interpretation of this map may require the assistance of appropriate professional services. The Town of Exeter or Dodson & Flinker makes no warranty, express or implied, related to the spatial accuracy, reliability, completeness or currentness of this map.
LARISSA BROWN+ ASSOCIATES
DODSON & FLINKER
Landscape Architecture and Planning


South County Rod & Gun Club
ESCOHEAG
Beach Pond State Park
Ben Utter Trailhead
AUSTIN
Arcadia Management Area Midway Parking
Fisherville Brook Wildlife Refuge - Parking
Exeter
CONNECTICUT
RHODE ISLAND
ARCADIA
Arcadia Management Area
BARBERVILLE
LIBERTY
SLOCUM
ROCKVILLE
WYOMING
Yawgoo Valley Ski Area & Water Park
Ell Pond Preserve Trailhead
The Preserve Sporting Club & Resort
HOPE VALLEY
EAST WYOMING
Meadow Brook Golf Course
USQUEPAUG
Fenner Hill Country Club

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www.CommunityResilienceBuilding.org

Appendix I- West Greenwich MRP June 2023 Summary of Findings

WEST GREENWICH




Photo Credit: South County Tourism Council, Town of West Greenwich, Chris Vaccaro,

Municipal Resilience Program
Community Resilience Building
Summary of Findings

June 2023

Town of West Greenwich, Rhode Island
Community Resilience Building
Summary of Findings

Overview

The need for municipalities, regional planning organizations, corporations, states, and federal agencies to increase resilience to extreme weather events and a changing climate is strikingly evident amongst the communities across the state of Rhode Island. Recent events such as Tropical Storm Irene, Super Storm Sandy, severe winter storms (2013 & 2015), and even the recent severe flooding during the summer of 2022 (i.e., I-95 closure) have reinforced this urgency and compelled leading communities like the Town of West Greenwich to proactively collaborate on planning and mitigating risks. Ultimately, this type of leadership is to be commended because it will reduce the vulnerability and reinforce the strengths of people, infrastructure, and ecosystems and serve as a model for other communities in Rhode Island, New England, and the nation.

In the winter of 2023, the Town of West Greenwich embarked on certification within the state of Rhode Island's Municipal Resilience Program (MRP). As a prerequisite to certification, the Rhode Island Infrastructure Bank (RIIB) and The Nature Conservancy (TNC) provided the Town with a community-driven process to assess current hazard and climate change impacts and to surface projects, plans, and policies for improved resilience. In June 2023, West Greenwich's Core Team helped organize their Community Resilience Building process and workshop facilitated by TNC in partnership with RIIB. The core directive of this effort was the engagement with and between community members to define strengths and vulnerabilities and the development of priority resilience and sustainability actions for the Town of West Greenwich.

The West Greenwich Community Resilience Building Workshop's central objectives were to:

- Define top local, natural, and climate-related hazards of concern.
- Identify existing and future strengths and vulnerabilities.
- Identify and prioritize actions for the Town.
- Identify opportunities to collaboratively advance actions to increase resilience alongside residents and organizations from across the Town and beyond.

The Town of West Greenwich employed an "anywhere at any scale", community-driven process - Community Resilience Building (CRB) (www.CommunityResilienceBuilding.org). The CRB's tools, reports, other relevant planning documents, and local maps were integrated into the workshop process to provide both decision-support and visualization around shared issues and existing priorities across West Greenwich. The West Greenwich Hazard Mitigation Plan Update (2005) was particularly instructive as a reference. Using the CRB process - rich with information, experience, and dialogue - the participants produced the findings presented in this summary report. This includes an overview of the top hazards, current concerns and challenges, existing strengths, and proposed actions to improve West Greenwich's resilience to hazards and climate change today, and in the future.

The summary of findings transcribed in this report, like any that concern the evolving nature of risk assessment and associated action, is proffered for comments, corrections and updates from workshop attendees and other stakeholders alike. The leadership displayed by the Town of West Greenwich on community resilience building will benefit from the continuous participation of all those concerned.

Summary of Findings

<u>Top Hazards and Vulnerable Areas for the Community</u>

Prior to the CRB Workshop, the West Greenwich Core Team identified the top hazards for the Town. The hazards of greatest concern included flooding from rivers and streams, drought during extended dry periods in the summer, and various impacts associated with tropical storms and hurricanes. Additional hazards highlighted by participants during this CRB workshop including Nor'easters and blizzards (particularly during the fall and spring), high wind events, and extended heat waves. These hazards have direct and increasing impacts on the infrastructure, environment, and residents of and visitors to West Greenwich. These effects are seen in residential homes, natural areas (wetlands, rivers, forests, preserves, parks), roads, bridges, dams, businesses, municipal facilities, recreational fields, historic building, churches, social support services, and other critical infrastructure and community assets within West Greenwich.

Current Concerns and Challenges Presented by Hazards

The Town of West Greenwich has several concerns and faces multiple challenges related to the impacts of natural hazards and climate change. In recent years, West Greenwich has experienced a series of highly disruptive and damaging weather events including severe flooding (March 2010), Tropical Storm Irene (August 2011), Superstorm Sandy (October 2012), Nor'easter Nemo (February 2013), Blizzard Juno (January 2015), severe drought (2016), and a significant blizzard (2022). Impacts from Irene and Sandy included widespread inland flooding along with tree damage and associated power outages. The winter storms Nemo and Juno dropped 2-3 feet of snow with 2-3 inches per hour of accumulation at their peak. The magnitude and intensity of these events and others across Rhode Island have increased awareness of natural hazards and climate change while motivating communities such as West Greenwich to proactively improve their resilience.

As is predicted with climate change, the impacts from these severe weather events have been varied and diverse. In West Greenwich this has included riverine flooding of critical infrastructure, roads, bridges, and low-lying areas; localized flooding from stormwater runoff during intense storms and heavy precipitation events; and property damage and utility outages (lasting several days or more) from wind, snow, and ice. Longer periods of elevated heat, particularly in July and August, have raised concerns about vulnerable segments of the population, including elderly and disabled residents who are homebound, those living in older housing stock without air conditioning, lower-income residents who may have difficulty with utility bills for temperature control in their homes, and the residents living in proximity to areas at increased potential for wildfires. The combination of these issues presents a challenge to preparedness and mitigation priorities and requires comprehensive, yet locally specific actions in West Greenwich.

The workshop participants were generally in agreement that West Greenwich is experiencing more intense and frequent storm events and heat waves. Additionally, there was a general concern about the increasing challenges of being prepared for the worst-case scenarios (e.g., major thunderstorms and hurricanes (Cat-3 or above)) particularly in the late summer and in the fall/winter months when more intense storms coincide with colder weather (i.e., Nor'easters, blizzards). The impact of the recent COVID-19 pandemic was raised by workshop participants as well.

Specific Categories of Concerns and Challenges

As in any community, West Greenwich is not uniformly vulnerable to hazards and climate change. Certain locations, assets, and populations have been and will be affected to a greater degree than others. Workshop participants identified the following items as their community's key areas of concern and challenges across several broad categories.

Roads & Road Networks, & Bridges:

- Engineering assessment conducted at a watershed scale identified several culverts on Hazard Road that are undersized and vulnerable to flooding. Washouts at Hazard Mill Pond along Hazard Road have occurred in the recent past.
- Rapid increase in flood stage on the Falls River during heavy rains (i.e., "flashy system") with a dramatic washout after the 2010 floods along this river corridor which resulted in the collapse of the Falls River Road bridge and impacts to many culverts that further isolated residents during that storm event and afterward during reconstruction of the bridge and roadway.
- Culvert on Plain Meeting House Road is vulnerable to runoff from heavy precipitation events.

Emergency Management & Preparedness:

- Rapidly aging population of residents that have limited mobility and are increasingly isolated during and after disasters.
- Ongoing flooding of residential buildings due to drainage issues during routine and major precipitation events.
- Recent 200+ acre wildfire has reinforced to leadership and staff in West Greenwich that wildfire is a growing risk. No active response by the state to the wildfire resulting municipal departments having to be the first responders and fire managers of the State-owned Big River Management Area (8,600 acres).
- Local concerns regarding wildfires include the very real possibility additional wildfires could ignite on public lands given the increasing fuel load without adequate leadership and responsibility taken by the state of Rhode Island. The Big River fire and the 700+ acre wildfire in the neighboring town of Exeter within a few days of each other was a real wake-up call for West Greenwich.

Specific Categories of Concerns and Challenges (cont'd)

- Many management areas or equivalent publicly owned lands currently not being maintained including routine maintenance on fire roads is a growing concern for residents and properties in West Greenwich and many other municipalities in western, more rural, areas of Rhode Island as well as the adjoining municipalities in Connecticut. The lack of maintained fire lanes/roads can quickly make fire response almost unmanageable.
- Residents and staff rely on the electric vehicle charging stations at the library however there a growing need to increase the charging station capacity and access across West Greenwich.
- Increasing concerns about the impacts of more frequent and intense windstorms that can cause widespread power outages for residents due to downed trees and limbs across power lines. Loss of power at the household level results in inability to draw and supply drinking water for residents.

Municipal Functions, Operations, & Growth:

- Lingering resentment locally for the condemnation of the 8,600-acre Big River Management Area back in the 1960s for the purpose of building a drinking water reservoir for residents in the state of Rhode Island. Local sentiment is that the land should be offered back to the families that were removed over five decades ago, since the land was never used for its intended purpose.
- Despite willingness of residents to volunteer coupled with mutual aid agreements with adjoining municipalities, there is rarely enough capacity and resources made available to respond fully after disasters.
- Concerns about lack of succession plan in West Greenwich staff, which may result in a decline in the high-quality services currently be provided as existing staff retire and/or depart.
- Delays in review and permitting at the state level for critical infrastructure such as bridges impacted during storm events and in need of repair are serious obstacles in the recovery phases post-disaster.
- Growing concerns about the relatively large amounts of state-owned lands that are not being properly managed for disasters such as wildfires coupled with the bureaucratic and long delays of reaching decisions regarding prevention and clean-up activities post-disaster.
- Limited capacity to identify and write grants to secure additional funding to complete resilience-related projects among other interests.

Specific Categories of Concerns and Challenges (cont'd)

Watersheds, Wetlands, Rivers, Open Space, Forests, & Trees:

- Ongoing concerns about dead and standing trees along roadways and proximity to buildings and structures.
- Increasing number of dead and standing trees in the forested landscape of West Greenwich due to spongy moth infestation (formally called gypsy moth).
- Ongoing increase in the conversion of forested lands for development of residential homes and properties.

Credit: Wikipedia

Credit: WPRI.com

Credit: The Providence Journal

Current Strengths and Assets

Just as certain locations, facilities, and populations in West Greenwich stand out as particularly vulnerable to the effects of hazards and climate change, other features are notable assets for West Greenwich's resilience building. Workshop participants identified the following items as their community's key strengths and expressed interest in centering them as the core of future resilience-building actions.

- Clearly, the responsive and committed engagement exhibited by leadership, staff, and residents is a very appreciated strength within and across West Greenwich. Ongoing collaboration between municipal staff, committee/commission volunteers, business owners, land trusts, faith-based organizations, non-government organizations, adjoining municipalities, and various state-level organizations, among others, on priorities identified herein will help advance comprehensive, cost-effective, community resilience-building actions.
- Strong interdependence between municipal leadership and staff over decades results in the ability to make quick decisions to solve issues at the local and municipal-wide scale, which is a relatively unique strength amongst municipalities in Rhode Island. Recent example of cooperative spirit in West Greenwich seen during the recent Big River Management Area wildfire event which burned over 200 acres of woodlands.
- West Greenwich retains a rural community feel, with long attachments to its agrarian roots over the centuries since incorporation in 1741.
- Strong sense of community amongst residents where regardless of job title or description people step up and help each other (i.e., "Issues get taken care of").
- Rapid response of Department of Public Works after storms addressing issues downed trees and limbs that may have caused power outages as well as assessing impacts to bridges, roads, and culverts, among other infrastructure needs.
- Rural community with large lots result in buildings and homes being spaced relatively far apart which helps to reduce the risk of wildfire spreading quickly between structures.
- Close working relationship and coordination with the town of Exeter on issues of hazard mitigation and services for residents (i.e., "We get more accomplished when we partner.").

Current Strengths and Assets (cont'd)

- Efficient and friendly municipal administration.
- The Upper Wood River and some of the headwaters flwo through the Town's west end. It has the highest biodiversity of any river in Rhode Island and New England within the Wood River watershed, which encompasses much of the western portions of West Greenwich (see Appendix B for Wood-Pawcatuck Watershed map).
- Route 3 -running north and south – is well-traveled and brings customers to local businesses that are along this transportation corridor.
- Most linear miles of Interstate 95 of any other municipality in Rhode Island coupled with four separate exits of the interstate, which offers opportunities to increase municipal tax base.
- Self-sufficient municipality where issues are solved with very little outsourcing to consultants or contractors.
- Outstanding Highway Department that works efficiently to solve infrastructure related issues quickly on behalf of residents and visitors alike.
- Relatively large amount of conserved open space within West Greenwich with strong partnerships between the West Greenwich Land Trust, The Nature Conservancy, and state Department of Environmental Management, among others.
- Large number of well-loved and used trails for passive recreation that are maintained by the West Greenwich Land Trust, among others.
- West Greenwich Land Trust maintains two buildings and grounds that are desirable for weddings and other gatherings.
- Quality of surface water sources and groundwater are relatively high and clean of any pollutants.
- Municipal pavilion at Town Hall offers a place for the community to gather and discuss topics of interest and concern, as well as a place for concerts and other entertainment in the evenings during the summer.

Recommendations to Improve Resilience

A common theme among workshop participants was the need to continue community-based planning efforts focused on developing adaptive measures to reduce West Greenwich's vulnerability to extreme weather, climate change and other common concerns raised. To that end, the workshop participants helped to identify several priority topics requiring more immediate and/or ongoing attention including:

- **Long-term vision and growth** (i.e. responsible/sustainable growth, volunteerism, conservation & recreation, education, funding/grants, wildfire management);
- **Infrastructure improvements** (i.e. road/bridge/culvert, stormwater management systems, green stormwater infrastructure, fire lanes/roads);
- **Quality of life improvements** (i.e. parks and recreation, open space & access, sustainability, health & safety, economic prosperity, rural lifestyle, wildfire control);
- **Emergency management** (i.e. communications, outreach, education, continuation of services, evacuation, vulnerable populations).

In direct response, the Community Resilience Building workshop participants developed the following actions and identified, but did not rank, them as priority or as additional actions. Mitigation actions from the West Greenwich Hazard Mitigation Plan (2005) are provided in Appendix A for cross reference with actions developed during the CRB workshop presented below. Maps provided during the CRB Workshop were gathered from the West Greenwich Hazard Mitigation Plan and municipal website (AxisGIS) and provided in Appendix B.

Priority Actions

Capacity Building

- Work to foster stronger relationships and partnership with the state Department of Environmental Management, with the goal of increasing improved management of state-owned forests and management areas such as the Big River Management Area, among others.

Priority Actions (cont'd)

Capital Projects

- Directly and immediately address the wildfire risk and response on state lands located in West Greenwich to help reduce the growing threat to residents and property.

Plans/Preparedness/Studies/Outreach

- Conduct an annual Natural Hazard Mitigation Plan meeting to track progress on completing identified and prioritized mitigation actions and to help identify way to advance other prioritized mitigation actions.

- Conduct training for emergency management staff and continue to orchestrate table-top exercises to increase readiness. Plan to focus next table-top exercise specifically on wildfires with site walk-throughs with state representatives and subsequently develop pre-plan responses for specific areas of highest concern for wildfires (i.e., "Get the game plan identified and in place before wildfire occurs again.").

- Continue to utilize the library as a convening location and educational outlet for residents of and visitors to West Greenwich.

Credit: Providence Business News

redit: South County Tourism

Credit: Redfin

Additional Actions

Capacity Building

- Examine Community Resilience Building Summary of Findings from neighboring municipalities in hopes of finding areas of common interest, shared value, and capacity availability to begin creating regional partnerships and networks to collaboratively tackle issues.

- Continue to strive for multi-municipal plans and coordination to help increase capacity and resources and help diminish expenses and redundancies in programs, equipment, and capital expenditures.

- Elevate conversations and discussions at the municipal level regarding identifying ways to ensure succession of volunteers to fill board and commission spaces as well as staff replacement due to attrition.

Capital Projects

- Look to support the effort of the West Greenwich Land Trust in maintaining trails and alerting Department of Public Works and other departments about identified wildfire hazards along trails in open space.

Plans/Preparedness/Studies/Outreach

- Ensure ongoing multi-municipal, joint Natural Hazard Mitigation Plan between West Greenwich and Exeter is successfully completed with individual and integrated mitigation actions across and between the two municipalities. Look to increase the involvement and participation of a broader suite of organizations and residents in the development of the Hazard Mitigation Plan via community-based processes such as Community Resilience Building.

- Increase educational opportunities and civic outreach to bring the next generation into the work of open space stewardship. One example is offering a merit badge for land stewardship amongst boy and girl scout troops.

Additional Actions (cont'd)

- Civic outreach and engagement with students at Greene School and West Greenwich High School. Increase opportunities for the younger generation, including students, to shadow municipal leaders and staff in hopes of addressing succession and involvement issues.

- Set up and populate a wildfire "hot spot" area spreadsheet to be shared amongst municipal departments and organizations to help increase the awareness of locations in West Greenwich that should be targeted for fire reduction activities.

- Discuss further the potential for securing grants for projects through the Wood Pawcatuck Wild & Scenic Rivers Stewardship Council and the Wood-Pawcatuck Watershed Association for projects within the West Greenwich portion of the Wood River Watershed.

- Set up a high-level, initial meeting with the state representative and spokesperson for the Big River Management Area in hopes of sharing ongoing concerns and activities at the property as well as long term prognosis for management and ownership of the area.

- Explore mechanisms to track impervious surfaces and to identify green stormwater infrastructure projects to help reduce localized flooding issues.

CRB Workshop Participants: Department/Organization

Town of West Greenwich – Office of the Town Council
Town of West Greenwich – Office of the Town Administrator
Town of West Greenwich – Planning Department
Town of West Greenwich – Department of Public Works
Town of West Greenwich – Emergency Management Agency
Town of West Greenwich – Fire Department
Town of West Greenwich – Police Department
Town of West Greenwich – Town Library
Town of West Greenwich – Planning Board
Town of West Greenwich – Conservation Commission
West Greenwich Land Trust
Town of West Greenwich – Resident
Town of Exeter – Emergency Management Agency
Rhode Island Emergency Management Agency
Rhode Island Department of Environmental Management

West Greenwich Core Project Team

Kevin Breene – Town Administrator – Town of West Greenwich
David Provonsil – Town Planner – Town of West Greenwich
Claude Wright – Public Works Director – Town of West Greenwich
Chris Grube – Conservation Committee Chair – Town of West Greenwich

Online CRB Workshop Facilitation Team

Rhode Island Infrastructure Bank - Kim Korioth (MRP Lead)
The Nature Conservancy - Adam Whelchel, Ph.D. (Lead Facilitator)
State of Rhode Island – DEM – Jennifer West (Small Group Facilitator)
The Nature Conservancy – Tim Mooney (Small Group Facilitator)
The Nature Conservancy - Kai Lo Muscio (MRP Coordinator/IT Manager/Scribe)
The Nature Conservancy – Rafeed Hussain (Scribe)
The Nature Conservancy – Isaac Slevin (Scribe)

Recommended Citation

Town of West Greenwich Online Community Resilience Building Workshop - Summary of Findings Report. (2023). State of Rhode Island's Municipal Resilience Program. The Nature Conservancy and Rhode Island Infrastructure Bank. West Greenwich, Rhode Island.

Acknowledgements

Special thanks to the Town leadership, staff, and community members for their willingness to embrace the process in hopes of a more resilient future for West Greenwich. This online Community Resilience Building Workshop was made possible in large part through the dedicated contribution of the facilitation team members who skillfully conducted the West Greenwich Community Resilience Building workshop in close partnership with the Town's Core Project Team.

Appendix A

Town of West Greenwich

Strategies for Reducing Risks from Natural Hazards (2005)

Mitigation Actions (Section 4)

Risk Area # 1 – Goal: Protect present and future property and citizens from the effects of flooding.

Action 1 – Identification of Dam Owners and Inspection of Dams – High priority.

a) Identification of dam owners to ensure proper maintenance and structural integrity.
Responsible Parties: Tax Assessor and Public Works Director
When: Short-term
Resources Available: Town annual budget
Benefit: Maintain continued responsibility of dam owners
Estimated Cost: No additional cost

b) Inspection/evaluation of dams after identification of owners; prioritize by likelihood of failure and potential damage caused.
Responsible Party: Public Works Director
In Coordination With: Fire Departments
When: Medium-term
Resources Available: RI DEM, Town annual budget
Benefit: Reduce/eliminate dam failure, protection of life and property
Estimated Cost: No additional cost

Action 2 – Review Comprehensive Plan for Drainage Requirements – Medium priority.

a) Review comprehensive plan to ensure adequacy of design standards to meet drainage requirements. Propose revisions to meet drainage requirements. Implement consistent maintenance program for storm drains in order to minimize flooding from storm water run-off.
Responsible Party: Town Planner
In Coordination With: Planning Department, Public Works Department and Town Engineer
When: Medium-term
Resources Available: Town annual budget
Model: Engineering design manuals
Benefit: Reduce further areas subject to flooding and improve those areas that are already flood-prone
Estimated Cost: No additional cost

Action 3 – Replacement of Undersized Culverts – Medium priority.

a) Evaluate the feasibility of replacing current undersized culverts with larger or properly sized culverts.
Responsible Party: Director of Public Works
In Coordination With: Department of Public Works
When: Long-term

Resources Available: State and Town funding
Model: City of Warwick Department of Public Works
Benefit: Increase drainage; reduce flooding
Estimated Cost: Unknown

Action 4 – Develop a Debris Management Plan – High priority.

a) Fallen debris and tree limbs resulting from thunderstorms, hurricanes, ice storms and windstorms collect under bridges and dams and blocks storm culverts. Prompt removal and proper disposal of this material decreases potential of road and property flooding. A comprehensive tree-trimming plan (see below) will minimize potential impacts in addition to decreasing the costs of cleanup.
Responsible Party: Director of Public Works
In Coordination With: Department of Public Works
When: Short-term and ongoing
Resources Available: Town annual budget
Model: RIEMA and FEMA Debris Management Plans
Benefit: Decrease flooding potential, maintain public safety, decrease damage to critical infrastructure
Estimated Cost: Minimal to no additional costs

Risk Area # 2 – Goal: Prevent power failure and loss of communication systems due to fallen tree limbs during weather events.

Action 5 – Regular Tree Trimming – High priority.

a) Establish a tree trimming program to trim trees adjacent to utility lines to avoid power outages and loss of communication systems during and after hurricanes, thunderstorms, ice storms and windstorms.
Responsible Party: Director of Public Works
In Coordination With: Department of Public Works, Narragansett Electric
When: Short-term
Resources Available: Town annual budget, Narragansett Electric
Model: City of Pawtucket, City of Warwick
Benefit: Decrease damage to critical infrastructure, public safety, reduce clean-up costs
Estimated Costs: Unknown

Risk Area # 3 – Goal: Protect the community from the effects of a forest fire.

Action 6 – Develop a Master Fire Plan – High Priority.

a) A master fire plan is a comprehensive review addressing a community's ability to maintain a high level of fire protection, prepare for large-scale

disasters and training personnel. A Mater Fire Plan for West Greenwich is intended to result in specific recommendations to amend land use regulation, review current and future fire suppression resources, increase response times, reduce risks from fires and increase the education and training of personnel and the citizenry.
Responsible Party: Fire Chief
In Coordination With: Fire Departments and Professional Consultant
When: Short-term
Resources Available: FEMA
Model: Fire Master Plan, City of Boulder
Benefit: Increase Public Safety
Estimated Cost: $30,000 - $40,000

Action 7 – Create Firebreaks, Fire Lanes and Install Cisterns/Dry Hydrants – High priority.

a) In order to prevent the spread of forest fires, evaluate and construct firebreaks, fire lanes and install cisterns/dry hydrants as necessary.
Responsible Party: Fire Chief
In Coordination With: Outside vendor supervised by Fire Department
When: Long-term
Resources Available: FEMA, RIEMA, State and Local funds
Model: Approved Fire Standards
Benefit: Increased response time, increase public safety
Estimated Cost: To be determined

Action 8 – Ensure Access Points to Large Forested Areas – High priority.

a) In the event of forest fires, access to the fire is essential in order to protect property and lives. To increase access and response time for emergency vehicles, it is imperative to coordinate efforts with the RI DEM to ensure access to large forested state owned property as well.
Responsible Party: Fire Chief
In Coordination With: Fire Department and Town Council
When: Short-term
Resources Available: State and Local funds
Benefit: Increased response time, increase public safety
Estimated Costs: Unknown

Risk Area # 4 – Goal: Ensure the community is effectively prepared for and can respond to the effects of the natural hazards faced by the community.

Action 9 – Direct, Develop and Implement Public Education and Outreach Programs for Preparedness and Emergency Response – High priority.

a) Distribute and make material available concerning evacuation routes and emergency shelters as well as how residents can prepare for each natural hazard that affects West Greenwich.
Responsible Party: Emergency Management Department
In Coordination With: Police Department and Fire Department
When: Short-term
Resources Available: West Greenwich Hazard Mitigation Committee, American Red Cross, RIEMA and FEMA
Benefit: Increased public safety; protection of life
Estimated Costs: $10,000

b) Organize and conduct training programs for town officials, employees, boards and commissions regarding hazard mitigation; including flood mitigation and actions/responsibilities during a natural disaster.
Responsible Party: Emergency Management Director
In Coordination With: Hazard Mitigation Committee
When: Medium-term
Resources Available: Town annual budget
Benefit: Improved coordination during an event; continued support for future mitigation actions
Estimated Costs: $5,000

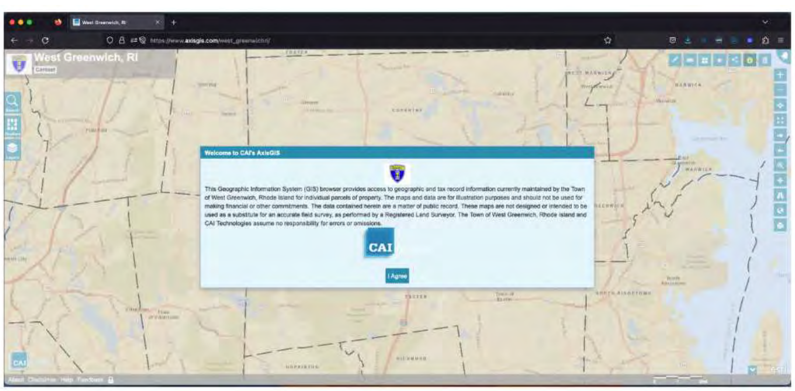
Appendix B

Town of West Greenwich

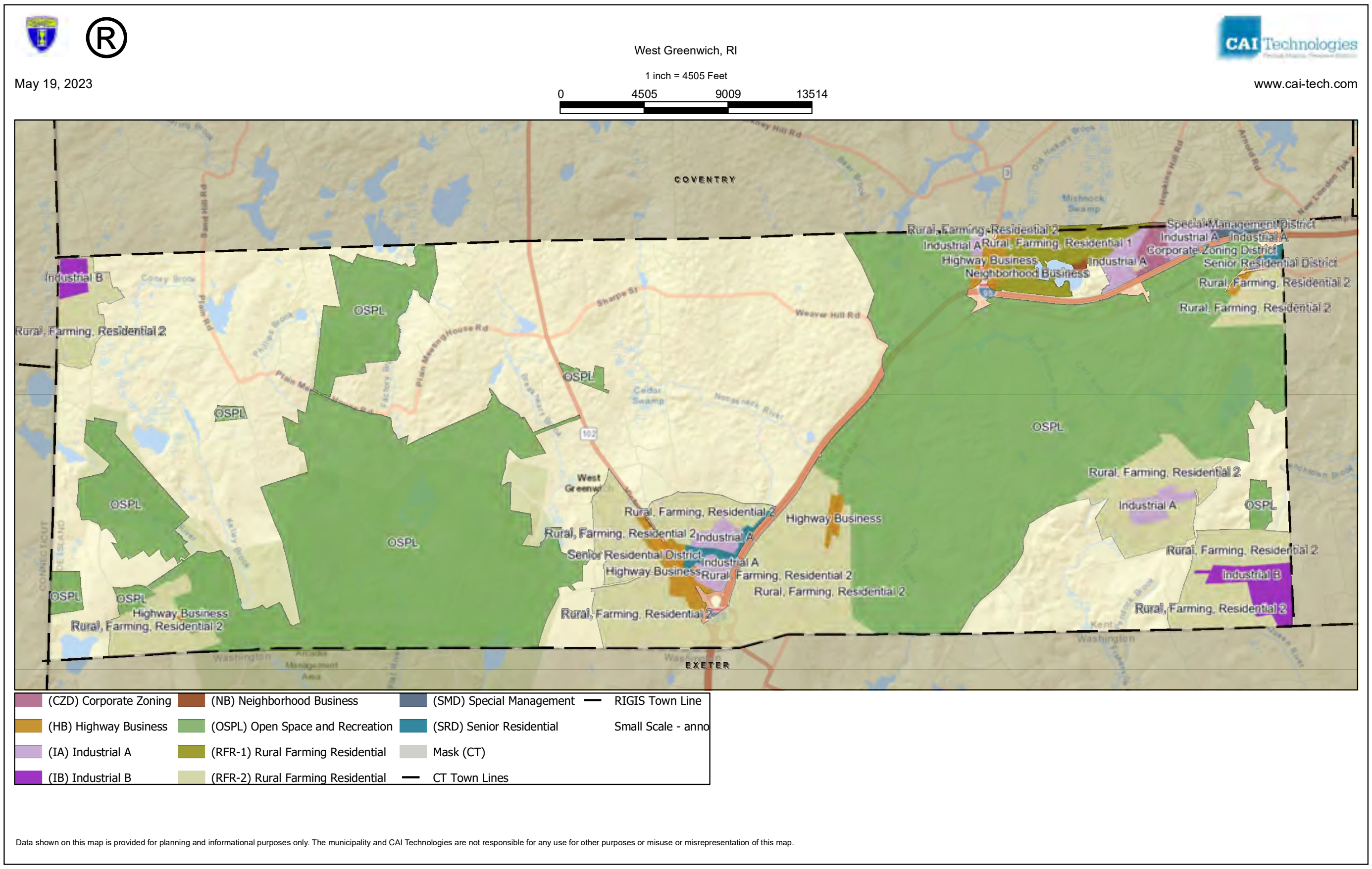
Map Resource Packet*

Used During

Community Resilience Building Workshop



***Gathered from Strategy for Reducing Risks from Natural Hazards (2005) and West Greenwich"s municipal website (AxisGIS).**


West Greenwich, RI
May 19, 2023
1 inch = 4505 Feet
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CAI Technologies
www.cai-tech.com
COVENTRY
EXETER
Industrial B
Rural, Farming, Residential 2
OSPL
Highway Business
Rural, Farming, Residential 1
Industrial A
Neighborhood Business
Special Management District
Corporate Zoning District
Senior Residential District
(CZD) Corporate Zoning
(NB) Neighborhood Business
(SMD) Special Management
RIGIS Town Line
(HB) Highway Business
(OSPL) Open Space and Recreation
(SRD) Senior Residential
Small Scale - anno
(IA) Industrial A
(RFR-1) Rural Farming Residential
Mask (CT)
(IB) Industrial B
(RFR-2) Rural Farming Residential
CT Town Lines
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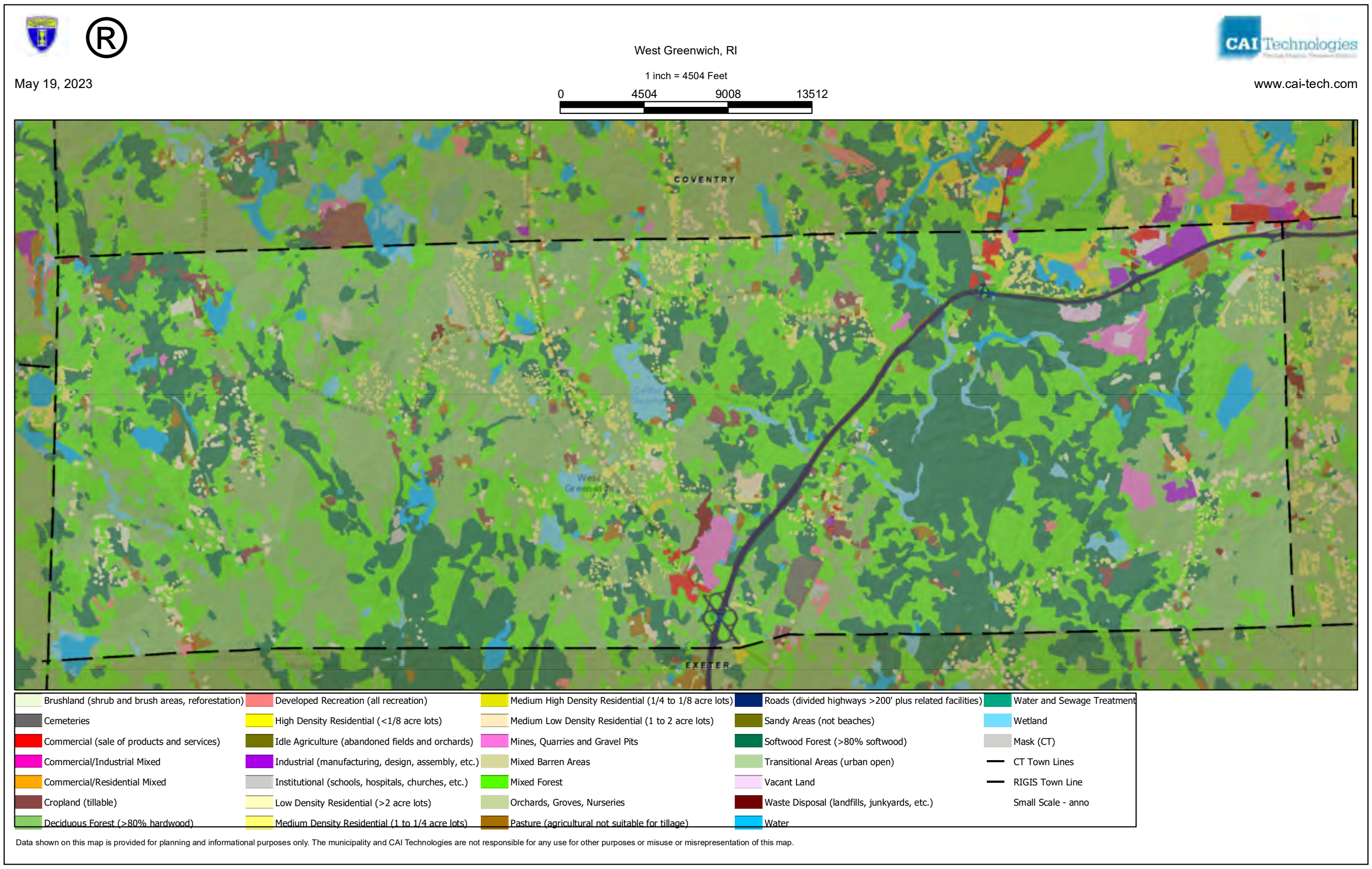
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West Greenwich, RI
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EXETER
Brushland (shrub and brush areas, reforestation)
Cemeteries
Commercial (sale of products and services)
Commercial/Industrial Mixed
Commercial/Residential Mixed
Cropland (tillable)
Deciduous Forest (>80% hardwood)
Developed Recreation (all recreation)
High Density Residential (<1/8 acre lots)
Idle Agriculture (abandoned fields and orchards)
Industrial (manufacturing, design, assembly, etc.)
Institutional (schools, hospitals, churches, etc.)
Low Density Residential (>2 acre lots)
Medium Density Residential (1 to 1/4 acre lots)
Medium High Density Residential (1/4 to 1/8 acre lots)
Medium Low Density Residential (1 to 2 acre lots)
Mines, Quarries and Gravel Pits
Mixed Barren Areas
Mixed Forest
Orchards, Groves, Nurseries
Pasture (agricultural not suitable for tillage)
Roads (divided highways >200' plus related facilities)
Sandy Areas (not beaches)
Softwood Forest (>80% softwood)
Transitional Areas (urban open)
Vacant Land
Waste Disposal (landfills, junkyards, etc.)
Water
Water and Sewage Treatment
Wetland
Mask (CT)
CT Town Lines
RIGIS Town Line
Small Scale - anno
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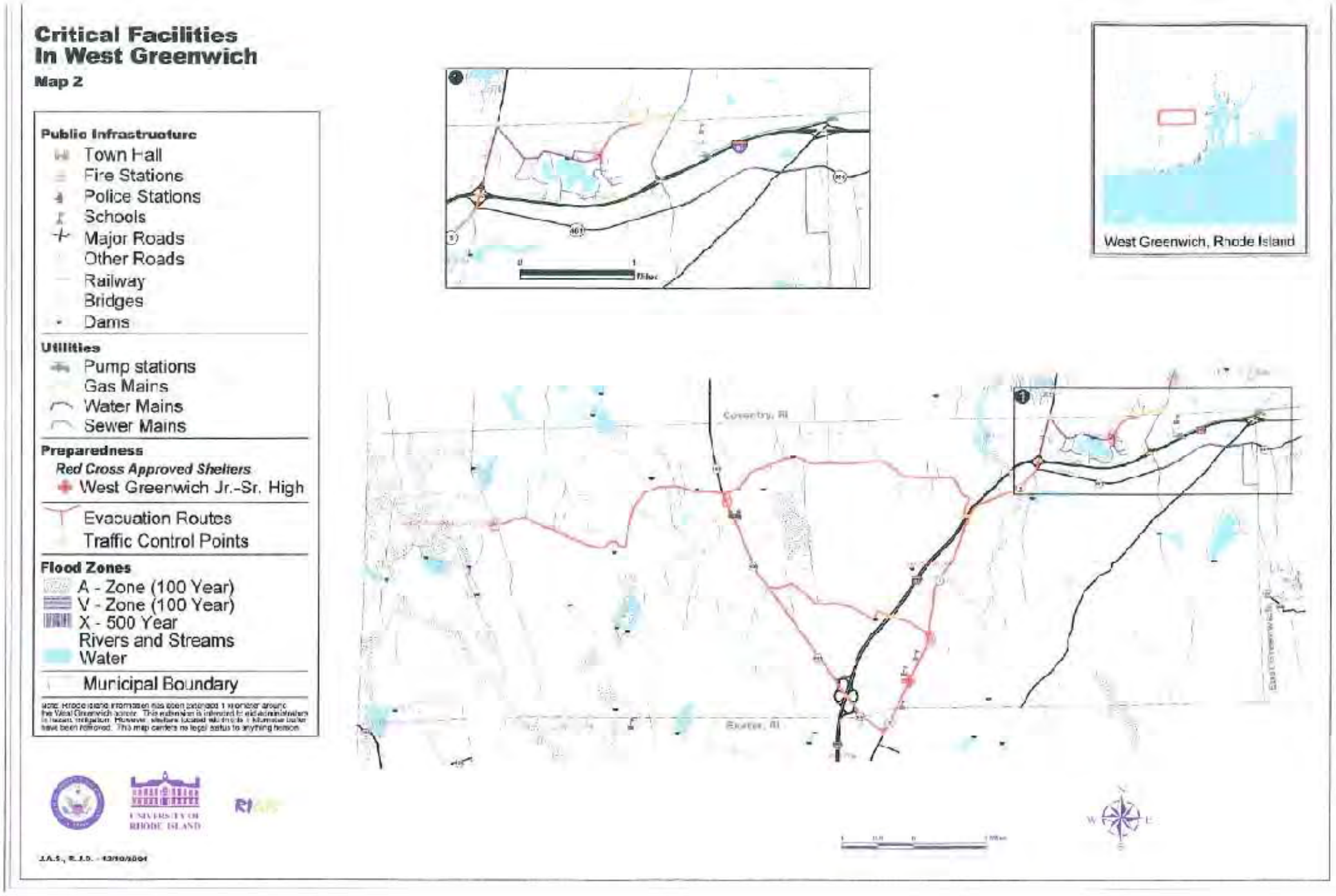
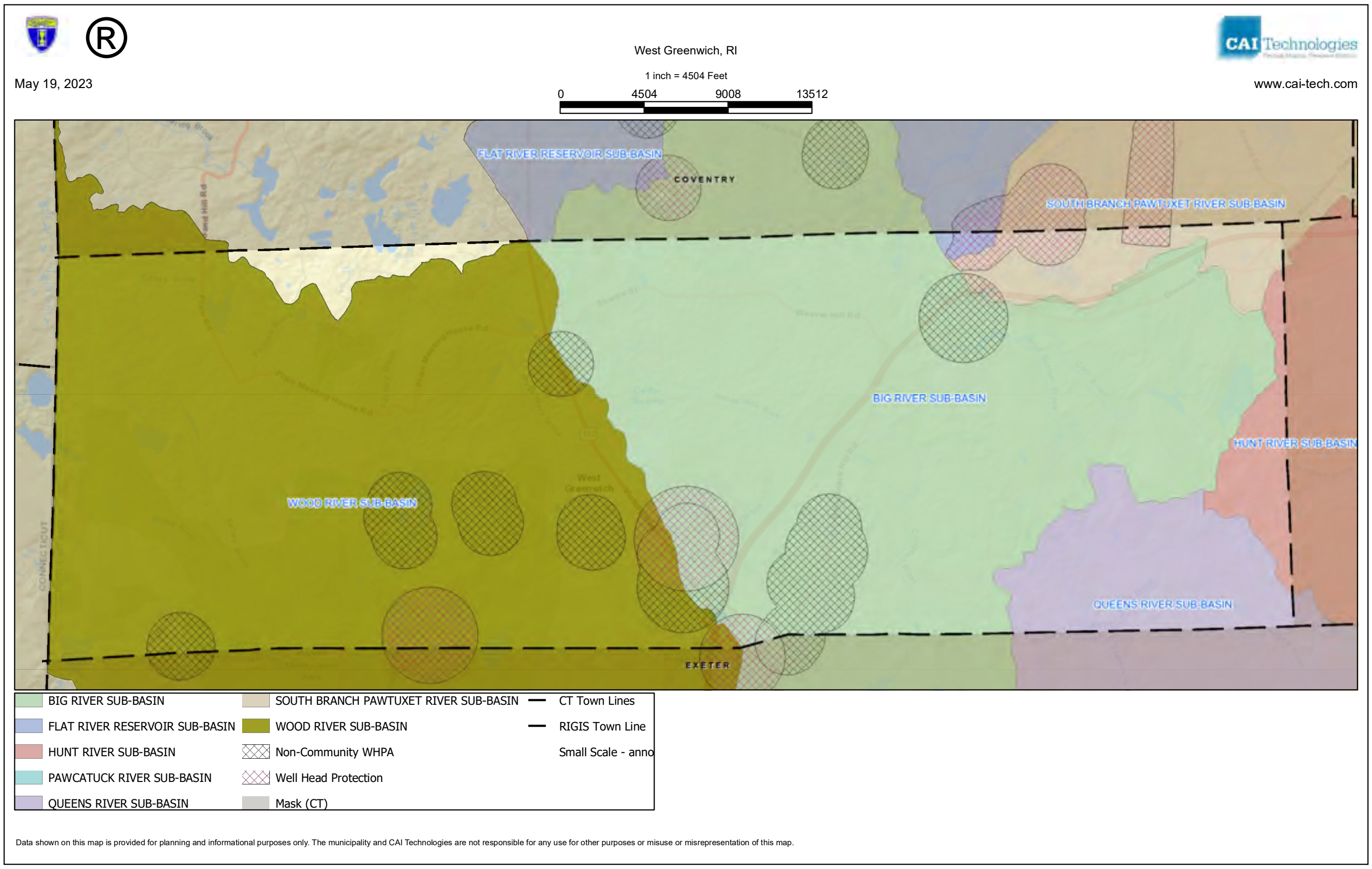

Critical Facilities
In West Greenwich
Map 2
Public Infrastructure
Town Hall
Fire Stations
Police Stations
Schools
Major Roads
Other Roads
Railway
Bridges
Dams
Utilities
Pump stations
Gas Mains
Water Mains
Sewer Mains
Preparedness
Red Cross Approved Shelters
West Greenwich Jr.-Sr. High
Evacuation Routes
Traffic Control Points
Flood Zones
A - Zone (100 Year)
V - Zone (100 Year)
X - 500 Year
Rivers and Streams
Water
Municipal Boundary
West Greenwich, Rhode Island
Coventry, RI
Exeter, RI


West Greenwich, RI
May 19, 2023
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FLAT RIVER RESERVOIR SUB-BASIN
COVENTRY
SOUTH BRANCH PAWTUXET RIVER SUB-BASIN
BIG RIVER SUB-BASIN
HUNT RIVER SUB-BASIN
WOOD RIVER SUB-BASIN
QUEENS RIVER SUB-BASIN
EXETER
BIG RIVER SUB-BASIN
FLAT RIVER RESERVOIR SUB-BASIN
HUNT RIVER SUB-BASIN
PAWCATUCK RIVER SUB-BASIN
QUEENS RIVER SUB-BASIN
SOUTH BRANCH PAWTUXET RIVER SUB-BASIN
WOOD RIVER SUB-BASIN
Non-Community WHPA
Well Head Protection
Mask (CT)
CT Town Lines
RIGIS Town Line
Small Scale - anno
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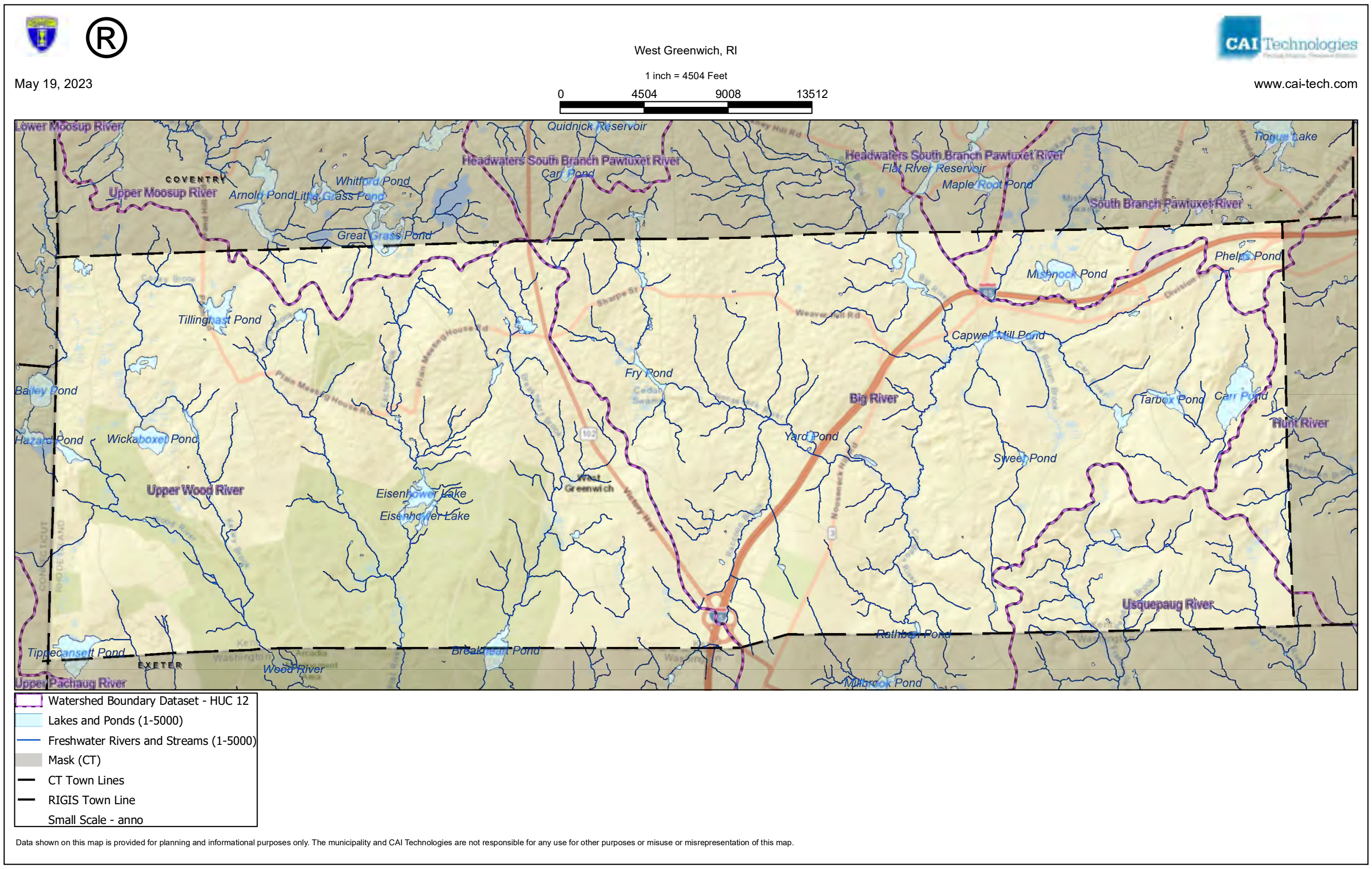
West Greenwich, RI
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Lower Moosup River
Quidnick Reservoir
Headwaters South Branch Pawtuxet River
Carr Pond
Headwaters South Branch Pawtuxet River
Flat River Reservoir
Maple Root Pond
Tiogue Lake
COVENTRY
Upper Moosup River
Arnold Pond
Little Grass Pond
Whitford Pond
Great Grass Pond
South Branch Pawtuxet River
Phelps Pond
Mishnock Pond
Tillinghast Pond
Capwell Mill Pond
Fry Pond
Big River
Bailey Pond
Tarbox Pond
Carr Pond
Hunt River
Hazard Pond
Wickaboxet Pond
Yard Pond
Sweet Pond
Upper Wood River
Eisenhower Lake
Eisenhower Lake
West Greenwich
Usquepaug River
Rathbun Pond
Tippecansett Pond
EXETER
Breakheart Pond
Wood River
Upper Pachaug River
Millbrook Pond
Watershed Boundary Dataset - HUC 12
Lakes and Ponds (1-5000)
Freshwater Rivers and Streams (1-5000)
Mask (CT)
CT Town Lines
RIGIS Town Line
Small Scale - anno
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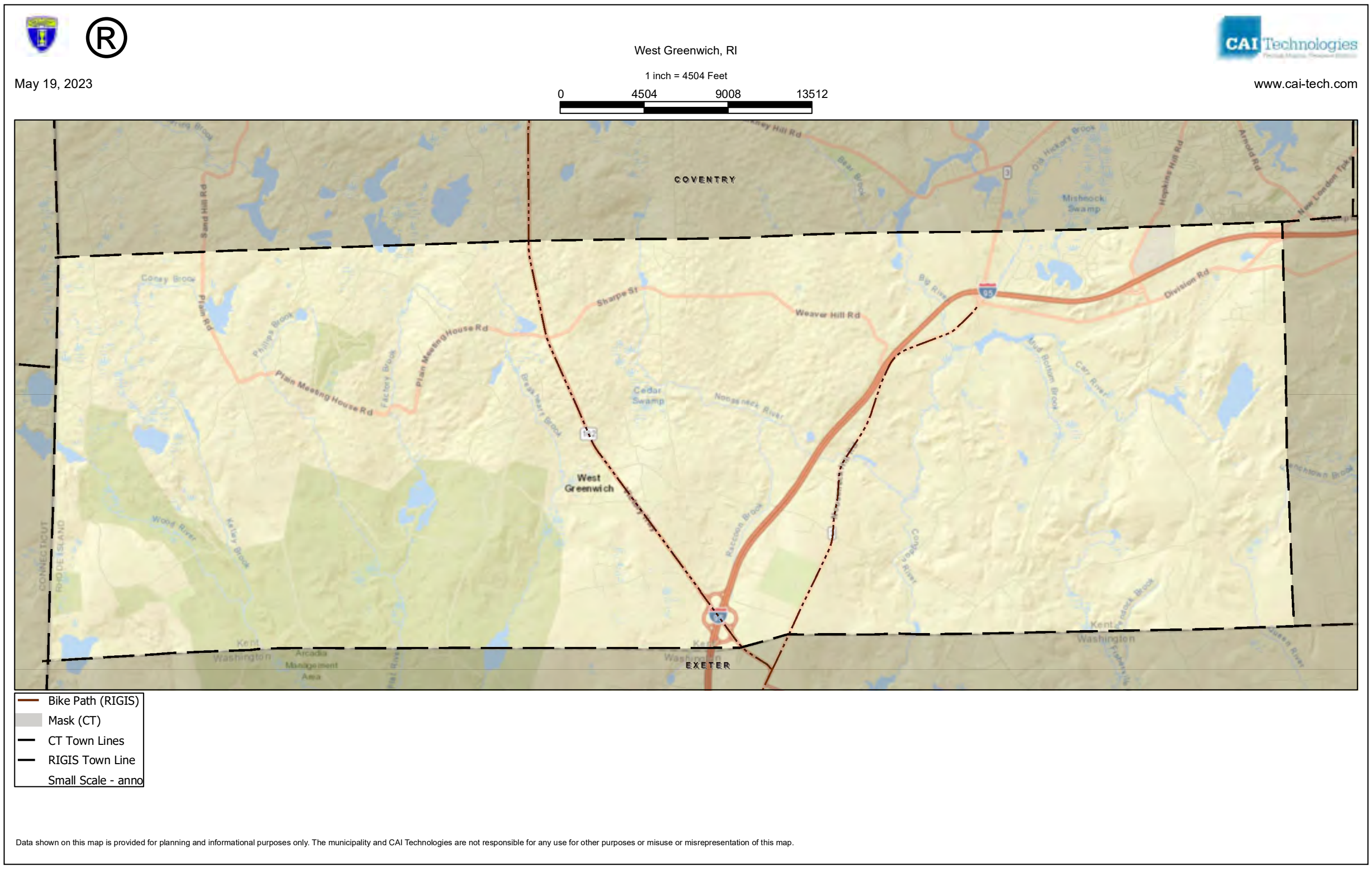
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CAI Technologies
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COVENTRY
West Greenwich
EXETER
Sharpe St
Weaver Hill Rd
Plain Meeting House Rd
Division Rd
Cedar Swamp
Mishnock Swamp
Wood River
Kent
Washington
Arcadia Management Area
Bike Path (RIGIS)
Mask (CT)
CT Town Lines
RIGIS Town Line
Small Scale - anno
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May 19, 2023

West Greenwich, RI

1 inch = 4504 Feet

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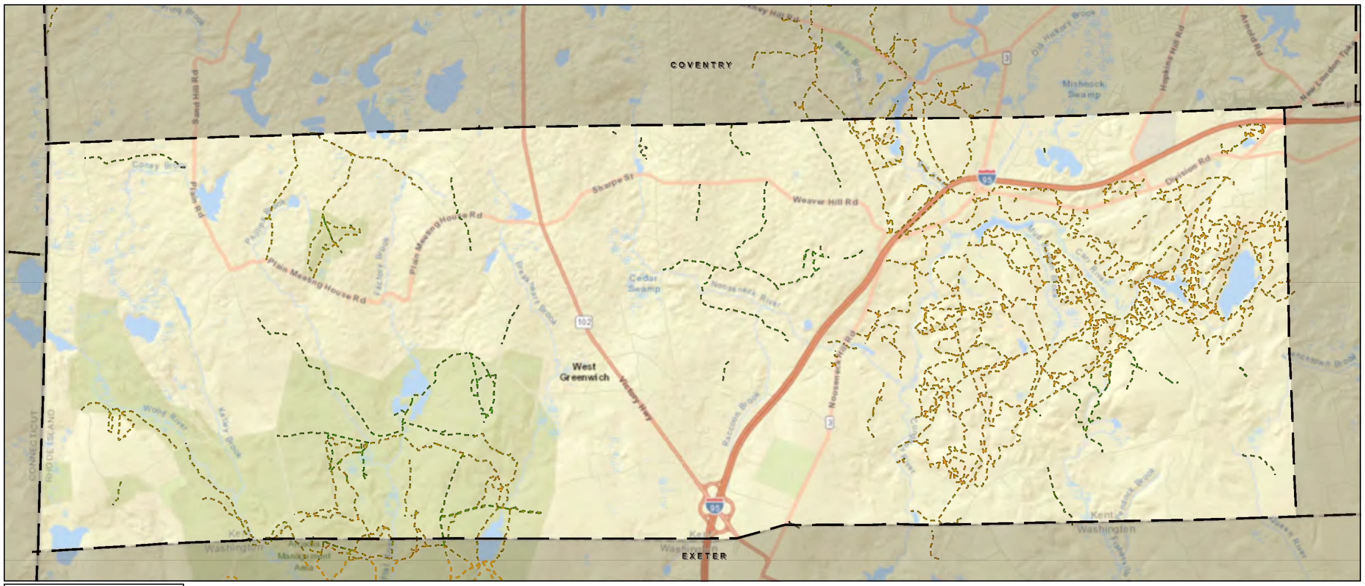

- - - Hiking Trails on State Lands
- - - Trail (Town)
Mask (CT)
— CT Town Lines
— RIGIS Town Line
Small Scale - anno

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May 19, 2023

West Greenwich, RI

1 inch = 4504 Feet

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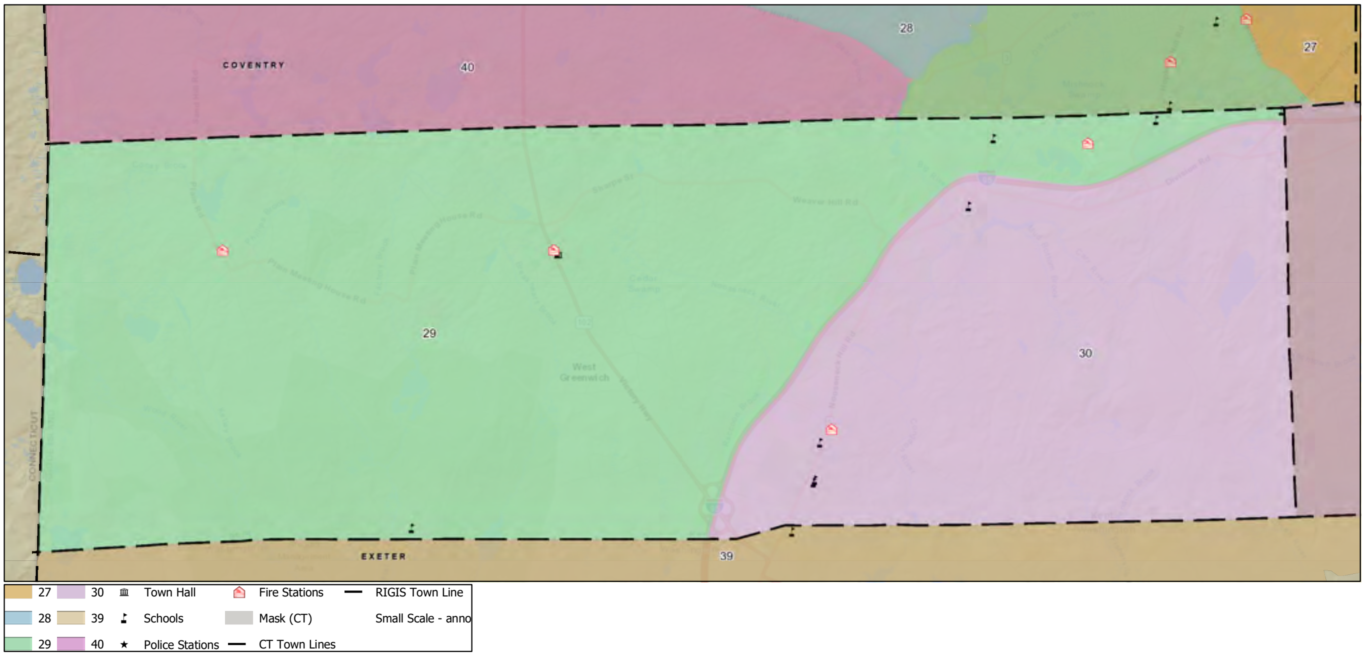

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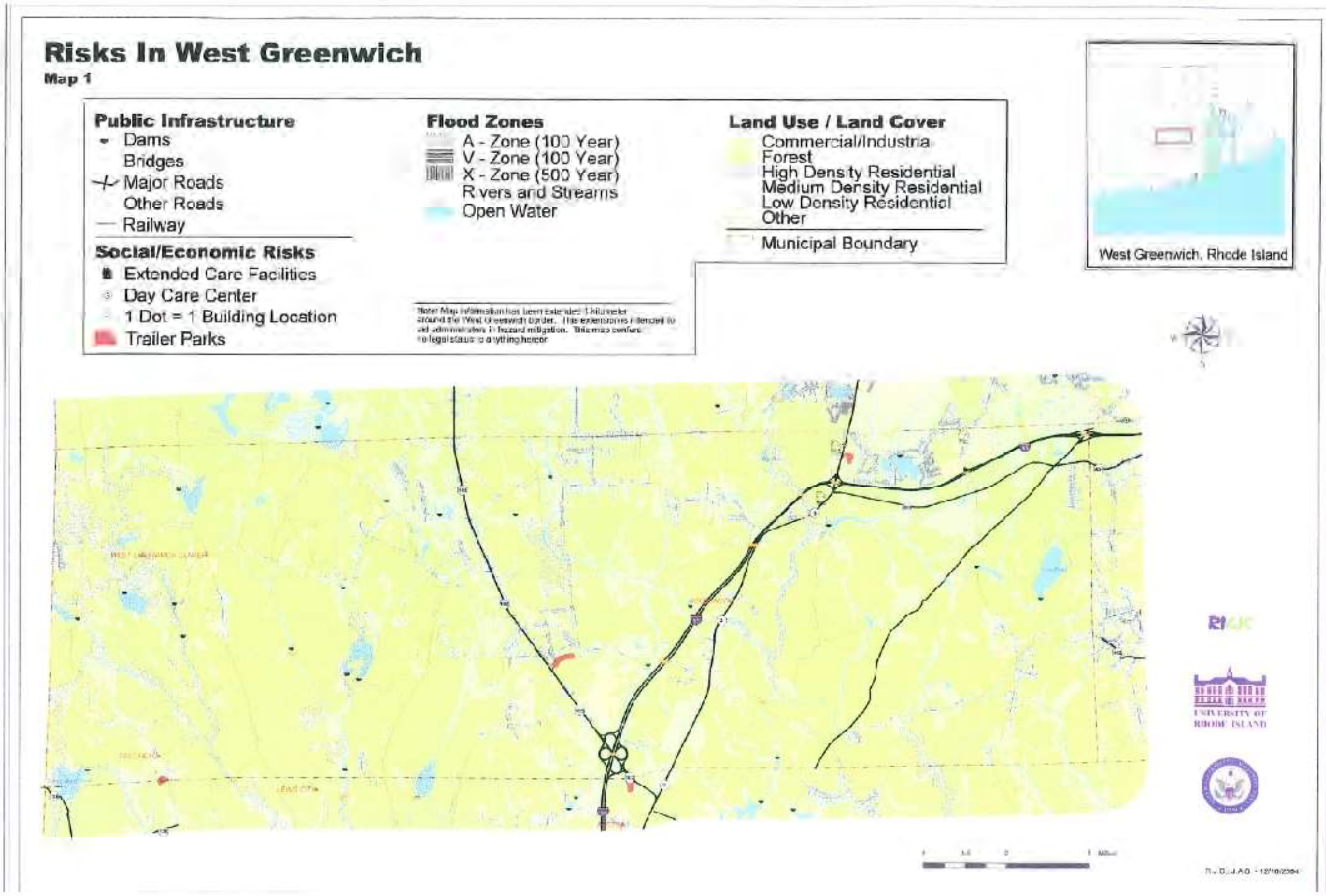
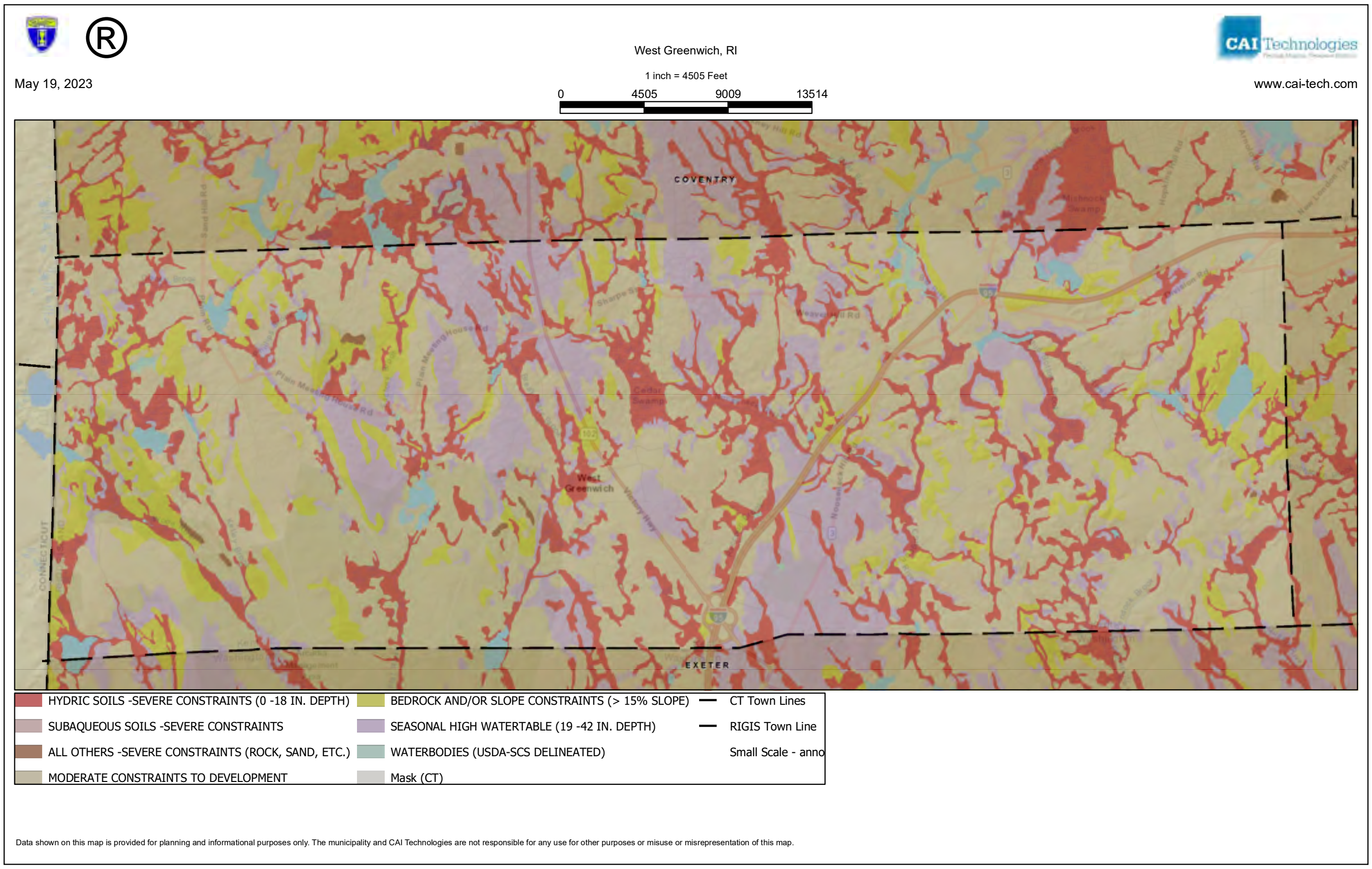

Risks In West Greenwich
Map 1
Public Infrastructure
Dams
Bridges
Major Roads
Other Roads
Railway
Social/Economic Risks
Extended Care Facilities
Day Care Center
1 Dot = 1 Building Location
Trailer Parks
Flood Zones
A - Zone (100 Year)
V - Zone (100 Year)
X - Zone (500 Year)
Rivers and Streams
Open Water
Land Use / Land Cover
Commercial/Industria
Forest
High Density Residential
Medium Density Residential
Low Density Residential
Other
Municipal Boundary
West Greenwich, Rhode Island
UNIVERSITY OF RHODE ISLAND


West Greenwich, RI
May 19, 2023
1 inch = 4505 Feet
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CAI Technologies
COVENTRY
West Greenwich
EXETER
HYDRIC SOILS -SEVERE CONSTRAINTS (0 -18 IN. DEPTH)
SUBAQUEOUS SOILS -SEVERE CONSTRAINTS
ALL OTHERS -SEVERE CONSTRAINTS (ROCK, SAND, ETC.)
MODERATE CONSTRAINTS TO DEVELOPMENT
BEDROCK AND/OR SLOPE CONSTRAINTS (> 15% SLOPE)
SEASONAL HIGH WATERTABLE (19 -42 IN. DEPTH)
WATERBODIES (USDA-SCS DELINEATED)
Mask (CT)
CT Town Lines
RIGIS Town Line
Small Scale - anno
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May 19, 2023

West Greenwich, RI

1 inch = 4504 Feet

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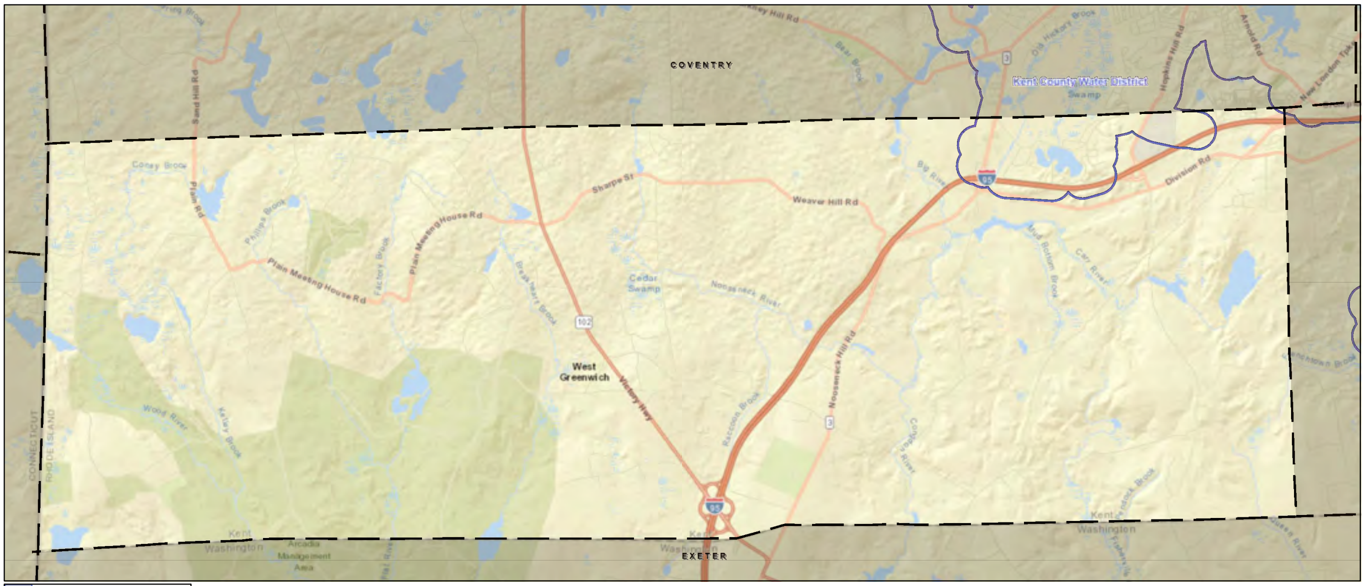

	Water Supply District (RIGIS)
	Mask (CT)
	CT Town Lines
	RIGIS Town Line
	Small Scale - anno

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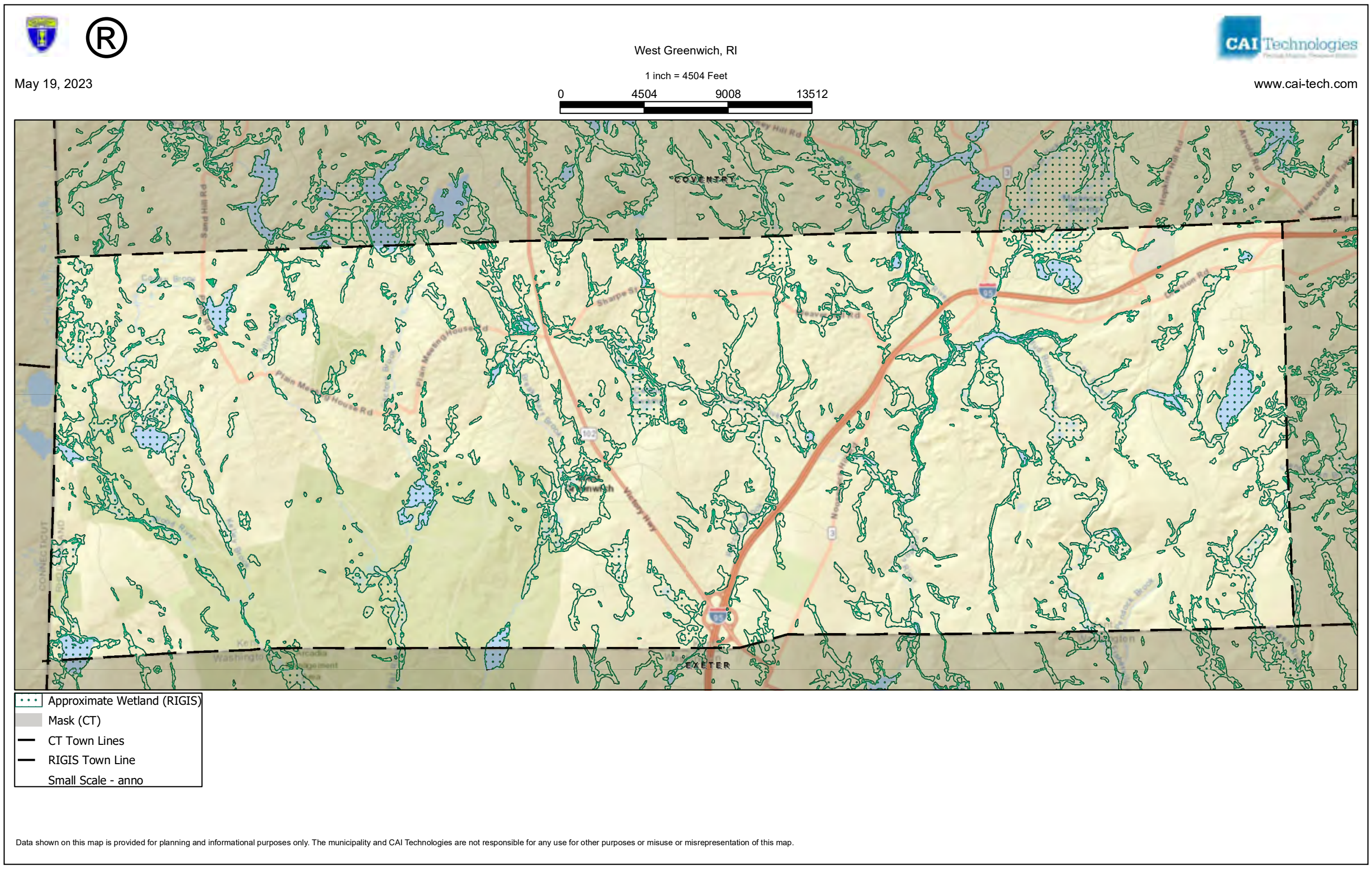
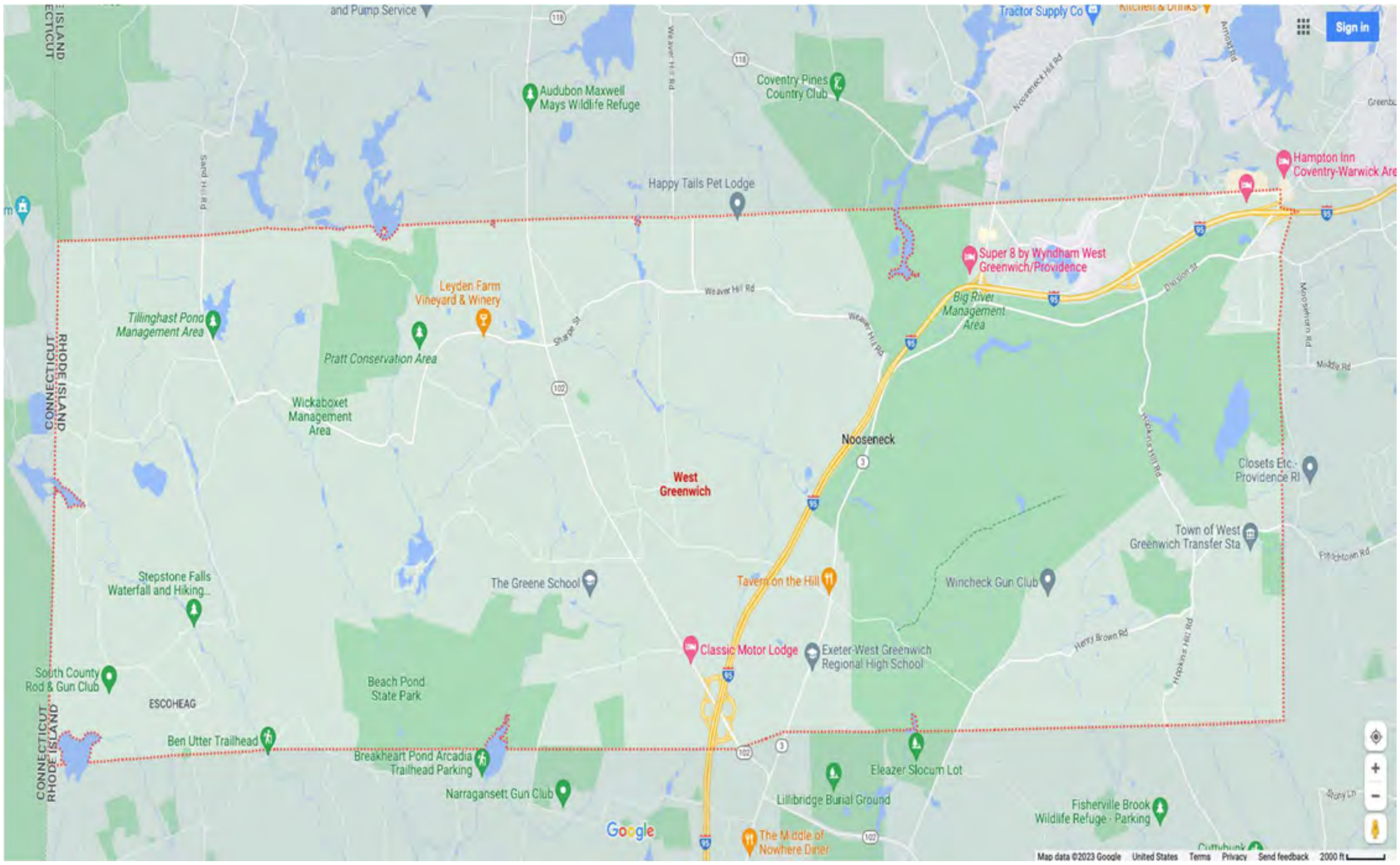

West Greenwich, RI
1 inch = 4504 Feet
0
4504
9008
13512
May 19, 2023
CAI Technologies
www.cai-tech.com
COVENTRY
EXETER
Approximate Wetland (RIGIS)
Mask (CT)
CT Town Lines
RIGIS Town Line
Small Scale - anno
Data shown on this map is provided for planning and informational purposes only. The municipality and CAI Technologies are not responsible for any use for other purposes or misuse or misrepresentation of this map.



West Greenwich
Nooseneck
Pratt Conservation Area
Wickaboxet Management Area
Tillinghast Pond Management Area
Leyden Farm Vineyard & Winery
Big River Management Area
Beach Pond State Park
Stepstone Falls Waterfall and Hiking...
South County Rod & Gun Club
ESCOHEAG
Ben Utter Trailhead
Breakheart Pond Arcadia Trailhead Parking
Narragansett Gun Club
The Greene School
Tavern on the Hill
Classic Motor Lodge
Exeter-West Greenwich Regional High School
Wincheck Gun Club
Town of West Greenwich Transfer Sta
Closets Etc. - Providence RI
Eleazer Slocum Lot
Lillibridge Burial Ground
Fisherville Brook Wildlife Refuge - Parking
The Middle of Nowhere Diner
Super 8 by Wyndham West Greenwich/Providence
Hampton Inn Coventry-Warwick Are
Happy Tails Pet Lodge
Audubon Maxwell Mays Wildlife Refuge
Coventry Pines Country Club
Tractor Supply Co
and Pump Service
CONNECTICUT
RHODE ISLAND
Google
Sign in


Wood-Pawcatuck Watershed
MA
RI
CT
Sterling
W. Greenwich
Voluntown
Exeter
Wood R.
102
Queen R.
Beaver R.
Hopkinton
95
3
138
Richmond
N. Stonington
Chipuxet R.
S. Kingstown
Charlestown
Pawcatuck R.
Stonington
Westerly
Rivers, Streams, and Communities in the Watershed
N
Data: RIGIS, USGS
Map by WPWA
February 2010
0 1.25 2.5 5
Miles

www.CommunityResilienceBuilding.org

Appendix J- Wood-Pawcatuck Watershed Maps

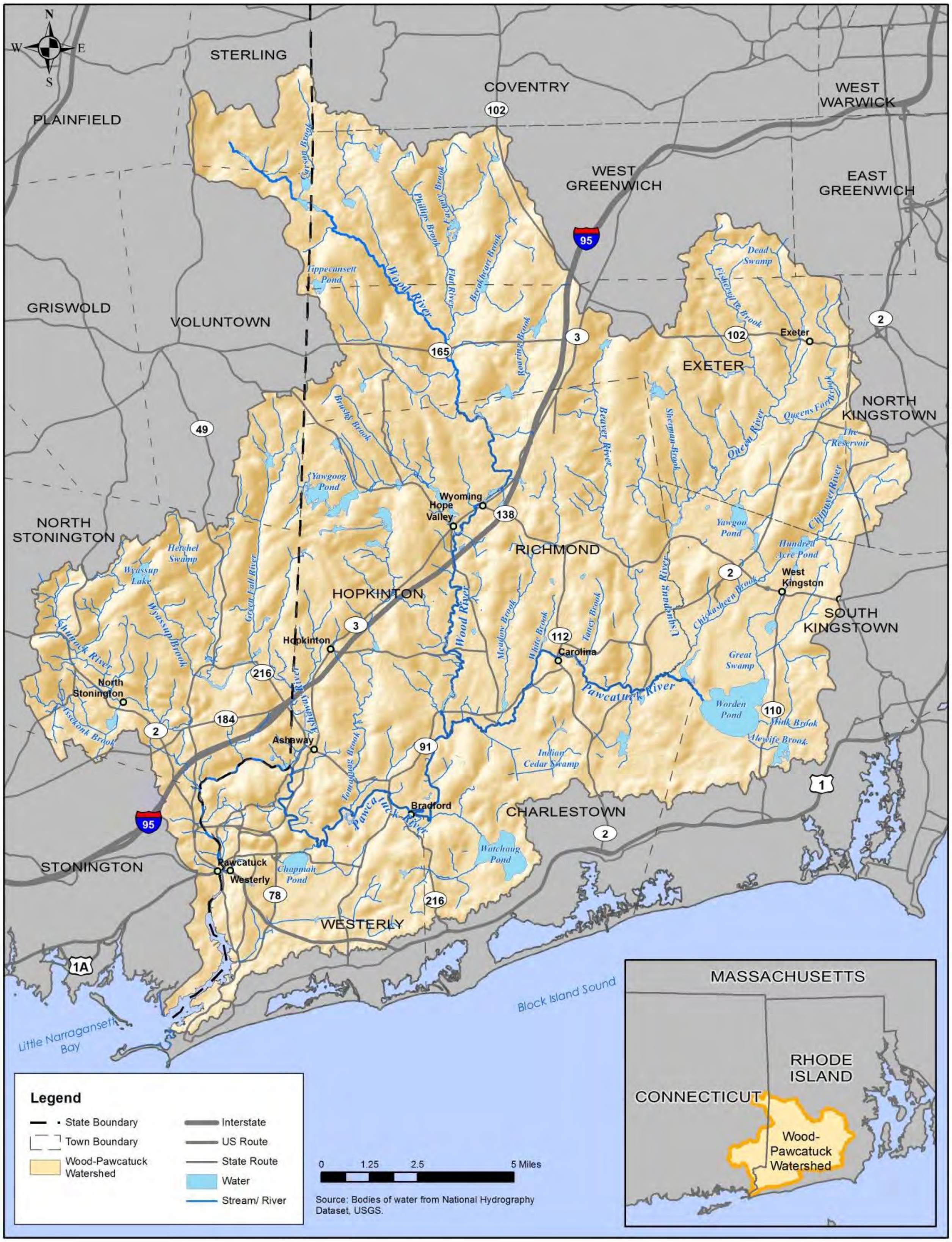


Figure 1-1. Wood-Pawcatuck watershed.

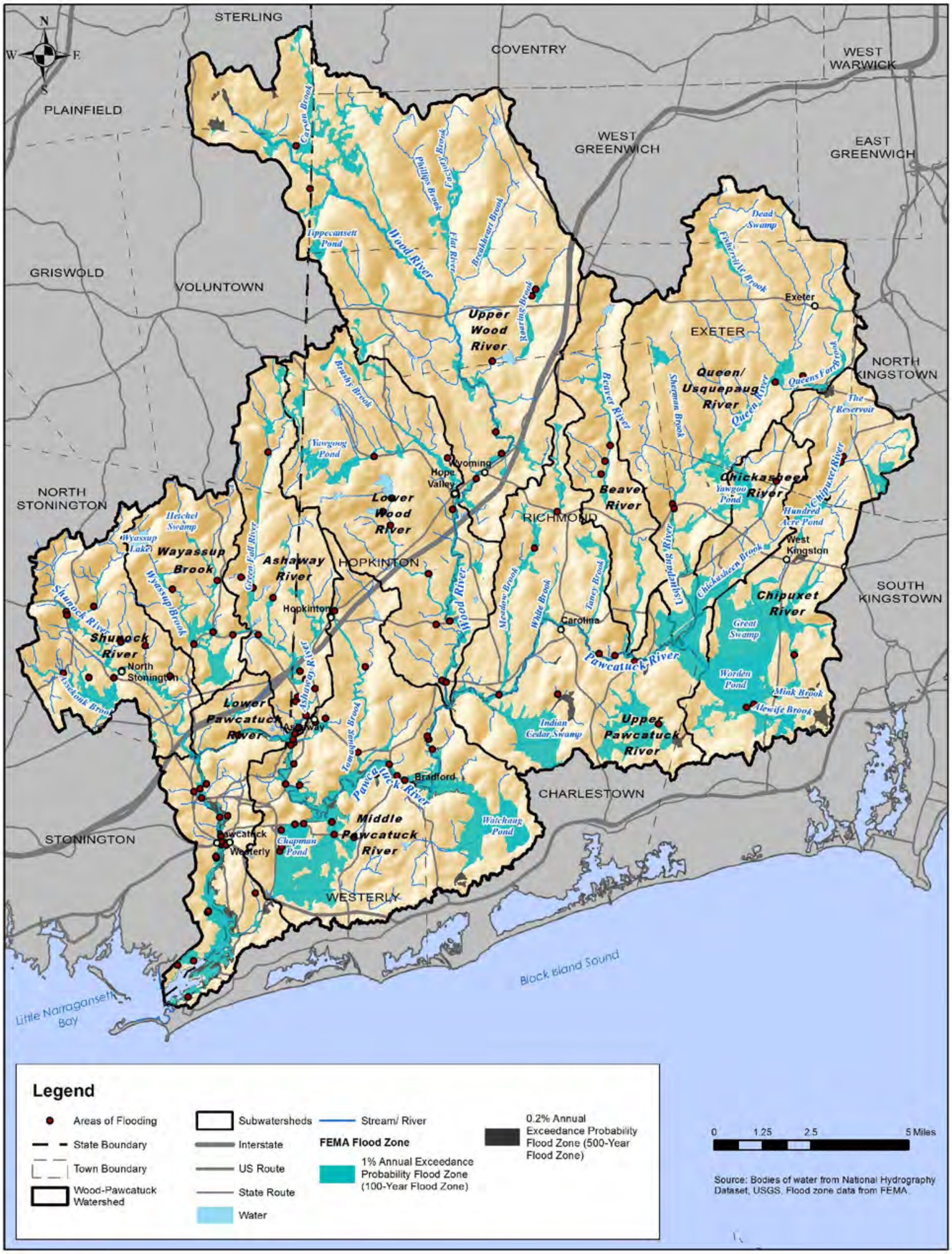


Figure 1-4. Special Flood Hazard Areas and areas of flooding in the Wood-Pawcatuck watershed.

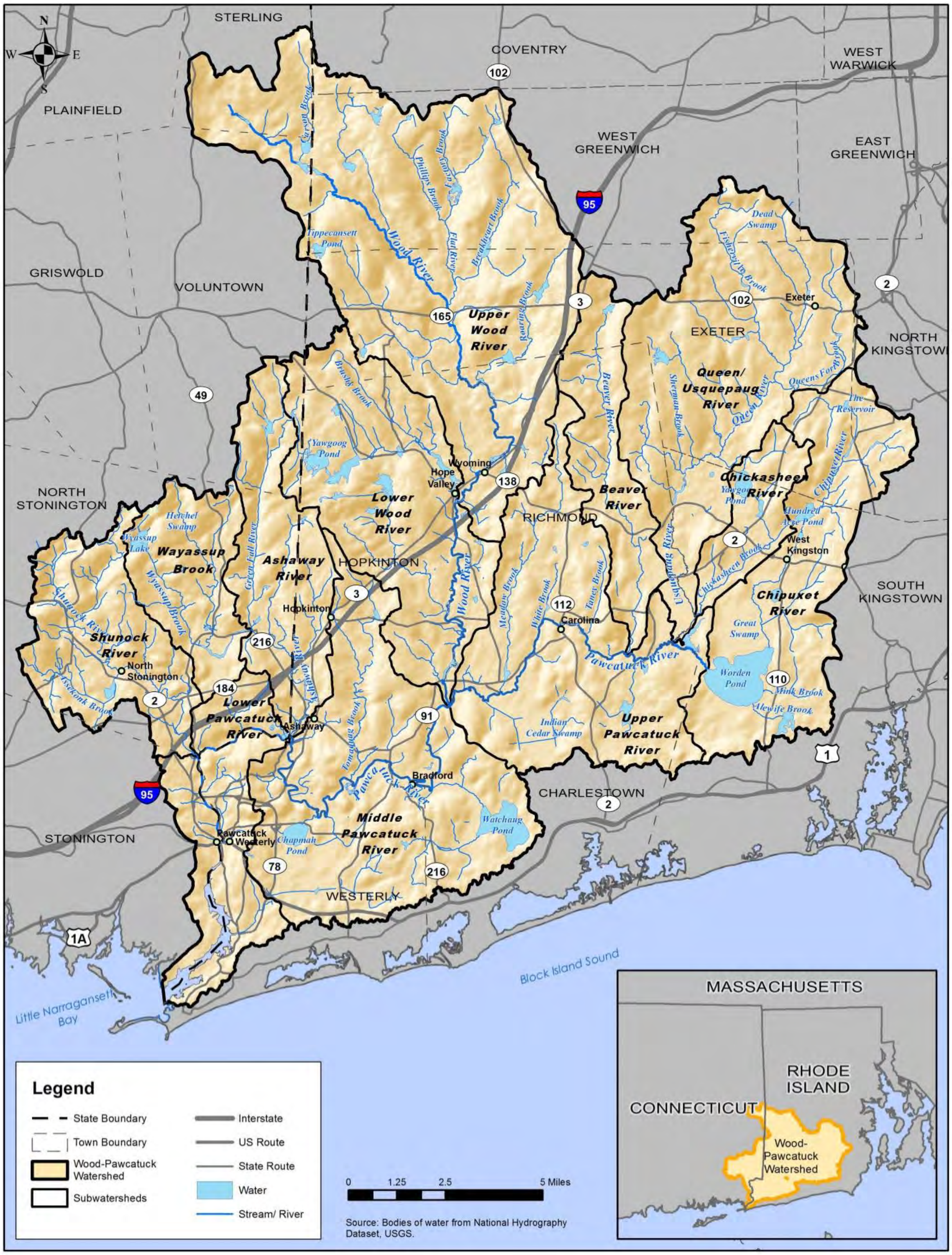


Figure 3-1. Major subwatersheds of the Wood-Pawcatuck.

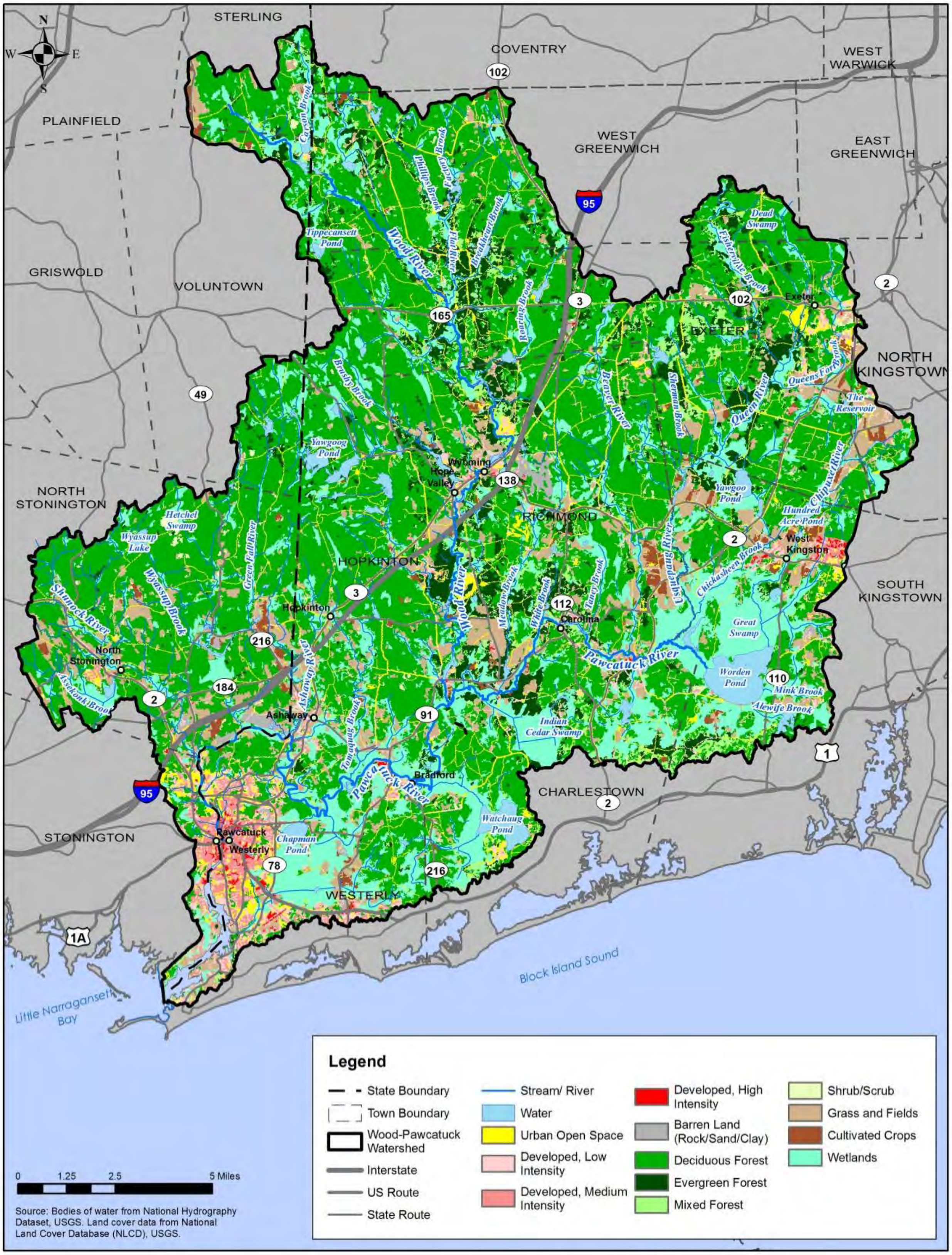


Figure 3-2. Land cover in the Wood-Pawcatuck watershed.

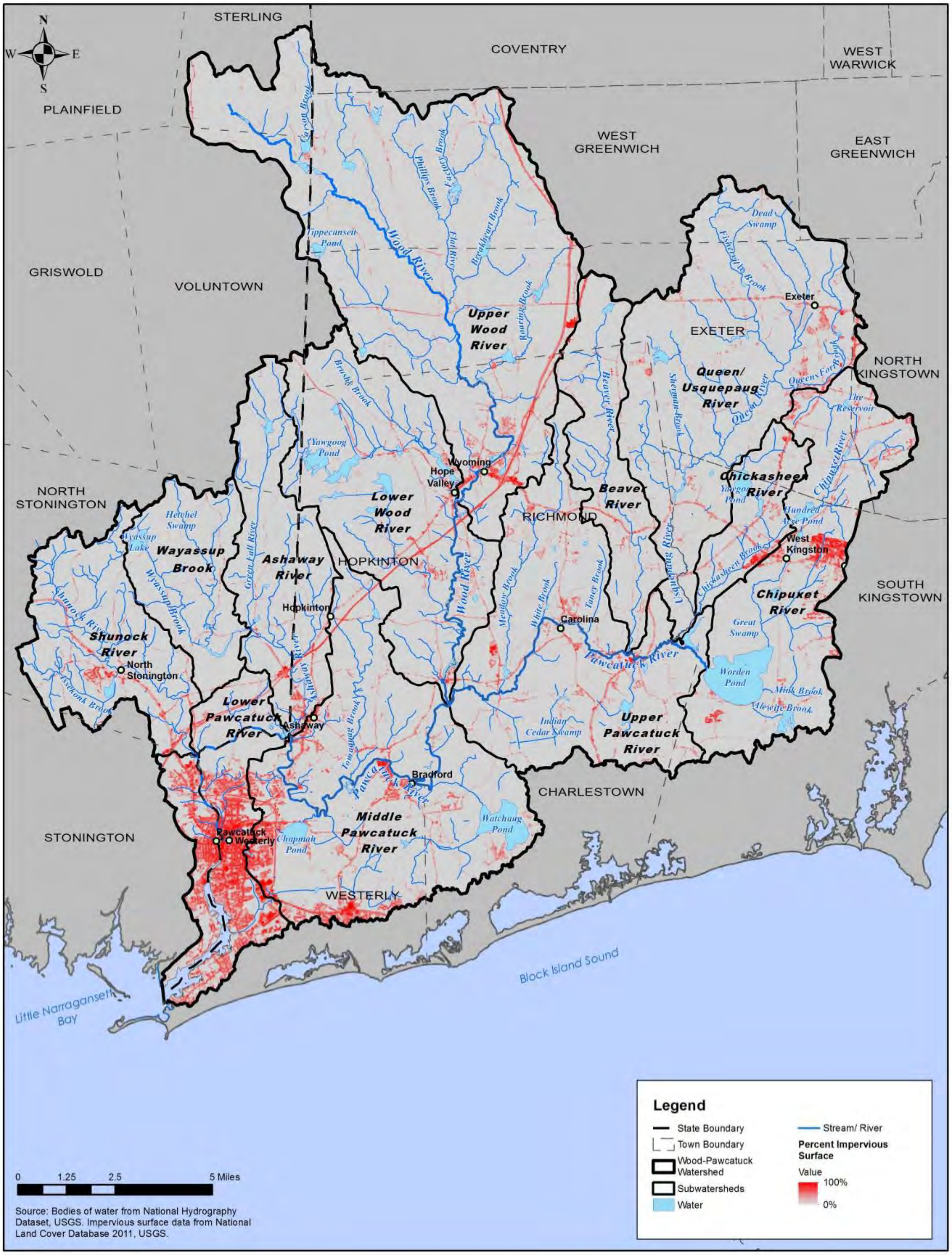


Figure 3-3. Percent impervious cover within the Wood-Pawcatuck watershed.

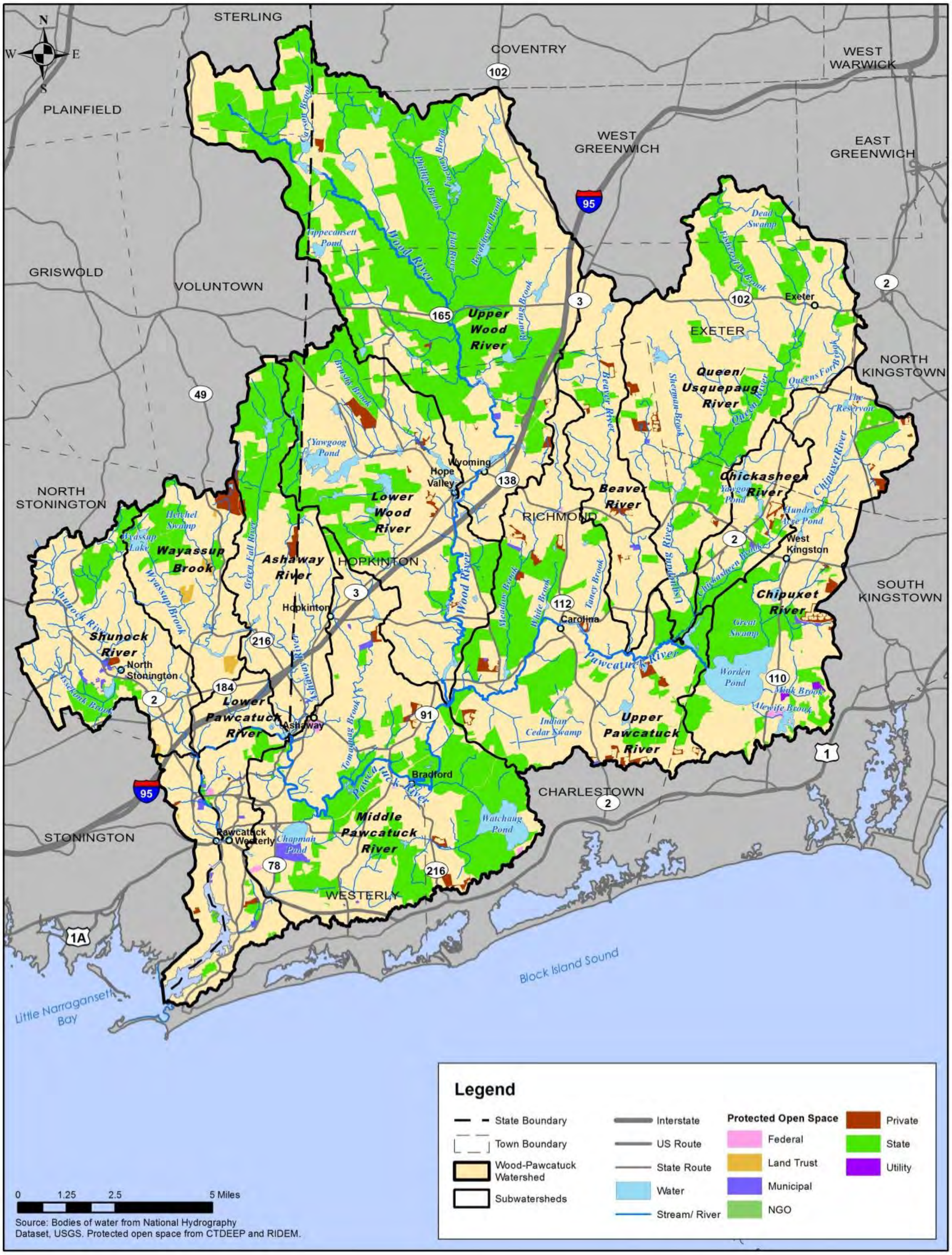


Figure 3-4. Areas of protected open space within the Wood-Pawcatuck watershed.

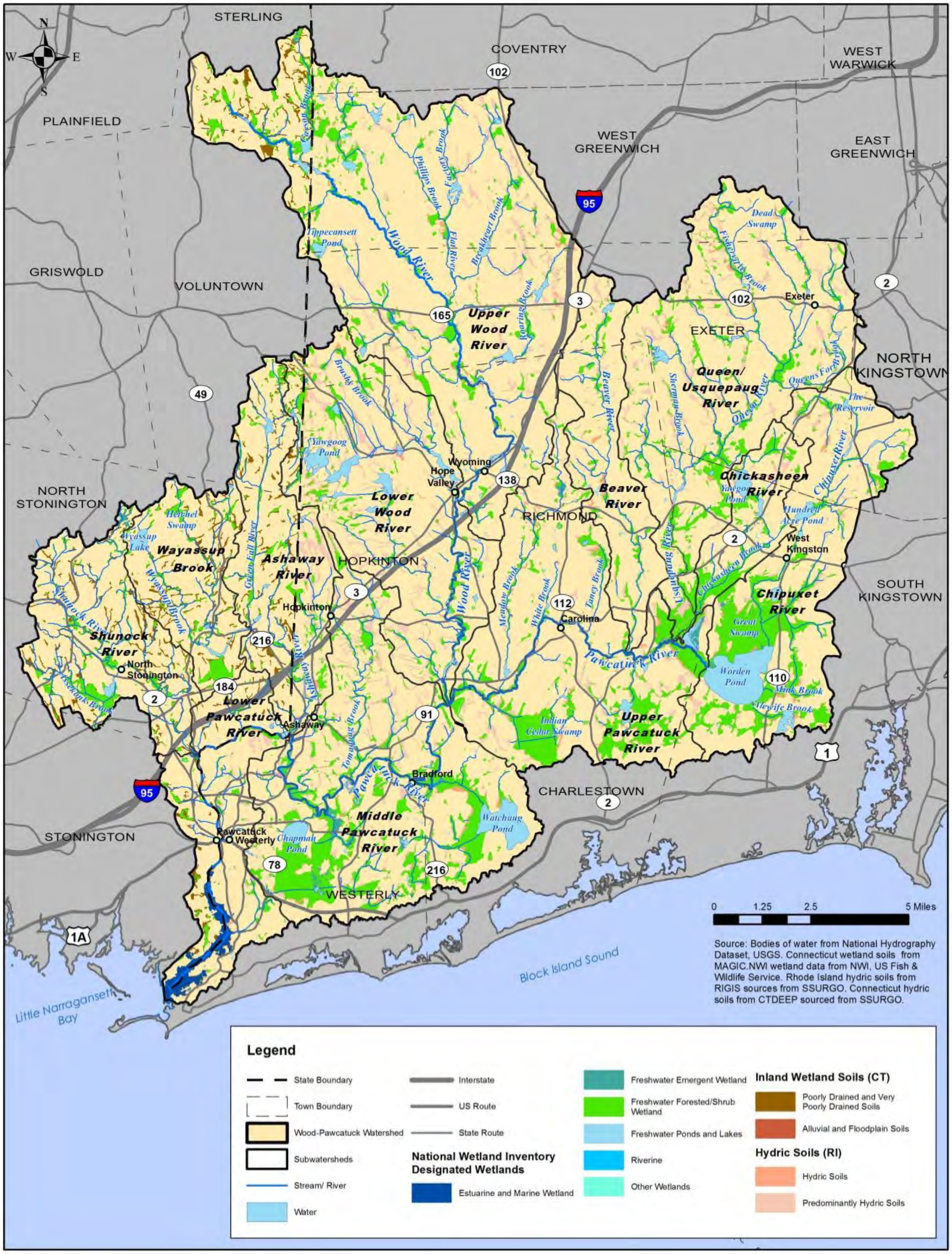


Figure 3-5. Wetland resources in the Wood-Pawcatuck watershed.

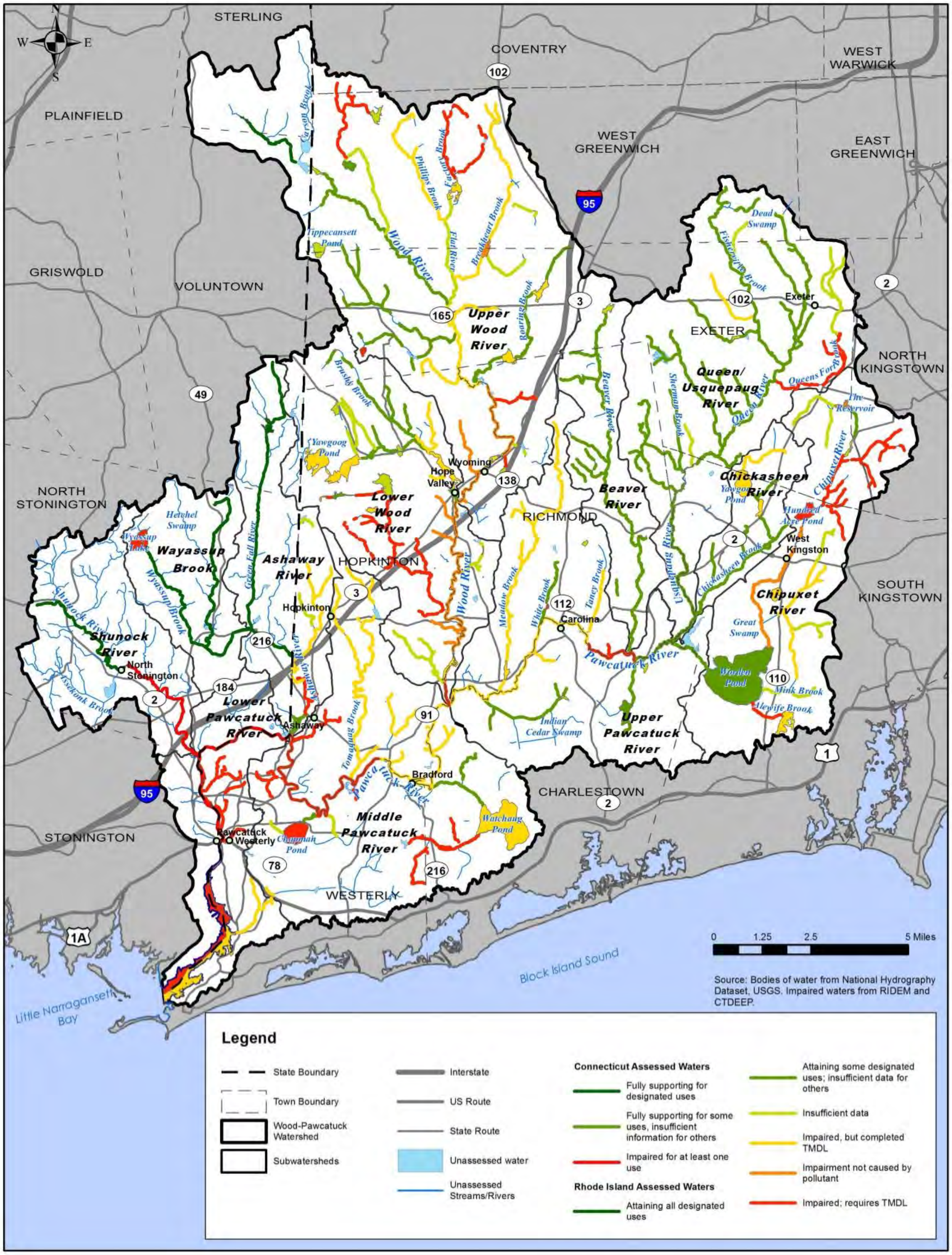
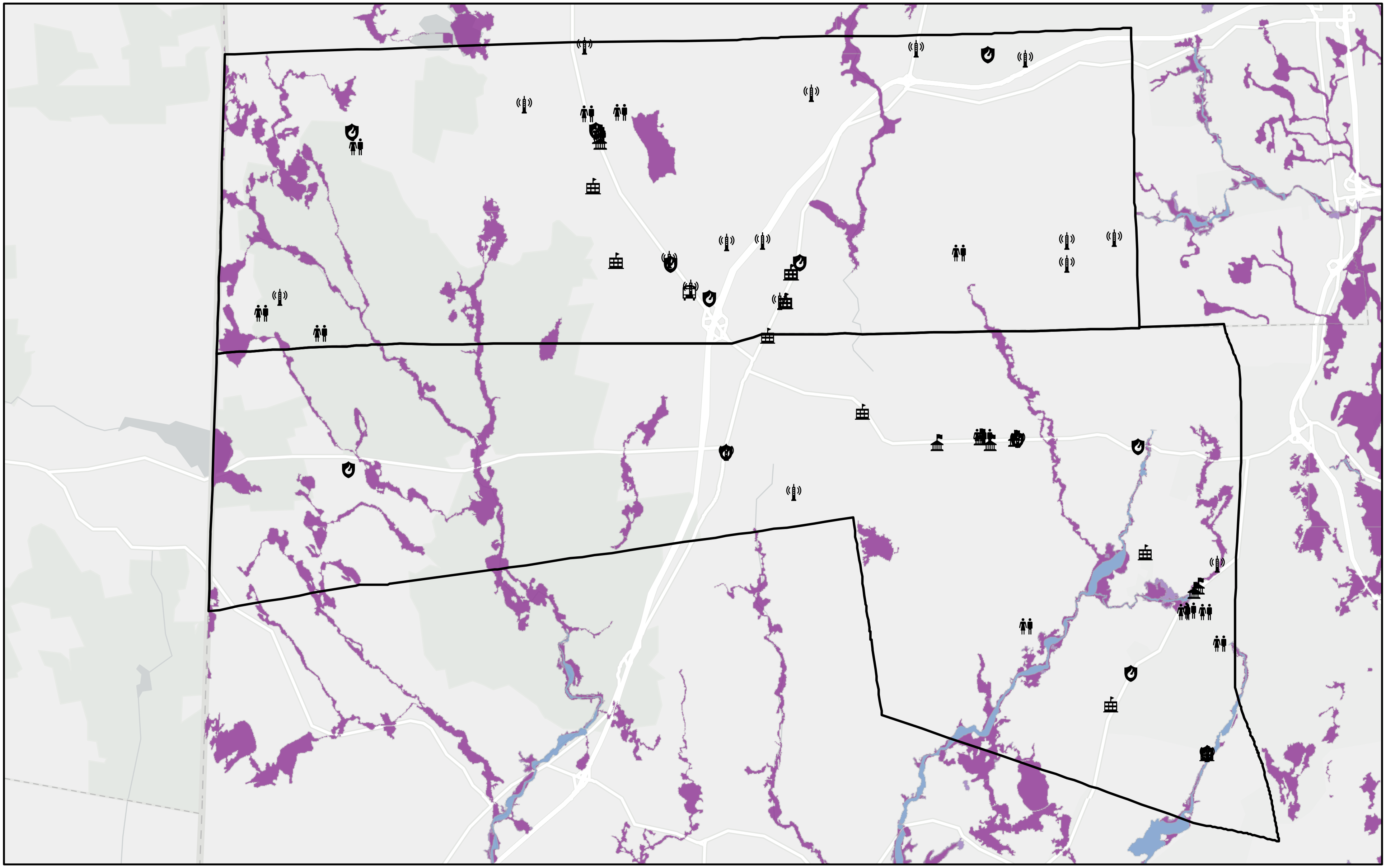


Figure 3-6. Impaired waterbodies in the Wood-Pawcatuck watershed.

Appendix K- Hazard Area Maps

Flood Hazard Areas



3/21/2025

Exeter CFs 12_4_24
- Government
- Emergency Services
- Utility
- Education
- Community

WG CFs 12_4_24
- Government
- Emergency Services
- Utility
- Education
- Community
- Transportation

USA Flood Hazard Areas
- 0.2% Annual Chance Flood Hazard
- 1% Annual Chance Flood Hazard
- Regulatory Floodway

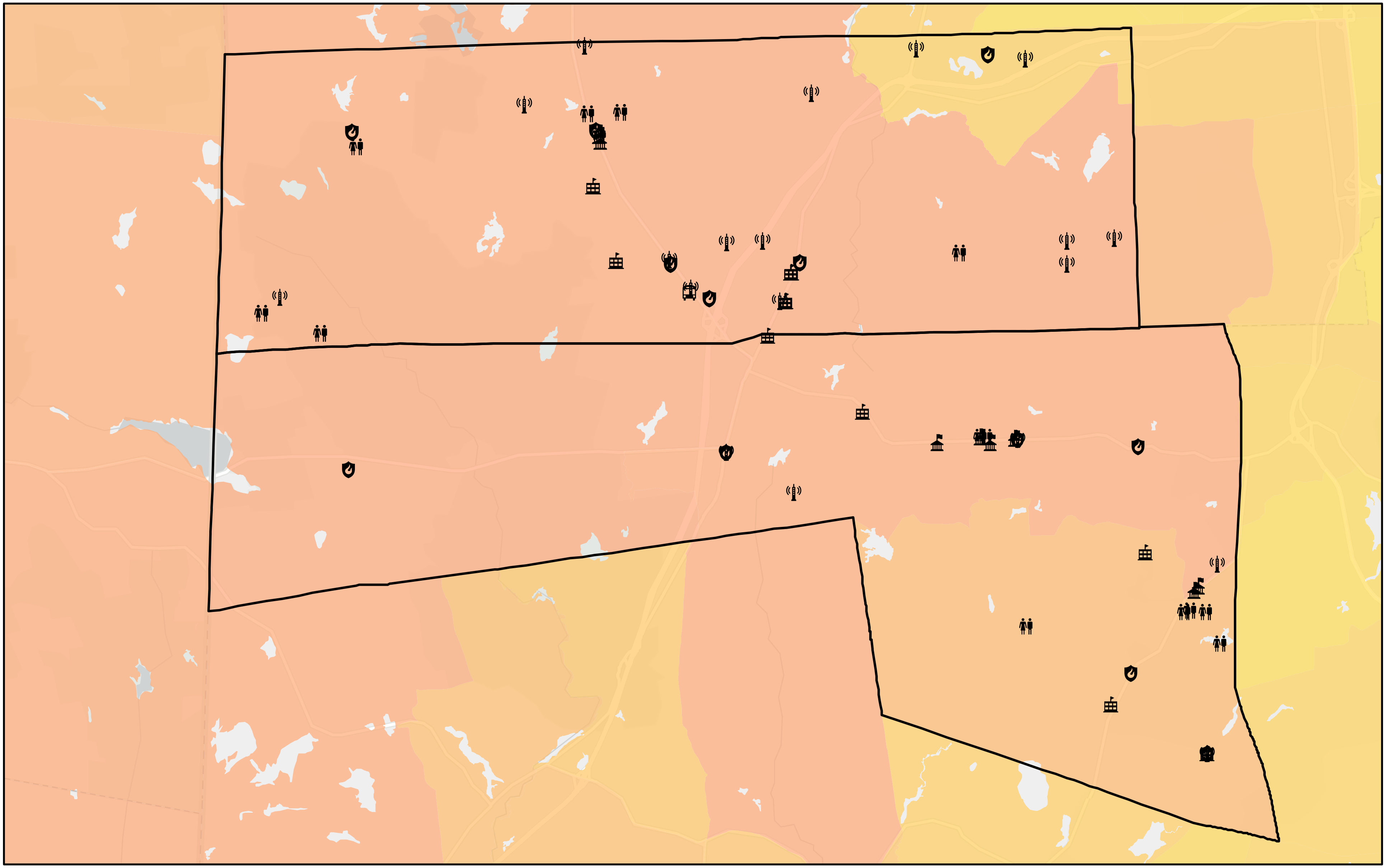
1:160,000

0 1 2 4 mi

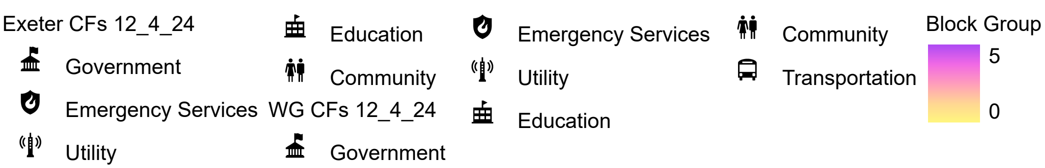
0 1.5 3 6 km

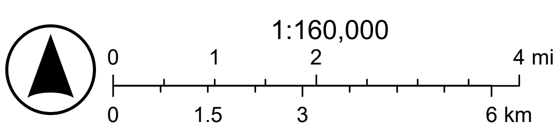
Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community

Wildfire/Brushfire Hazard Areas



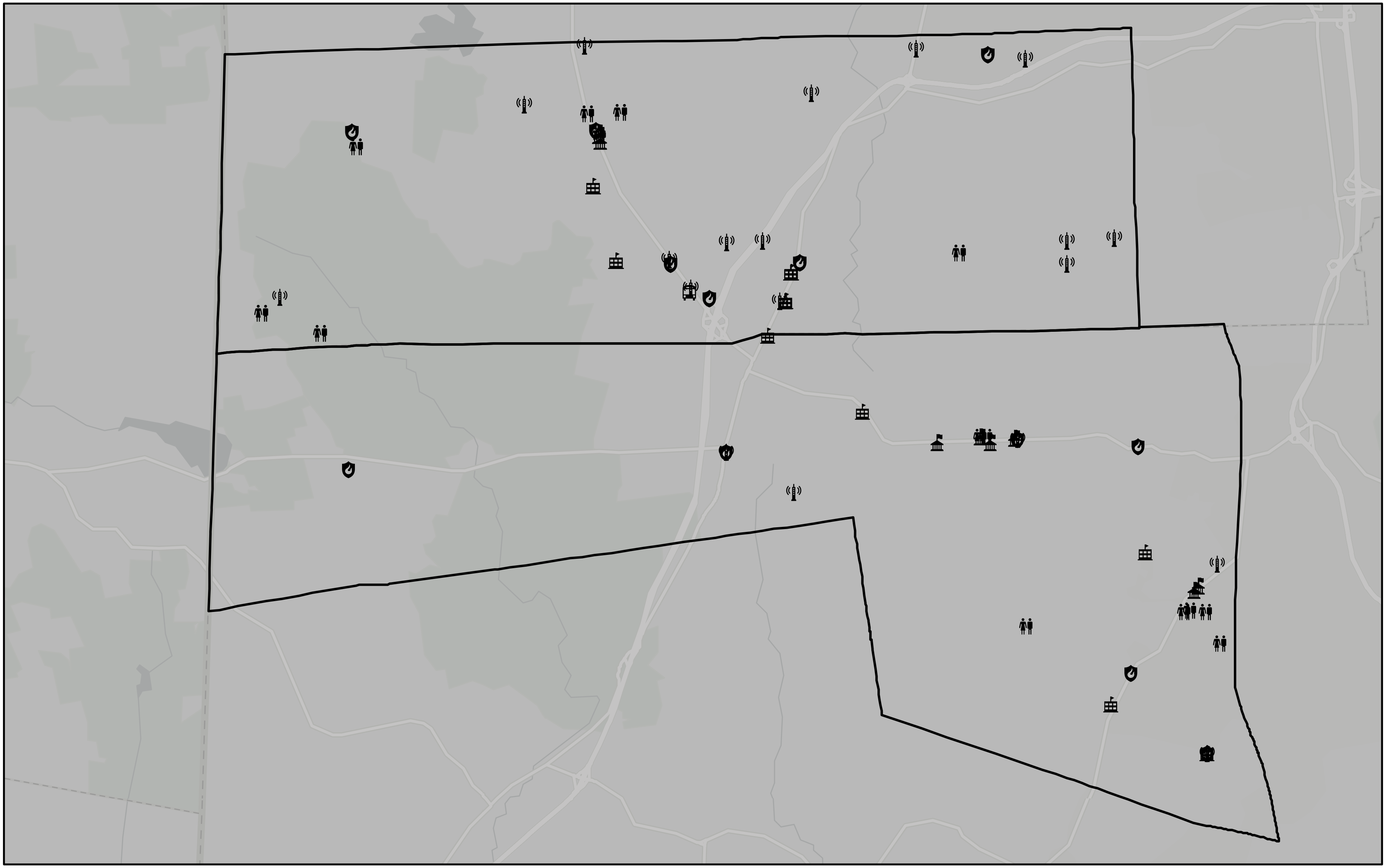
3/21/2025





Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community

Earthquake Hazard Areas



3/21/2025

Exeter CFs 12_4_24
- Government
- Emergency Services
- Utility

WG CFs 12_4_24
- Education
- Community
- Government

- Education
- Community
- Emergency Services
- Utility
- Transportation

Earthquake Risk
- 0 - 1%g
- 1 - 2%g
- 3 - 4%g
- 4 - 5%g
- 5 - 6%g
- 6 - 7%g
- 7 - 8%g
- 8 - 9%g
- 9 - 10%g
- 10 - 15%g
- 16 - 20%g
- 21 - 25%g
- 26 - 30%g
- 31 - 40%g
- 41 - 60%g
- 61 - 80%g
- 81 - 100%g

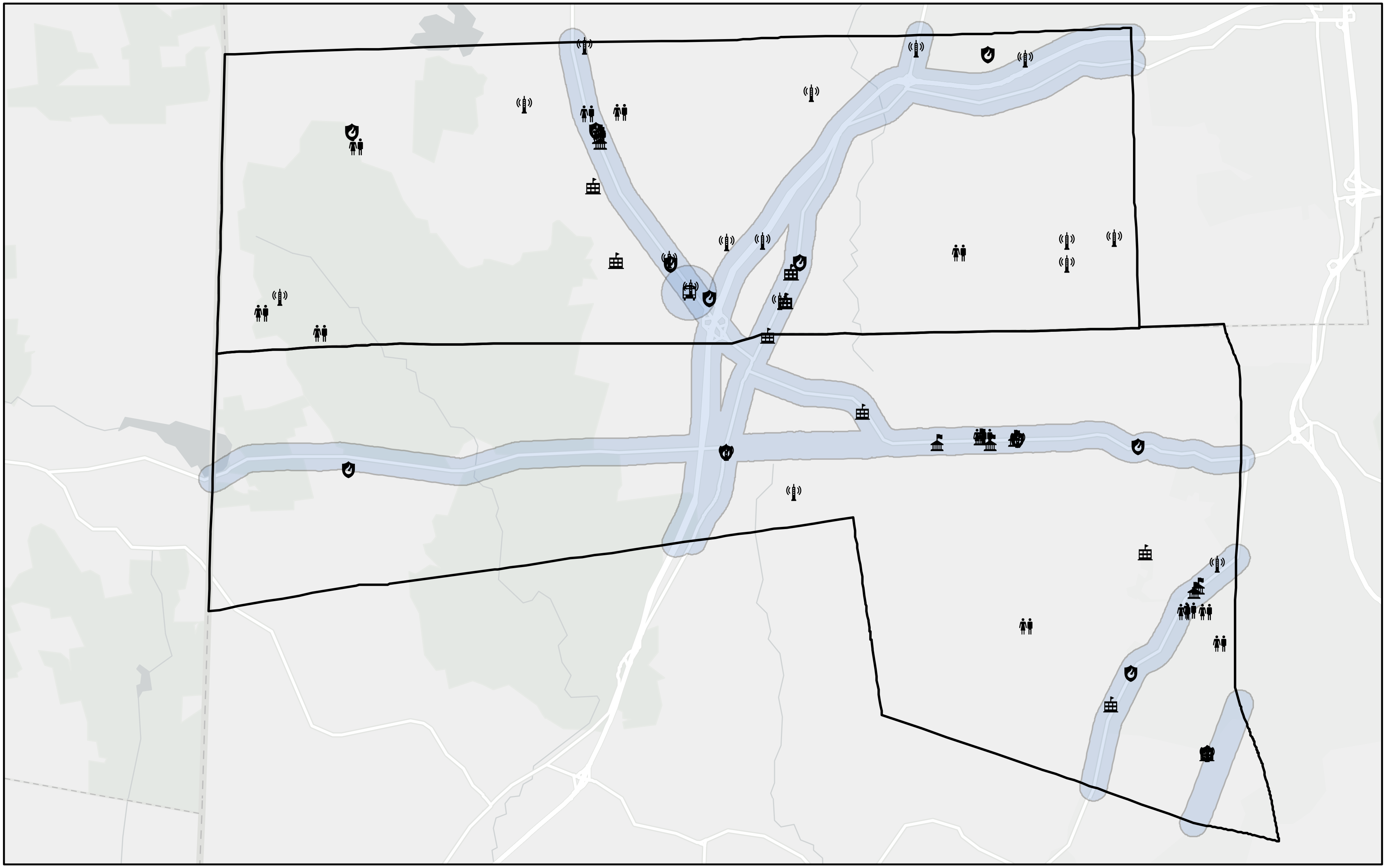
1:160,000

0 1 2 4 mi

0 1.5 3 6 km

Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community, Source: USGS National Atlas,

HAZMAT Hazard Areas



3/21/2025

Exeter CFs 12_4_24
Government
Emergency Services
Utility
Education
Community
WG CFs 12_4_24
Government
Emergency Services
Utility
Education
Community
Transportation
Travel Center_Buffer
EWG_roads buffer
EWG_rail buffer

1:160,000

0 1 2 4 mi

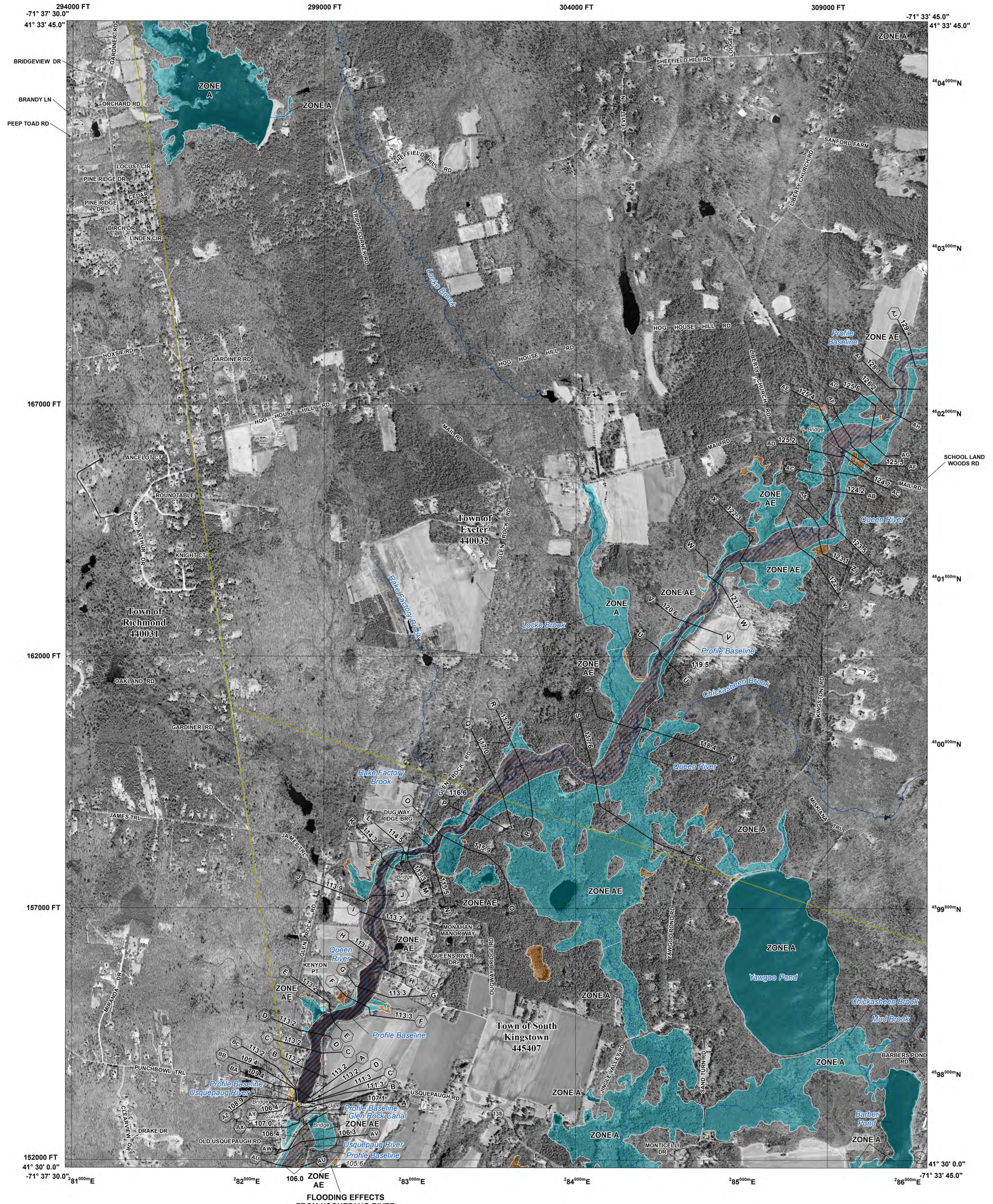
0 1.5 3 6 km

Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community

Appendix L- FEMA Flood Insurance Rate Maps (FIRMs)

Flood Insurance Rate Maps for the
Town of Exeter

Last Revised: 4/3/2020



FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT HTTP://MSC.FEMA.GOV

SPECIAL FLOOD HAZARD AREAS	Without Base Flood Elevation (BFE) *Zone A,V, A99*
	With BFE or Depth *Zone AE, AO, AH, VE, AR*
	Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD	0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
	Future Conditions 1% Annual Chance Flood Hazard *Zone X*
	Area with Reduced Flood Risk due to Levee See Notes. *Zone X*
OTHER AREAS	NO SCREEN Areas Determined to be Outside the 0.2% Annual Chance Floodplain *Zone X*
	Area of Undetermined Flood Hazard *Zone D*
GENERAL STRUCTURES	Channel, Culvert, or Storm Sewer
	Accredited or Provisionally Accredited Levee, Dike, or Floodwall
	Non-accredited Levee, Dike, or Floodwall
	E 18.2 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation (BFE)
	8 Coastal Transect
	Coastal Transect Baseline
	Profile Baseline
	Hydrographic Feature
	513 Base Flood Elevation Line (BFE)
OTHER FEATURES	Limit of Study
	Jurisdiction Boundary

NOTES TO USERS

For information and questions about this map, available products associated with this FIRM including historic versions of this FIRM, how to order products or the National Flood Insurance Program in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Map Service Center website at http://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the FEMA Map Service Center website or by calling the FEMA Map Information eXchange.

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For community and countywide map dates refer to the Flood Insurance Study report for this jurisdiction.

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Base map information shown on this FIRM was provided in digital format by the U.S. Geological Survey and Rhode Island GIS at a 0.3-meter resolution, dated 2015.

SCALE

N

Map Projection:
Rhode Island State Plane (FIPSZONE 3800); North American Datum 1983; Western Hemisphere; Vertical Datum: NAVD 88

1 inch = 1,000 feet 1:12,000

0 1,000 2,000 4,000 Feet

0 250 500 1,000 Meters

PANEL LOCATOR

* PANEL NOT PRINTED

FEMA

National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP

WASHINGTON COUNTY, RI
(ALL JURISDICTIONS)

PANEL 90 OF 368

FEMA

Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
EXETER , TOWN OF	440032	0090	J
RICHMOND , TOWN OF	440031	0090	J
SOUTH KINGSTOWN , TOWN OF	445407	0090	J

VERSION NUMBER
2.3.3.2

MAP NUMBER
44009C0090J

MAP REVISED
April 3, 2020

FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT HTTP://MSC.FEMA.GOV

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	Regulatory Floodway
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	Future Conditions 1% Annual Chance Flood Hazard *Zone X*
	Area with Reduced Flood Risk due to Levee See Notes. *Zone X*
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	Area of Undetermined Flood Hazard *Zone D*
GENERAL STRUCTURES	Channel, Culvert, or Storm Sewer
	Accredited or Provisionally Accredited Levee, Dike, or Floodwall
	Non-accredited Levee, Dike, or Floodwall
	E 18.2 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation (BFE)
	8 Coastal Transect
	Coastal Transect Baseline
	Profile Baseline
	Hydrographic Feature
	513 Base Flood Elevation Line (BFE)
OTHER FEATURES	Limit of Study
	Jurisdiction Boundary

NOTES TO USERS

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Base map information shown on this FIRM was provided in digital format by the U.S. Geological Survey and Rhode Island GIS at a 0.3-meter resolution, dated 2015.

SCALE

N

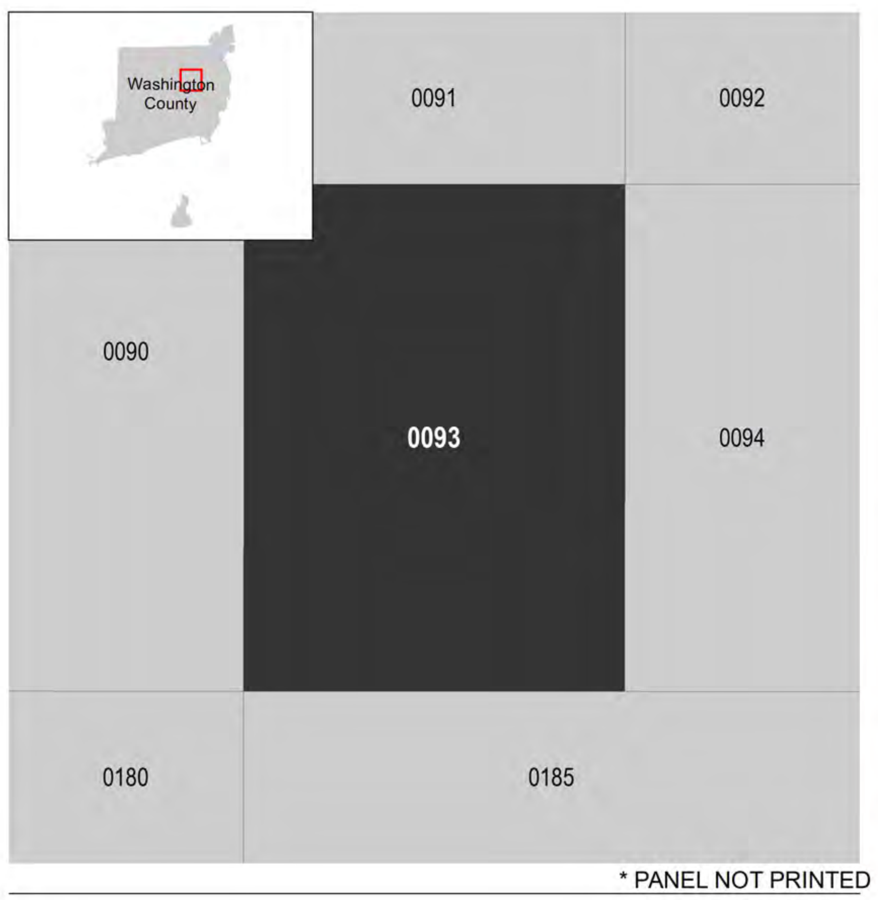
Map Projection:
Rhode Island State Plane (FIPSZONE 3800); North American Datum 1983; Western Hemisphere; Vertical Datum: NAVD 88

1 inch = 500 feet **1:6,000**

0 500 1,000 2,000 Feet

Meters 0 125 250 500

PANEL LOCATOR



* PANEL NOT PRINTED

FEMA

National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP

WASHINGTON COUNTY, RI

(ALL JURISDICTIONS)

PANEL **93** OF **368**

FEMA

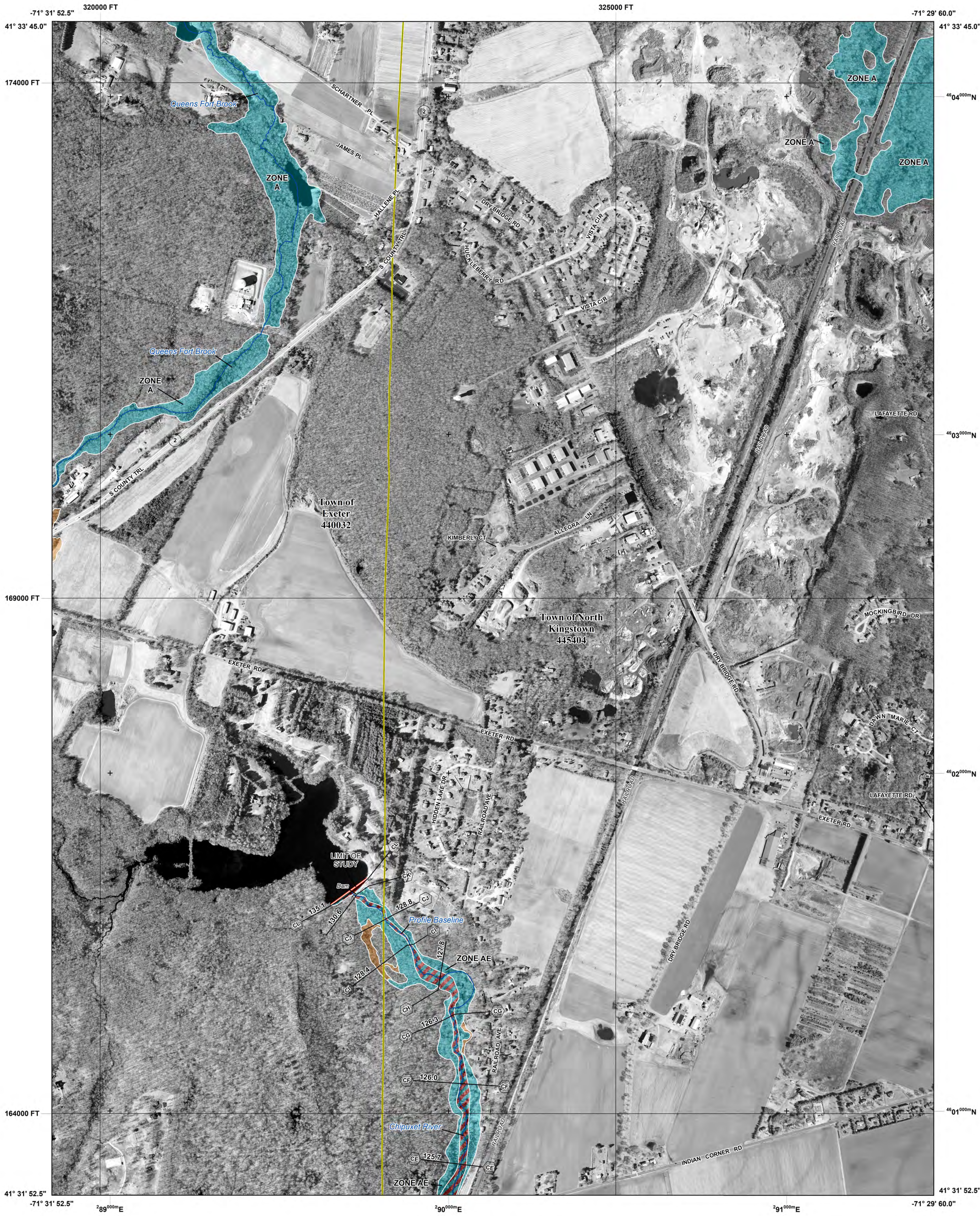
Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
EXETER , TOWN OF	440032	0093	J
SOUTH KINGSTOWN , TOWN OF	445407	0093	J

VERSION NUMBER
2.3.3.2

MAP NUMBER
44009C0093J

MAP REVISED
April 3, 2020



FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

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SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A,V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee See Notes. *Zone X*

OTHER AREAS
- NO SCREEN Areas Determined to be Outside the 0.2% Annual Chance Floodplain *Zone X*
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Accredited or Provisionally Accredited Levee, Dike, or Floodwall
- Non-accredited Levee, Dike, or Floodwall

OTHER FEATURES
- E 18.2 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation (BFE)
- 8 Coastal Transect
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary

NOTES TO USERS

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SCALE

N

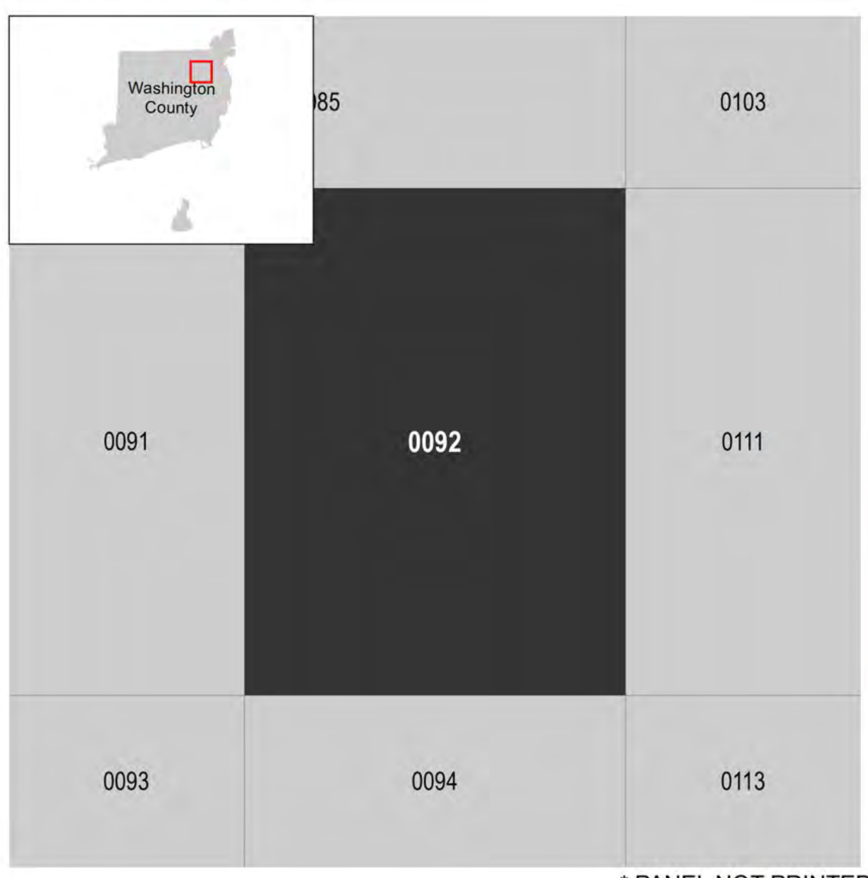
Map Projection:
Rhode Island State Plane (FIPSZONE 3800); North American Datum 1983; Western Hemisphere; Vertical Datum: NAVD 88

1 inch = 500 feet	1:6,000

0 500 1,000 2,000 Feet

0 125 250 500 Meters

PANEL LOCATOR



* PANEL NOT PRINTED

FEMA

National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP

WASHINGTON COUNTY, RI
(ALL JURISDICTIONS)

PANEL 92 OF 368

FEMA

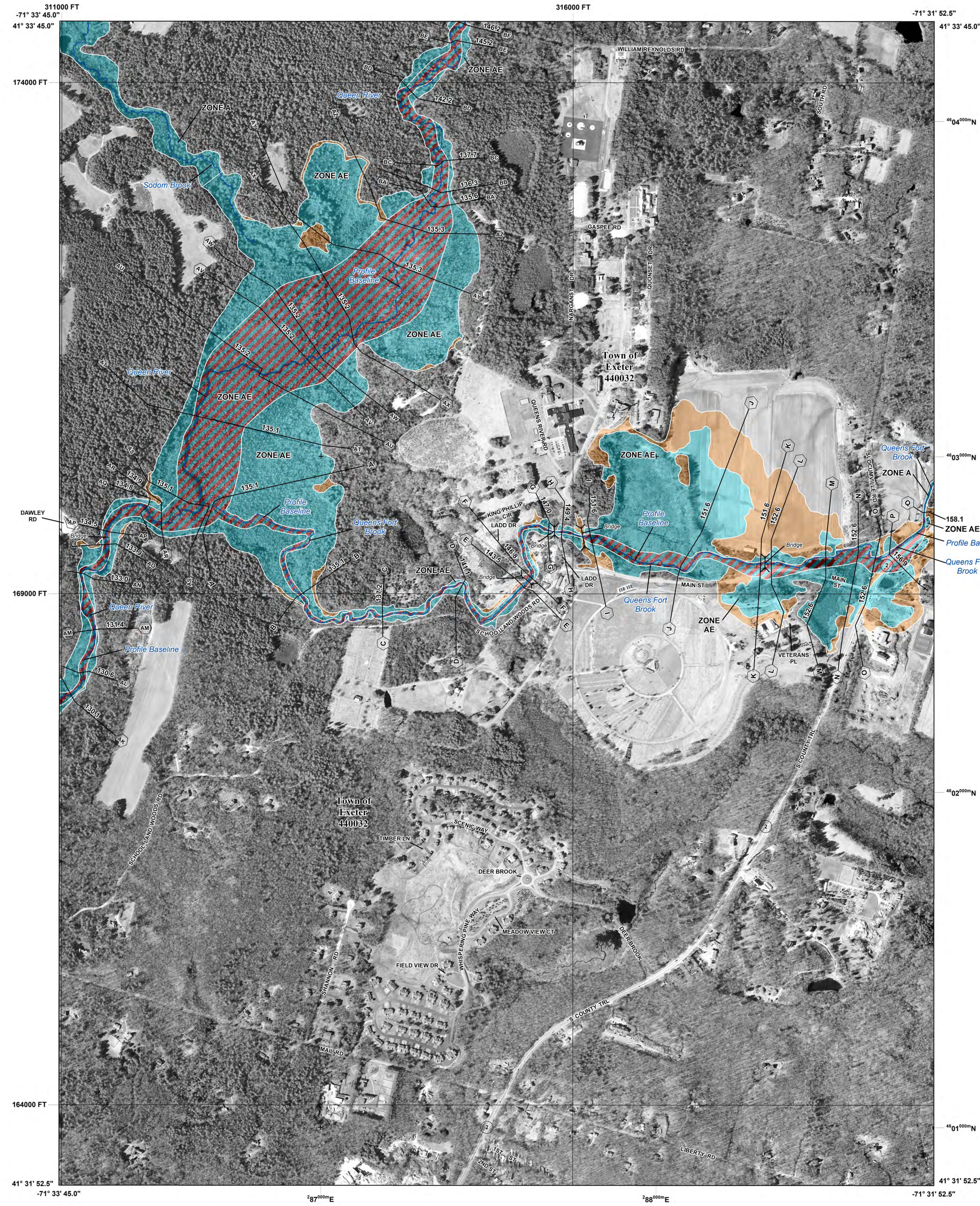
Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
EXETER , TOWN OF	440032	0092	J
NORTH KINGSTOWN , TOWN OF	445404	0092	J

VERSION NUMBER
2.3.3.2

MAP NUMBER
44009C0092J

MAP REVISED
April 3, 2020



FLOOD HAZARD INFORMATION

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	Coastal Transect Baseline
	Profile Baseline
	Hydrographic Feature
	513 Base Flood Elevation Line (BFE)
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	Jurisdiction Boundary

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SCALE

N

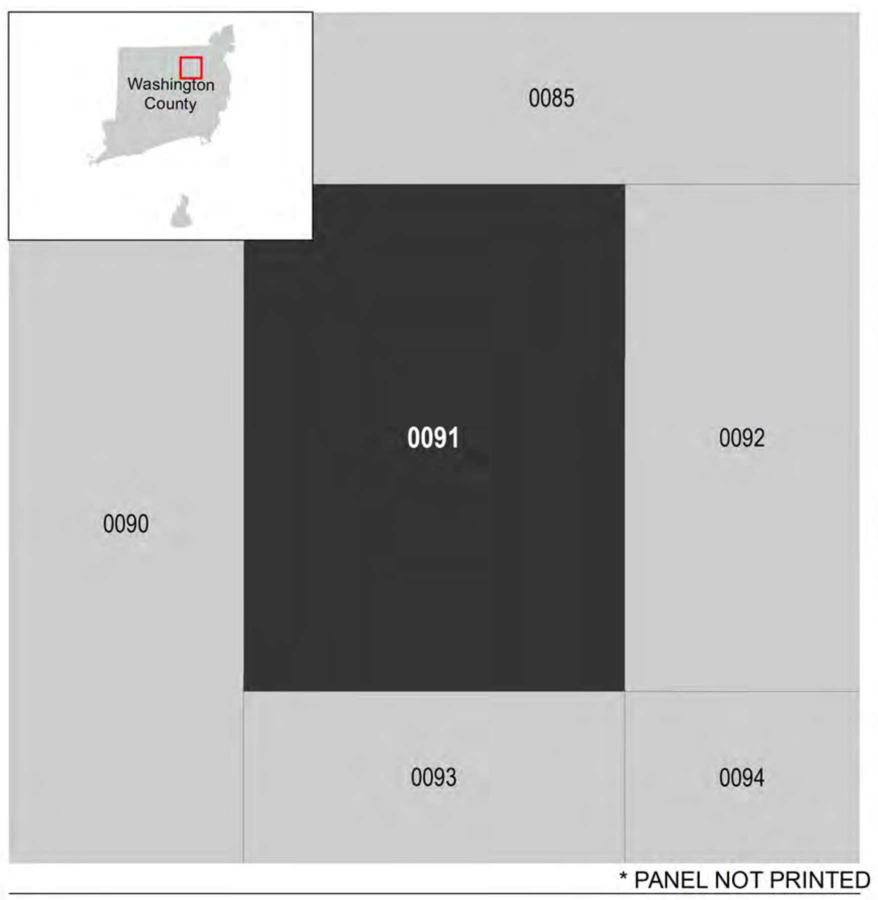
Map Projection:
Rhode Island State Plane (FIPSZONE 3800); North American Datum 1983; Western Hemisphere; Vertical Datum: NAVD 88

1 inch = 500 feet **1:6,000**

0 500 1,000 2,000 Feet

Meters 0 125 250 500

PANEL LOCATOR



* PANEL NOT PRINTED

FEMA

National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP

WASHINGTON COUNTY, RI
(ALL JURISDICTIONS)

PANEL **91 OF 368**

FEMA

Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
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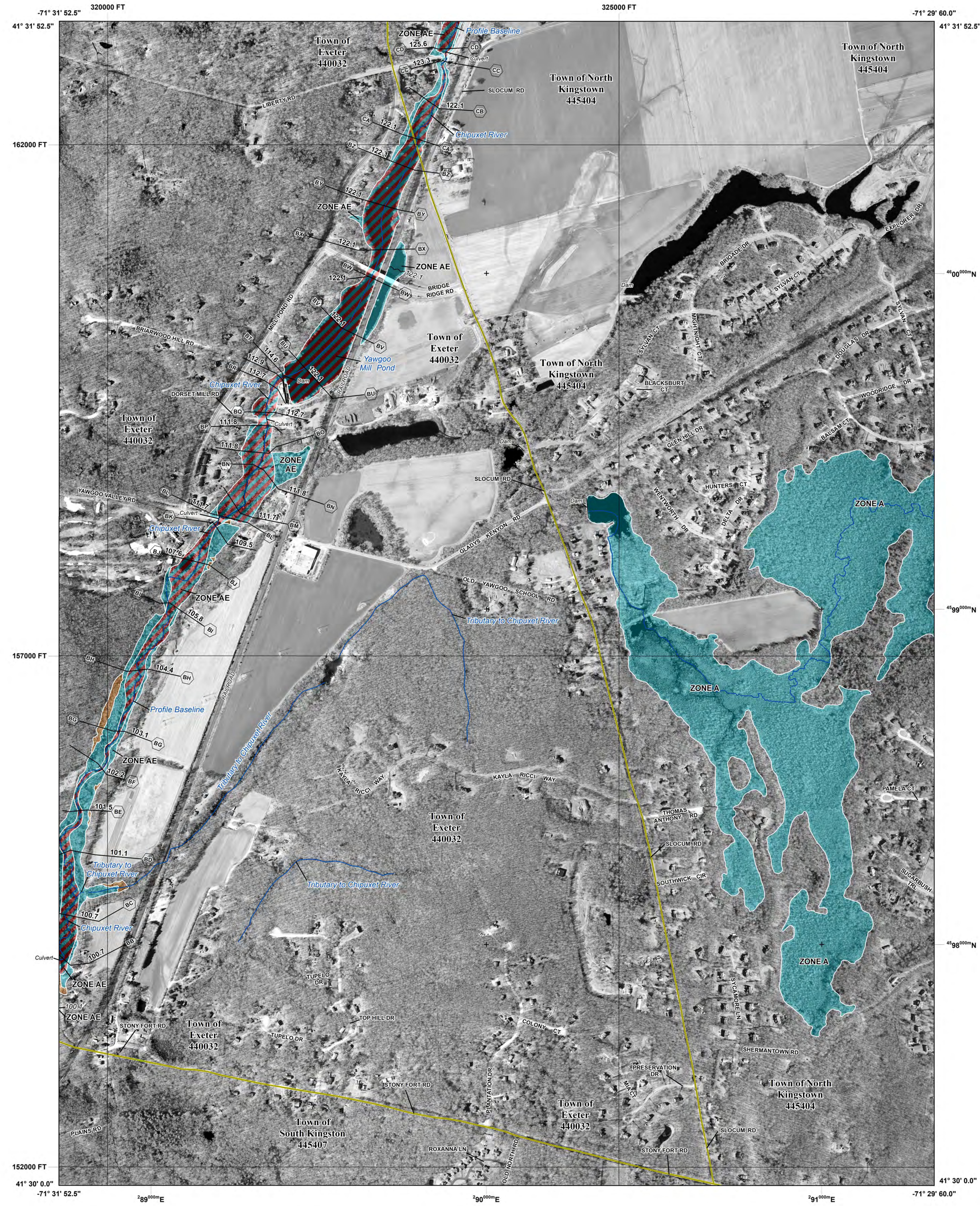
VERSION NUMBER
2.3.3.2

MAP NUMBER
44009C0091J

MAP REVISED
April 3, 2020



FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

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	Non-accredited Levee, Dike, or Floodwall
	E 18.2 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation (BFE)
	8 Coastal Transect
	Coastal Transect Baseline
	Profile Baseline
	Hydrographic Feature
	513 Base Flood Elevation Line (BFE)
OTHER FEATURES	Limit of Study
	Jurisdiction Boundary

NOTES TO USERS

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Base map information shown on this FIRM was provided in digital format by the U.S. Geological Survey and Rhode Island GIS at a 0.3-meter resolution, dated 2015.

SCALE

N

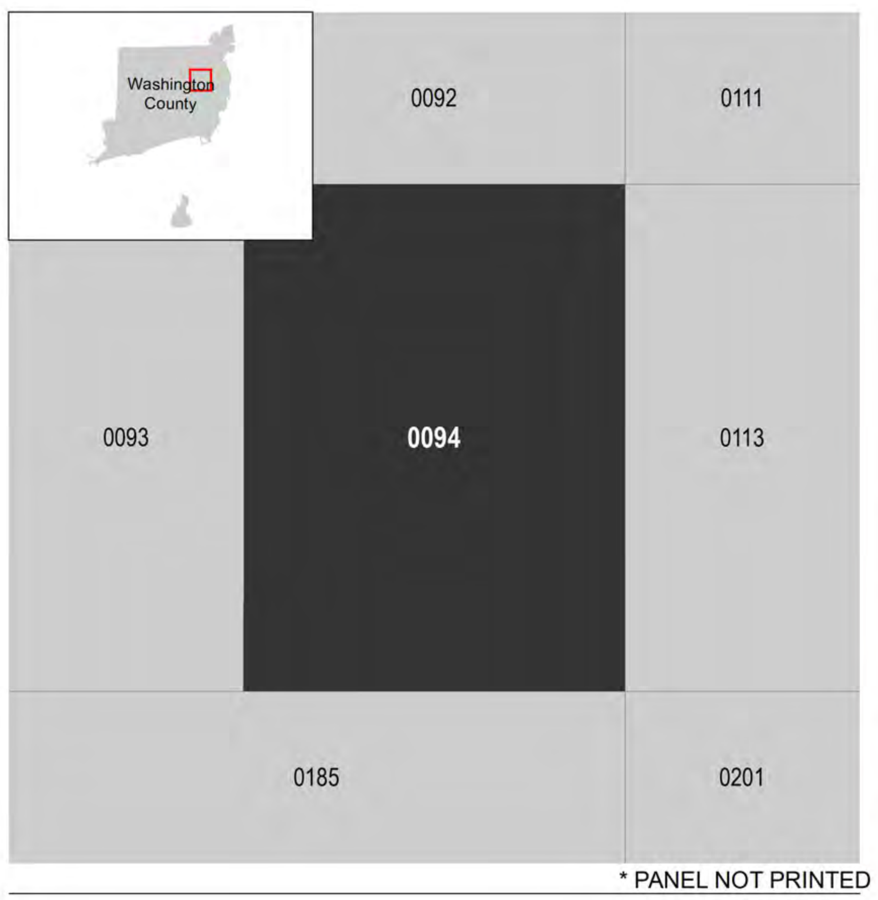
Map Projection:
Rhode Island State Plane (FIPSZONE 3800); North American Datum 1983; Western Hemisphere; Vertical Datum: NAVD 88

1 inch = 500 feet 1:6,000

0 500 1,000 2,000 Feet

0 125 250 500 Meters

PANEL LOCATOR



* PANEL NOT PRINTED

FEMA

National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP

WASHINGTON COUNTY, RI

(ALL JURISDICTIONS)

PANEL 94 OF 368

FEMA

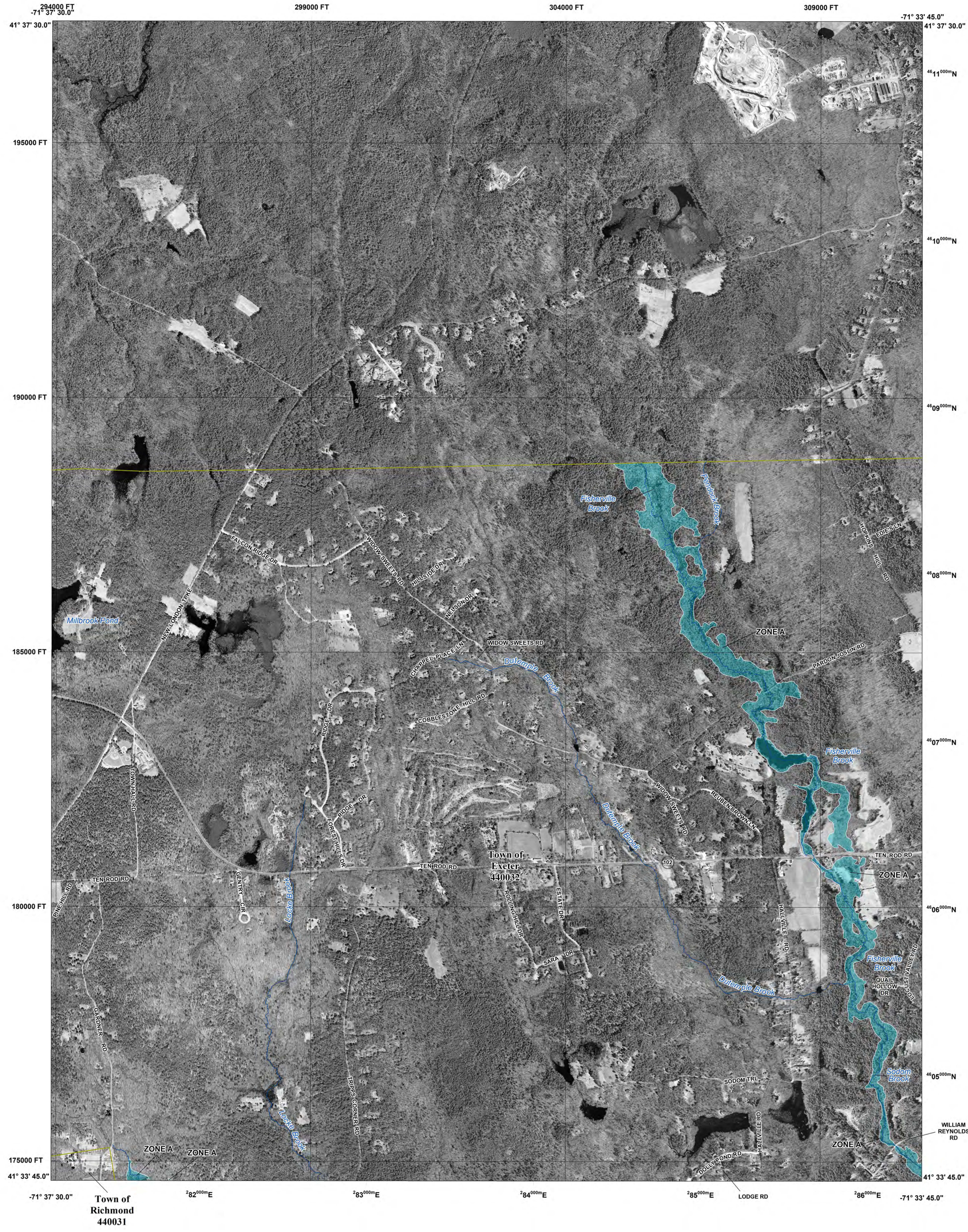
Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
EXETER , TOWN OF	440032	0094	J
NORTH KINGSTOWN , TOWN OF	445404	0094	J
SOUTH KINGSTOWN , TOWN OF	445407	0094	J

VERSION NUMBER
2.3.3.2

MAP NUMBER
44009C0094J

MAP REVISED
April 3, 2020



FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT HTTP://MSC.FEMA.GOV

SPECIAL FLOOD HAZARD AREAS	Without Base Flood Elevation (BFE) *Zone A,V, A99*
	With BFE or Depth *Zone AE, AO, AH, VE, AR*
	Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD	0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
	Future Conditions 1% Annual Chance Flood Hazard *Zone X*
	Area with Reduced Flood Risk due to Levee See Notes. *Zone X*
OTHER AREAS	NO SCREEN Areas Determined to be Outside the 0.2% Annual Chance Floodplain *Zone X*
	Area of Undetermined Flood Hazard *Zone D*
GENERAL STRUCTURES	Channel, Culvert, or Storm Sewer
	Accredited or Provisionally Accredited Levee, Dike, or Floodwall
	Non-accredited Levee, Dike, or Floodwall
	E 18.2 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation (BFE)
	8 Coastal Transect
	Coastal Transect Baseline
	Profile Baseline
	Hydrographic Feature
	513 Base Flood Elevation Line (BFE)
OTHER FEATURES	Limit of Study
	Jurisdiction Boundary

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SCALE

N

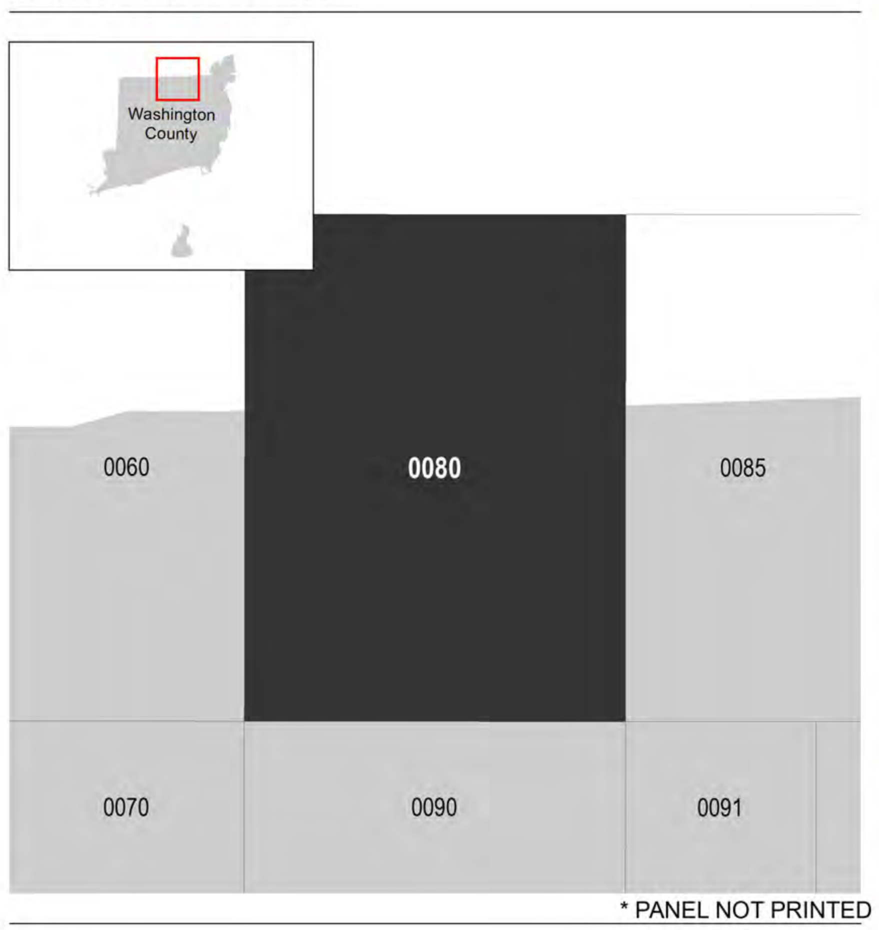
Map Projection:
Rhode Island State Plane (FIPSZONE 3800); North American Datum 1983; Western Hemisphere; Vertical Datum: NAVD 88

1 inch = 1,000 feet 1:12,000

0 1,000 2,000 4,000 Feet

0 250 500 1,000 Meters

PANEL LOCATOR



* PANEL NOT PRINTED

FEMA

National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP

WASHINGTON COUNTY, RI
(ALL JURISDICTIONS)

PANEL **80 OF 368**

FEMA

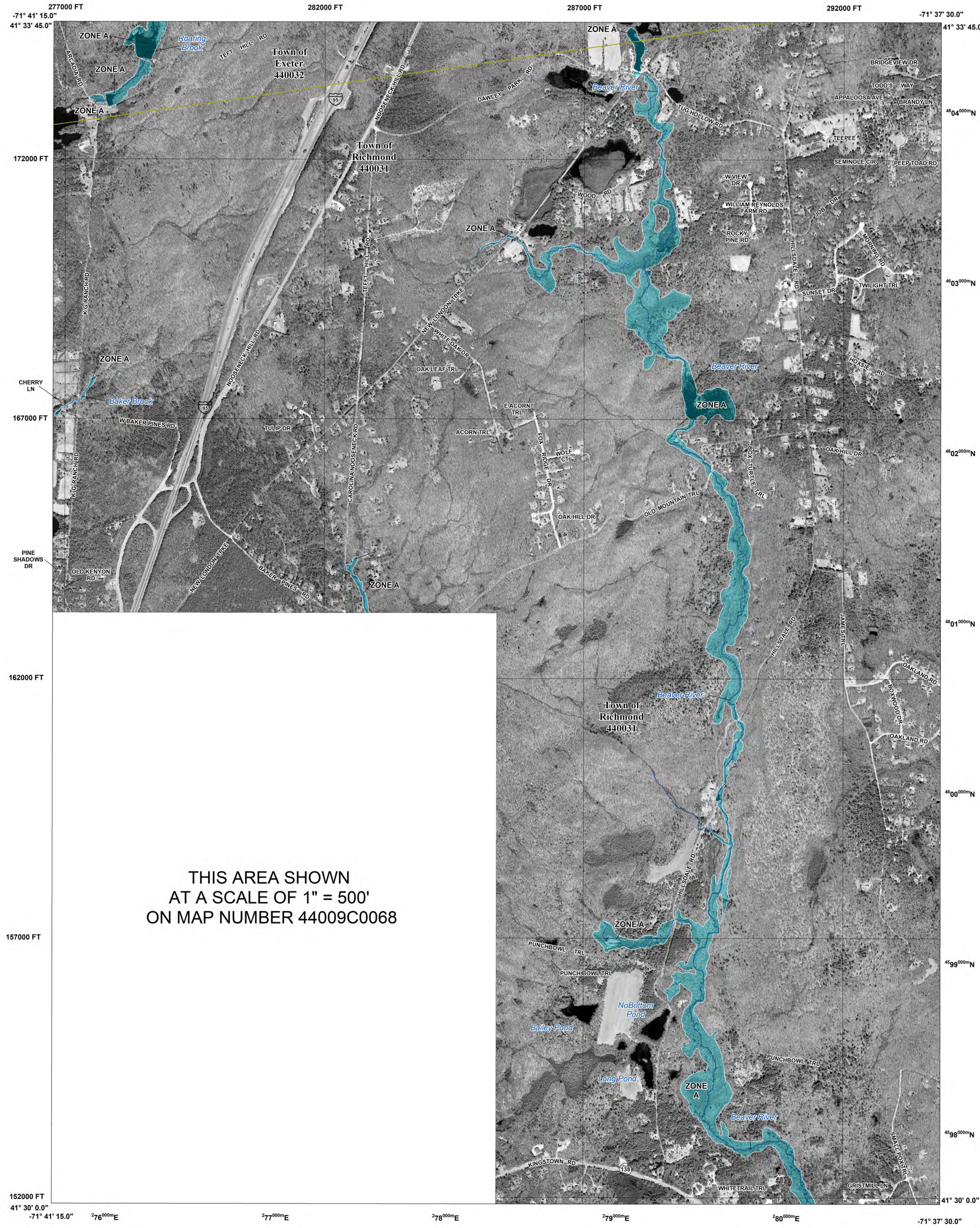
Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
EXETER , TOWN OF	440032	0080	J
RICHMOND , TOWN OF	440031	0080	J

VERSION NUMBER
2.3.3.2

MAP NUMBER
44009C0080J

MAP REVISED
April 3, 2020



FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

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SPECIAL FLOOD HAZARD AREAS	Without Base Flood Elevation (BFE) *Zone A,V, A99*
	With BFE or Depth *Zone AE, AO, AH, VE, AR*
	Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD	0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
	Future Conditions 1% Annual Chance Flood Hazard *Zone X*
	Area with Reduced Flood Risk due to Levee See Notes. *Zone X*
OTHER AREAS	NO SCREEN Areas Determined to be Outside the 0.2% Annual Chance Floodplain *Zone X*
	Area of Undetermined Flood Hazard *Zone D*
GENERAL STRUCTURES	Channel, Culvert, or Storm Sewer
	Accredited or Provisionally Accredited Levee, Dike, or Floodwall
	Non-accredited Levee, Dike, or Floodwall
	E 18.2 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation (BFE)
	8 Coastal Transect
	Coastal Transect Baseline
	Profile Baseline
	Hydrographic Feature
	513 Base Flood Elevation Line (BFE)
OTHER FEATURES	Limit of Study
	Jurisdiction Boundary

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SCALE

N

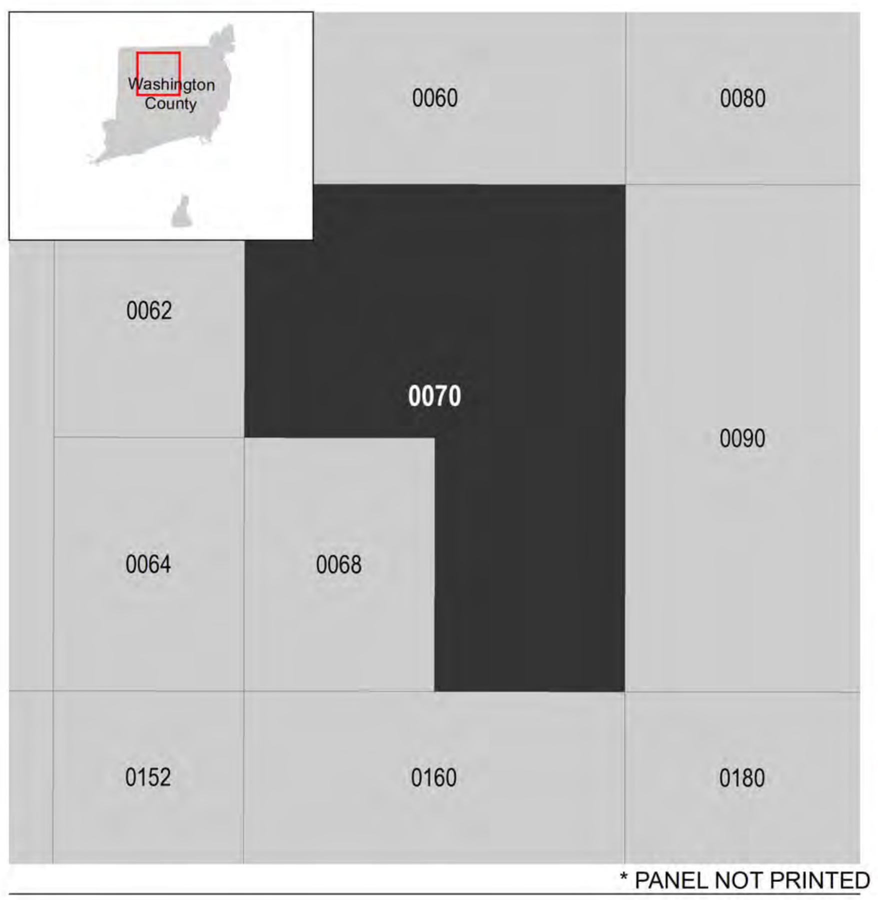
Map Projection:
Rhode Island State Plane (FIPSZONE 3800); NAD 1983; Western Hemisphere; Vertical Datum: NAVD 88

1 inch = 1,000 feet **1:12,000**

0 1,000 2,000 4,000 Feet

0 250 500 1,000 Meters

PANEL LOCATOR



* PANEL NOT PRINTED

FEMA

National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP

WASHINGTON COUNTY, RI
(ALL JURISDICTIONS)

PANEL 70 OF 368

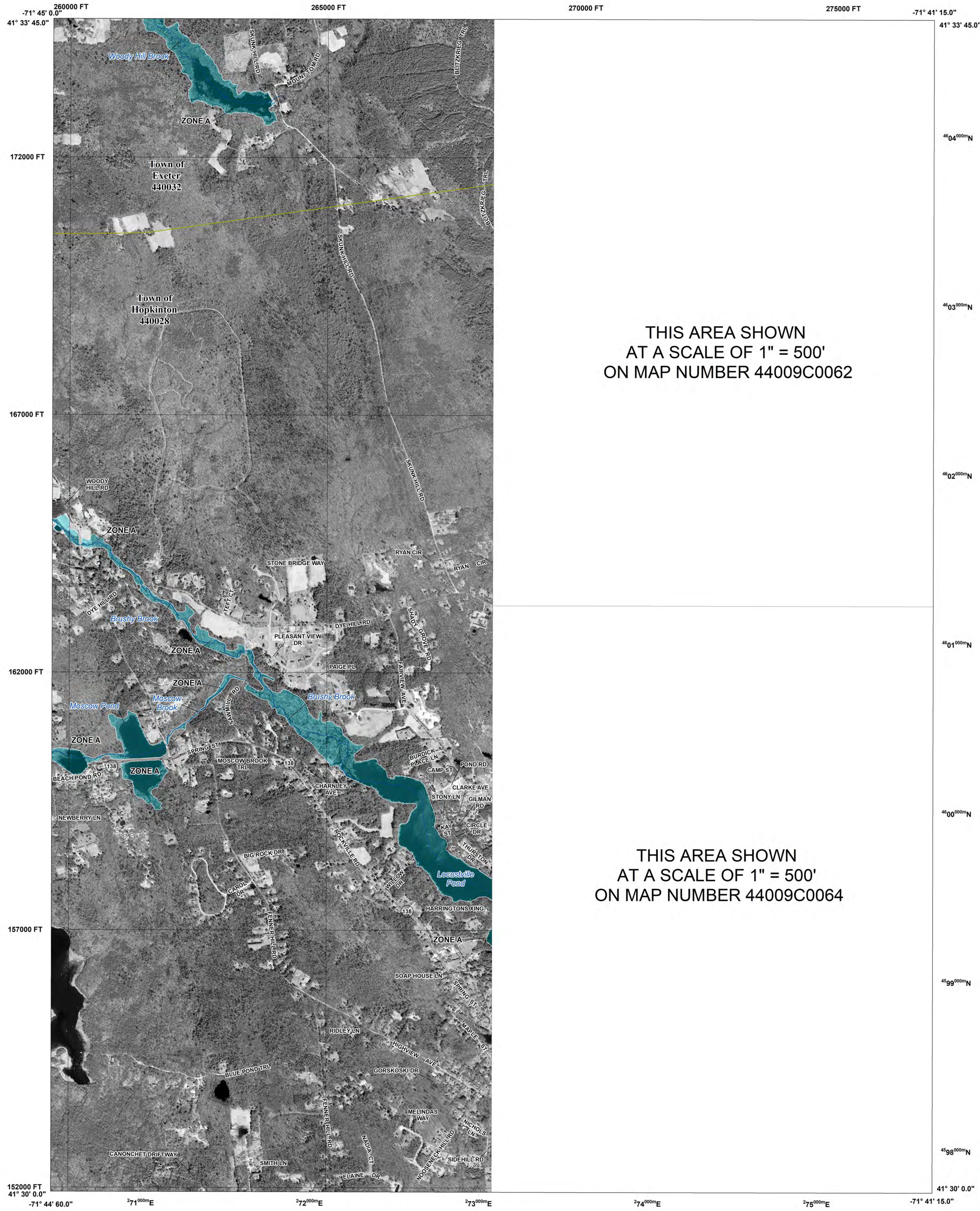
Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
EXETER , TOWN OF	440032	0070	J
RICHMOND , TOWN OF	440031	0070	J

VERSION NUMBER
2.3.3.2

MAP NUMBER
44009C0070J

MAP REVISED
April 3, 2020



FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

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SPECIAL FLOOD HAZARD AREAS	Without Base Flood Elevation (BFE) *Zone A,V, A99*; With BFE or Depth *Zone AE, AO, AH, VE, AR*; Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD	0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*; Future Conditions 1% Annual Chance Flood Hazard *Zone X*; Area with Reduced Flood Risk due to Levee See Notes. *Zone X*
OTHER AREAS	NO SCREEN Areas Determined to be Outside the 0.2% Annual Chance Floodplain *Zone X*; Area of Undetermined Flood Hazard *Zone D*
GENERAL STRUCTURES	Channel, Culvert, or Storm Sewer; Accredited or Provisionally Accredited Levee, Dike, or Floodwall; Non-accredited Levee, Dike, or Floodwall
OTHER FEATURES	E 18.2 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation (BFE); 8 Coastal Transect; Coastal Transect Baseline; Profile Baseline; Hydrographic Feature; 513 Base Flood Elevation Line (BFE); Limit of Study; Jurisdiction Boundary

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SCALE

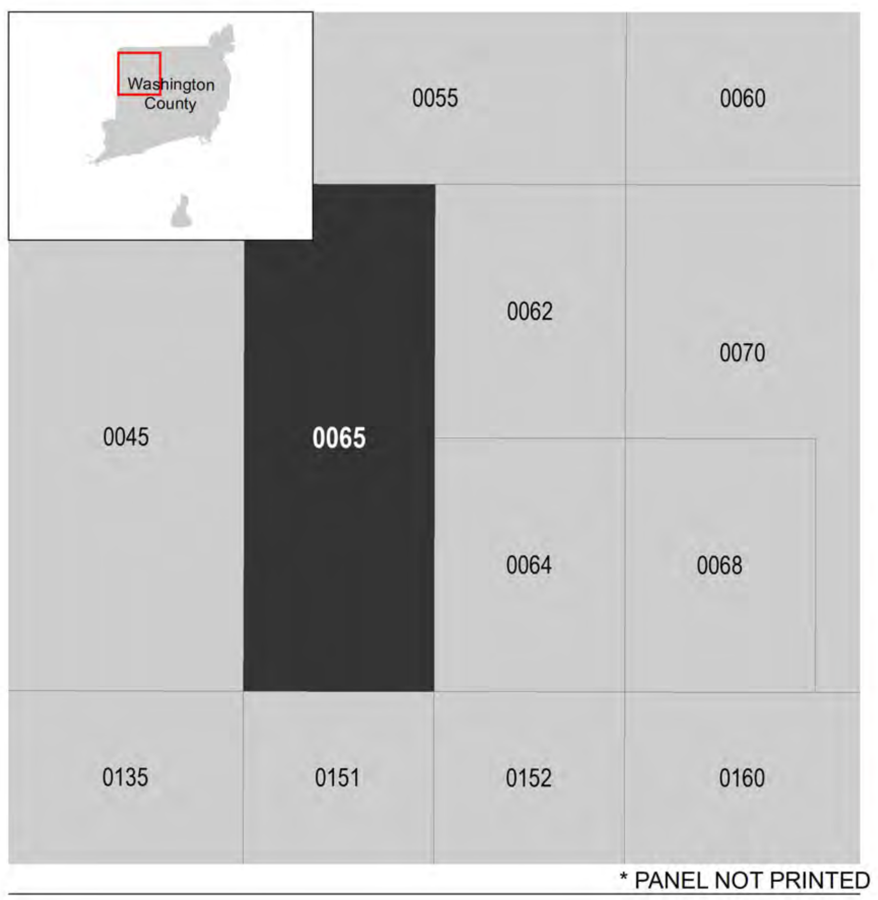
Map Projection:
Rhode Island State Plane (FIPSZONE 3800); NAD 1983;
Western Hemisphere; Vertical Datum: NAVD 88

1 inch = 1,000 feet 1:12,000

0 1,000 2,000 4,000 Feet

0 250 500 1,000 Meters

PANEL LOCATOR



* PANEL NOT PRINTED

FEMA

National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP

WASHINGTON COUNTY, RI
(ALL JURISDICTIONS)

PANEL 65 OF 368

FEMA

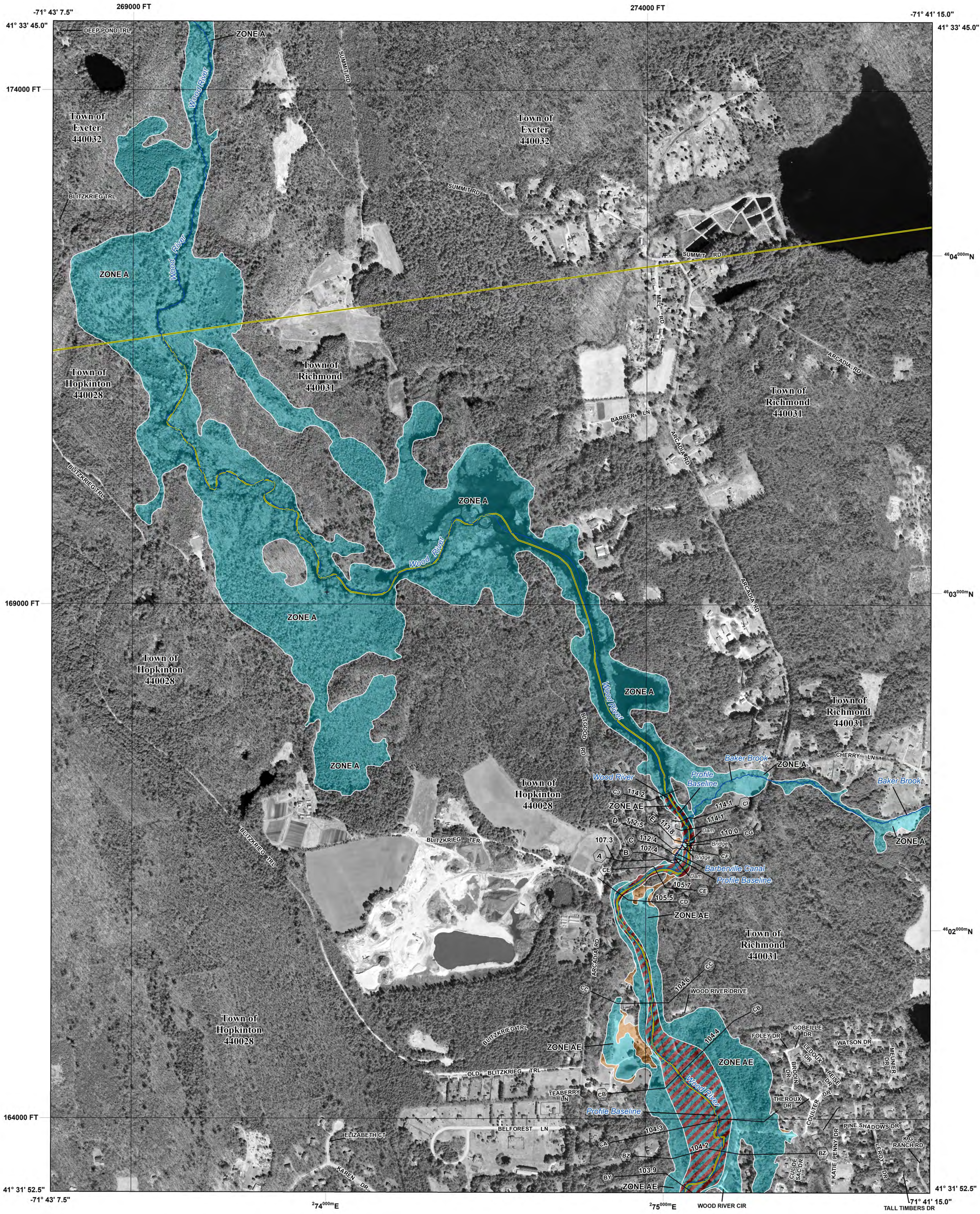
Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
EXETER , TOWN OF	440032	0065	J
HOPKINTON , TOWN OF	440028	0065	J

VERSION NUMBER
2.3.3.2

MAP NUMBER
44009C0065J

MAP REVISED
April 3, 2020



FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

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SPECIAL FLOOD HAZARD AREAS	Without Base Flood Elevation (BFE) *Zone A,V, A99*
	With BFE or Depth *Zone AE, AO, AH, VE, AR*
	Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD	0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
	Future Conditions 1% Annual Chance Flood Hazard *Zone X*
	Area with Reduced Flood Risk due to Levee See Notes. *Zone X*
OTHER AREAS	NO SCREEN Areas Determined to be Outside the 0.2% Annual Chance Floodplain *Zone X*
	Area of Undetermined Flood Hazard *Zone D*
GENERAL STRUCTURES	Channel, Culvert, or Storm Sewer
	Accredited or Provisionally Accredited Levee, Dike, or Floodwall
	Non-accredited Levee, Dike, or Floodwall
OTHER FEATURES	E 18.2 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation (BFE)
	8 Coastal Transect
	Coastal Transect Baseline
	Profile Baseline
	Hydrographic Feature
	513 Base Flood Elevation Line (BFE)
	Limit of Study
	Jurisdiction Boundary

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SCALE

N

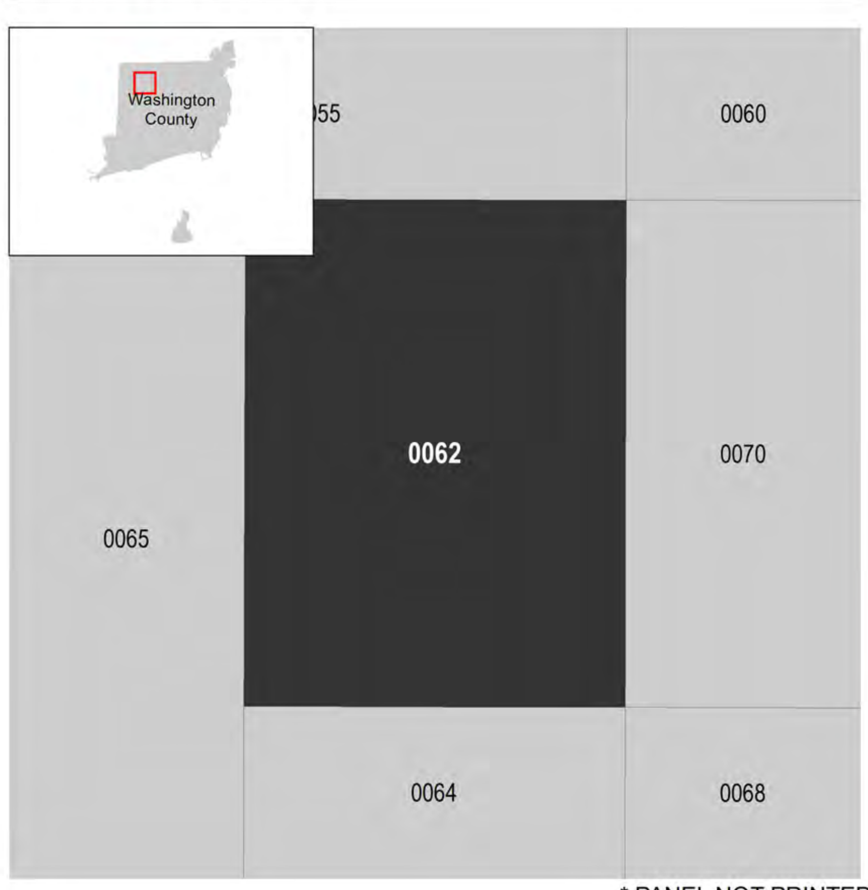
Map Projection:
Rhode Island State Plane (FIPSZONE 3800); North American Datum 1983; Western Hemisphere; Vertical Datum: NAVD 88

1 inch = 500 feet 1:6,000

0 500 1,000 2,000 Feet

0 125 250 500 Meters

PANEL LOCATOR



* PANEL NOT PRINTED

FEMA

National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP

WASHINGTON COUNTY, RI

(ALL JURISDICTIONS)

PANEL 62 OF 368

FEMA

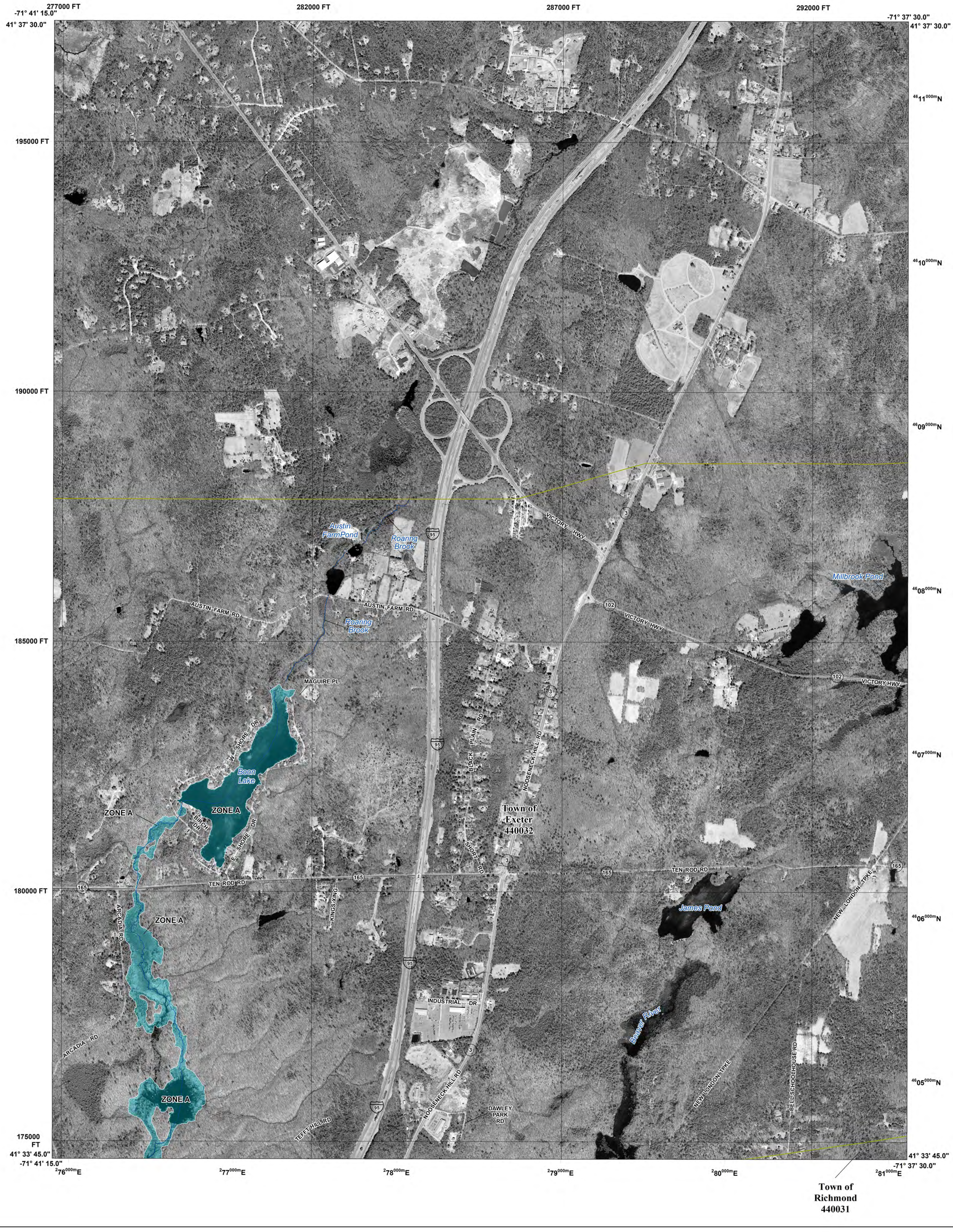
Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
EXETER , TOWN OF	440032	0062	J
HOPKINTON , TOWN OF	440028	0062	J
RICHMOND , TOWN OF	440031	0062	J

VERSION NUMBER
2.3.3.2

MAP NUMBER
44009C0062J

MAP REVISED
April 3, 2020



FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

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SPECIAL FLOOD HAZARD AREAS	Without Base Flood Elevation (BFE) *Zone A,V, A99*
	With BFE or Depth *Zone AE, AO, AH, VE, AR*
	Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD	0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
	Future Conditions 1% Annual Chance Flood Hazard *Zone X*
	Area with Reduced Flood Risk due to Levee See Notes. *Zone X*
OTHER AREAS	NO SCREEN Areas Determined to be Outside the 0.2% Annual Chance Floodplain *Zone X*
	Area of Undetermined Flood Hazard *Zone D*
GENERAL STRUCTURES	Channel, Culvert, or Storm Sewer
	Accredited or Provisionally Accredited Levee, Dike, or Floodwall
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	Coastal Transect Baseline
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	Hydrographic Feature
	513 Base Flood Elevation Line (BFE)
OTHER FEATURES	Limit of Study
	Jurisdiction Boundary

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SCALE

N

Map Projection:
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1 inch = 1,000 feet 1:12,000

0 1,000 2,000 4,000 Feet

0 250 500 1,000 Meters

PANEL LOCATOR

* PANEL NOT PRINTED

FEMA

National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP

WASHINGTON COUNTY, RI

(ALL JURISDICTIONS)

PANEL **60 OF 368**

FEMA

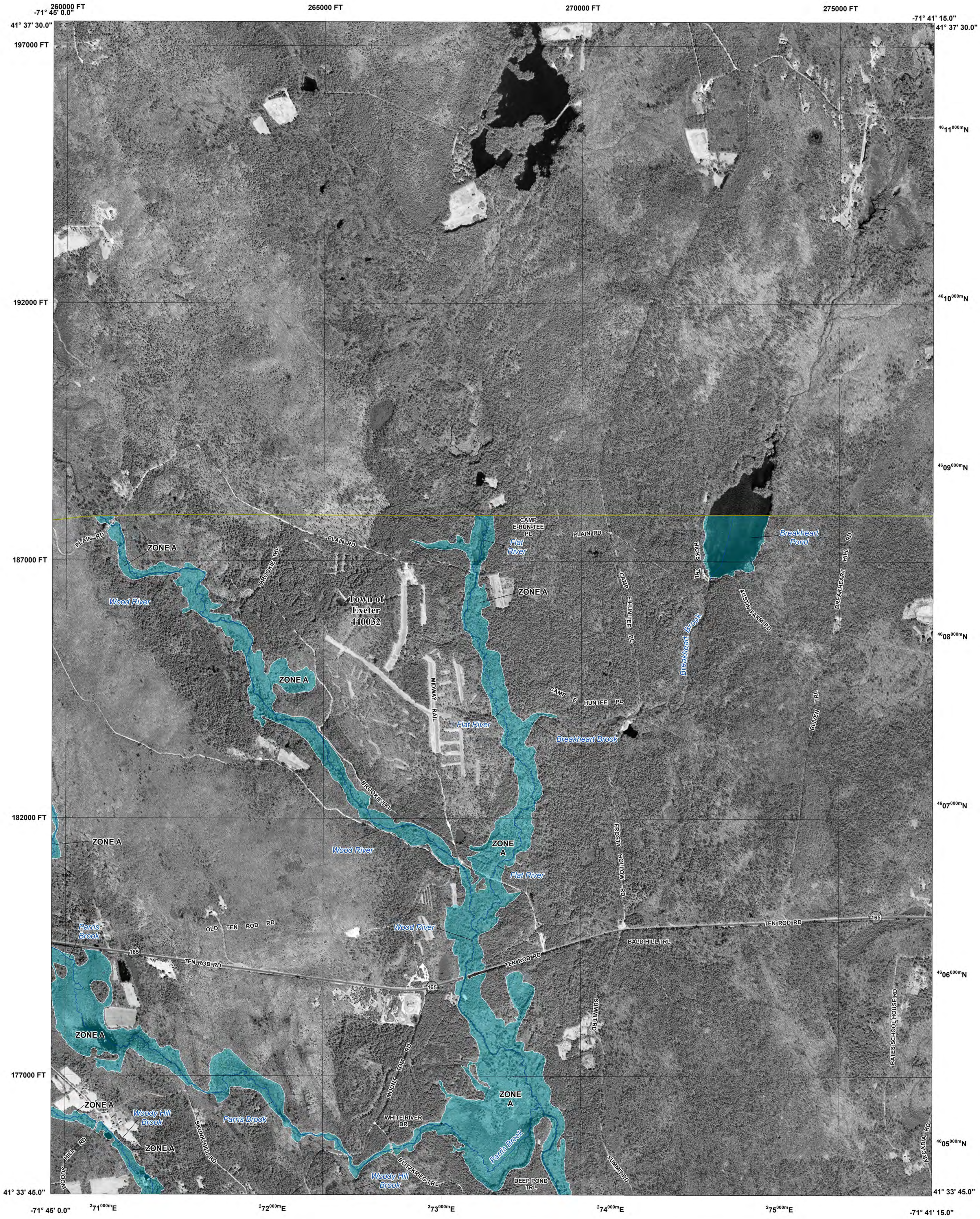
Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
EXETER , TOWN OF	440032	0060	J
RICHMOND , TOWN OF	440031	0060	J

VERSION NUMBER
2.3.3.2

MAP NUMBER
44009C0060J

MAP REVISED
April 3, 2020



FLOOD HAZARD INFORMATION

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	With BFE or Depth *Zone AE, AO, AH, VE, AR*
	Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD	0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
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	Area with Reduced Flood Risk due to Levee See Notes. *Zone X*
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	Area of Undetermined Flood Hazard *Zone D*
GENERAL STRUCTURES	Channel, Culvert, or Storm Sewer
	Accredited or Provisionally Accredited Levee, Dike, or Floodwall
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	Hydrographic Feature
	513 Base Flood Elevation Line (BFE)
OTHER FEATURES	Limit of Study
	Jurisdiction Boundary

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SCALE

N

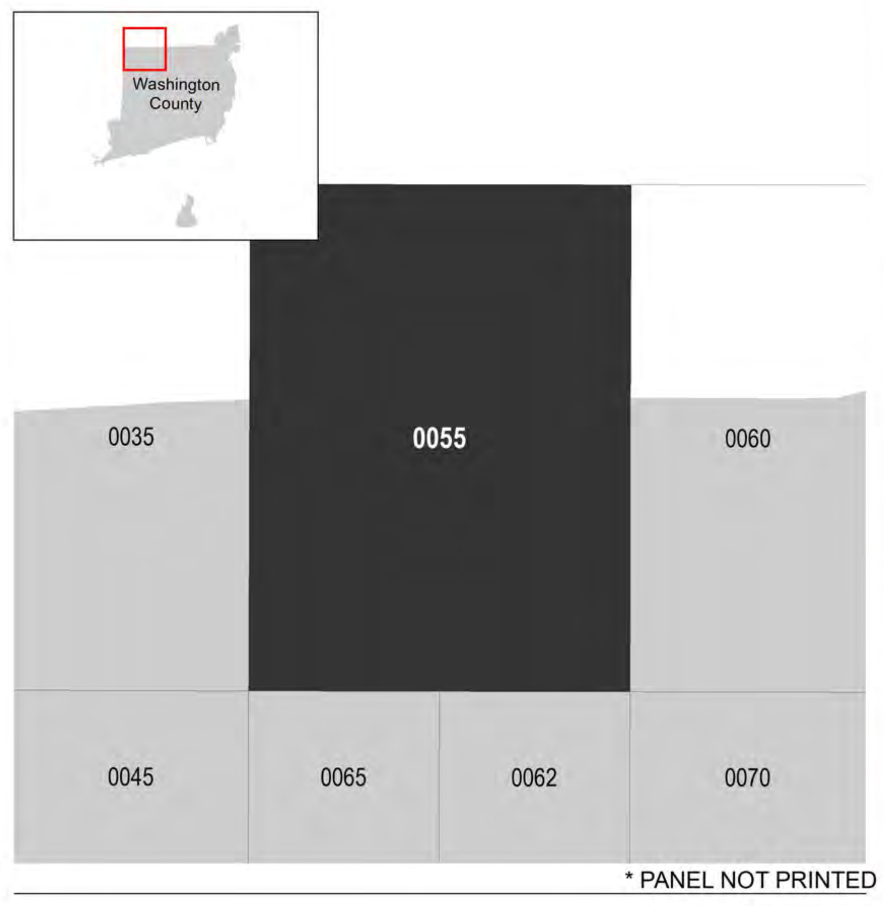
Map Projection:
Rhode Island State Plane (FIPSZONE 3800); North American Datum 1983; Western Hemisphere; Vertical Datum: NAVD 88

1 inch = 1,000 feet **1:12,000**

0 1,000 2,000 4,000 Feet

0 250 500 1,000 Meters

PANEL LOCATOR



FEMA

National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP

WASHINGTON COUNTY, RI

(ALL JURISDICTIONS)

PANEL 55 OF 368

FEMA

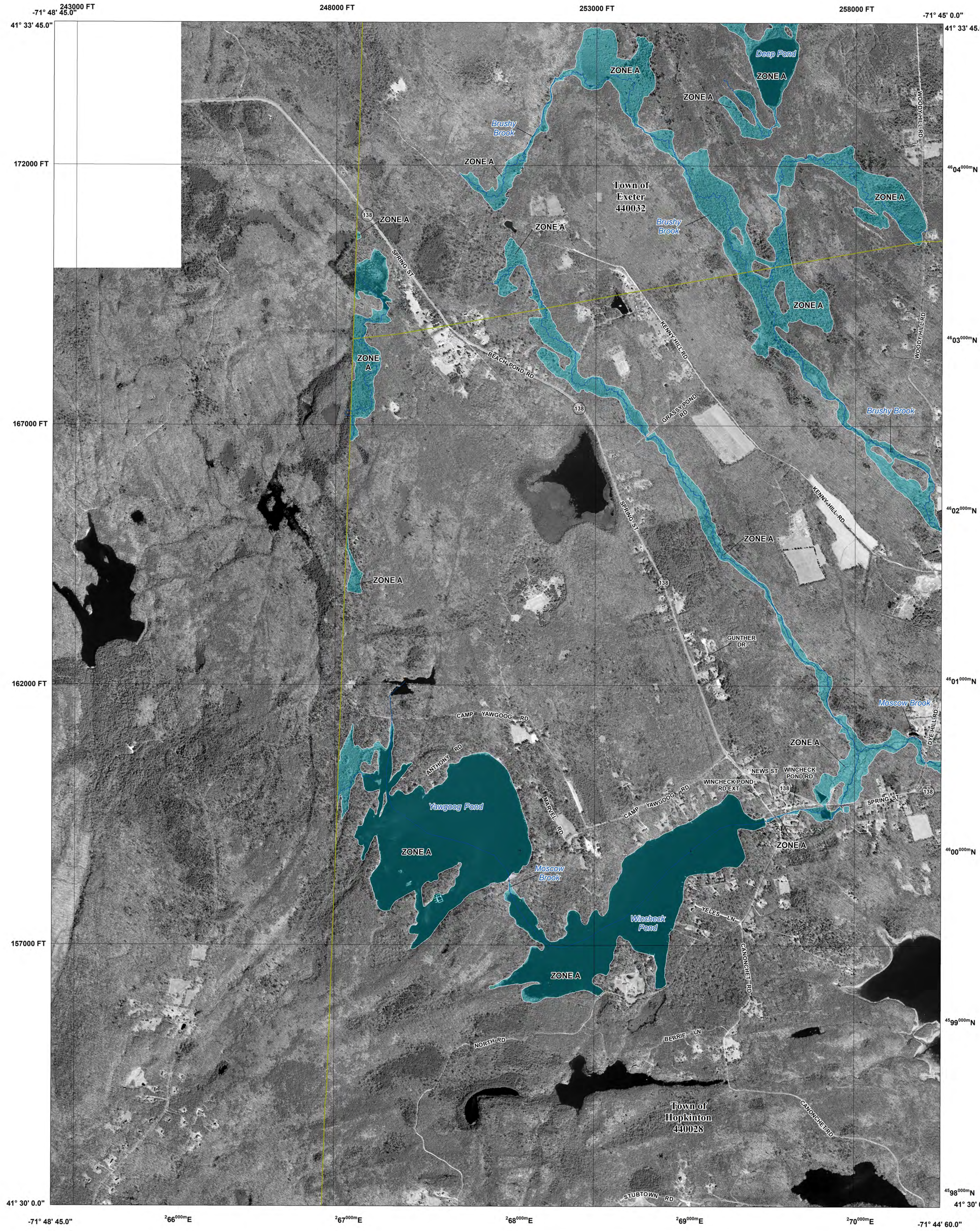
Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
EXETER , TOWN OF	440032	0055	J

VERSION NUMBER
2.3.3.2

MAP NUMBER
44009C0055J

MAP REVISED
April 3, 2020



FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

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SPECIAL FLOOD HAZARD AREAS	Without Base Flood Elevation (BFE) *Zone A,V, A99*
	With BFE or Depth *Zone AE, AO, AH, VE, AR*
	Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD	0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
	Future Conditions 1% Annual Chance Flood Hazard *Zone X*
	Area with Reduced Flood Risk due to Levee See Notes. *Zone X*
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	Area of Undetermined Flood Hazard *Zone D*
GENERAL STRUCTURES	Channel, Culvert, or Storm Sewer
	Accredited or Provisionally Accredited Levee, Dike, or Floodwall
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	8 Coastal Transect
	Coastal Transect Baseline
	Profile Baseline
	Hydrographic Feature
	513 Base Flood Elevation Line (BFE)
OTHER FEATURES	Limit of Study
	Jurisdiction Boundary

NOTES TO USERS

For information and questions about this map, available products associated with this FIRM including historic versions of this FIRM, how to order products or the National Flood Insurance Program in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Map Service Center website at http://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the FEMA Map Service Center website or by calling the FEMA Map Information eXchange.

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For community and countywide map dates refer to the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in the community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

Base map information shown on this FIRM was provided in digital format by the U.S. Geological Survey and Rhode Island GIS at a 0.3-meter resolution, dated 2015.

SCALE

N

Map Projection:
Rhode Island State Plane (FIPSZONE 3800); North American Datum 1983; Western Hemisphere; Vertical Datum: NAVD 88

1 inch = 1,000 feet **1:12,000**

0 1,000 2,000 4,000 Feet

0 250 500 1,000 Meters

PANEL LOCATOR

* PANEL NOT PRINTED

FEMA

National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP

WASHINGTON COUNTY, RI
(ALL JURISDICTIONS)

PANEL **45 OF 368**

FEMA

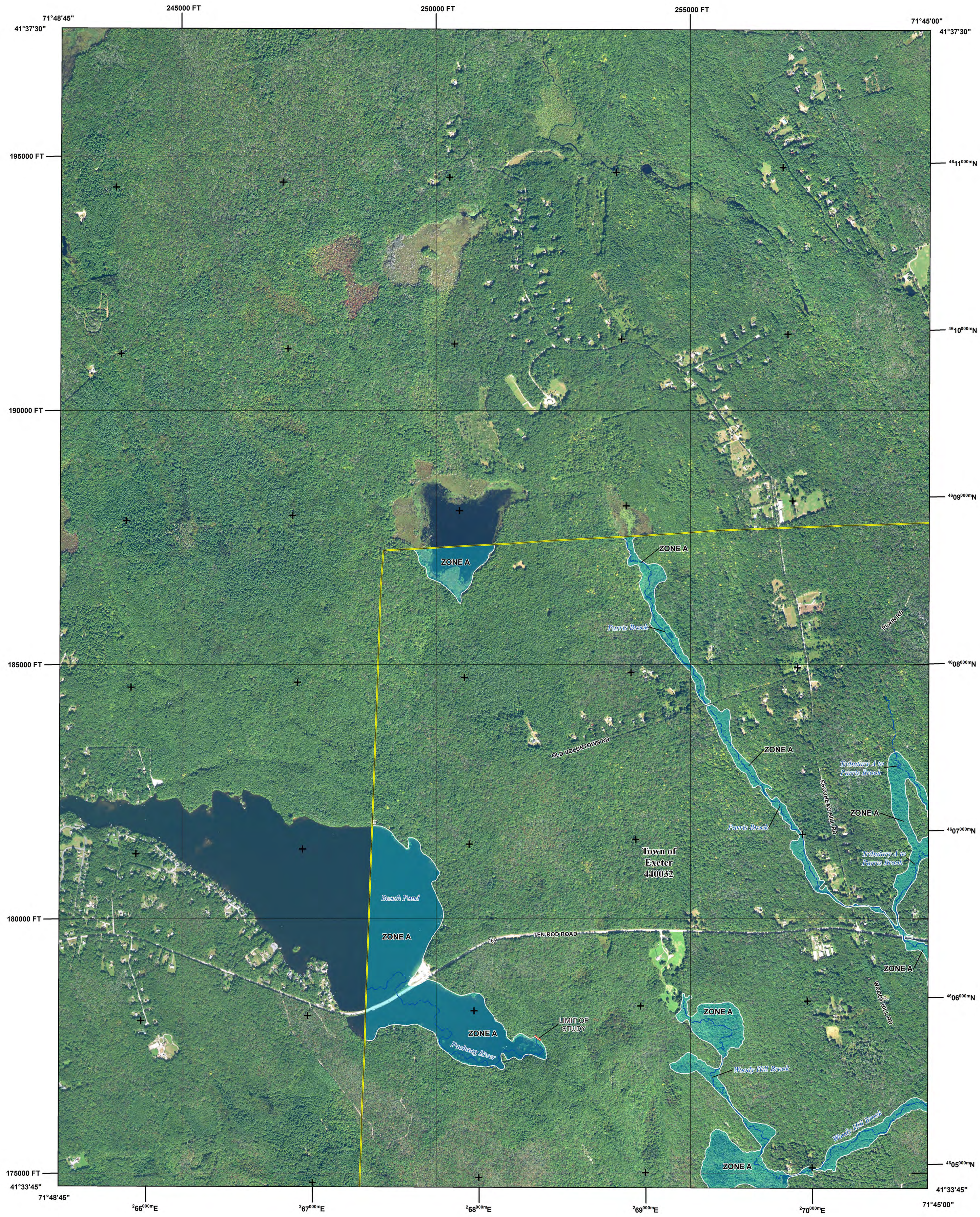
Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
EXETER , TOWN OF	440032	0045	J
HOPKINTON , TOWN OF	440028	0045	J

VERSION NUMBER
2.3.3.2

MAP NUMBER
44009C0045J

MAP REVISED
April 3, 2020



FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT

HTTPS://MSC.FEMA.GOV

SPECIAL FLOOD HAZARD AREAS	Without Base Flood Elevation (BFE) *Zone A,V, A99*
	With BFE or Depth *Zone AE, AO, AH, VE, AR*
	Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD	0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
	Future Conditions 1% Annual Chance Flood Hazard *Zone X*
	Area with Reduced Flood Risk due to Levee See Notes. *Zone X*
	Area with Flood Risk due to Levee *Zone D*
OTHER AREAS	NO SCREEN Area of Minimal Flood Hazard *Zone X*
	Area of Undetermined Flood Hazard *Zone D*
GENERAL STRUCTURES	Channel, Culvert, or Storm Sewer
	Levee, Dike, or Floodwall
OTHER FEATURES	E 18.2 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
	8 Coastal Transect
	Coastal Transect Baseline
	Profile Baseline
	Hydrographic Feature
	513 Base Flood Elevation Line (BFE)
	Limit of Study
	Jurisdiction Boundary

NOTES TO USERS

For information and questions about this Flood Insurance Rate Map (FIRM), available products associated with this FIRM, including historic versions, the current map date for each FIRM panel, how to order products, or the National Flood Insurance Program (NFIP) in general, please call the FEMA Mapping and Insurance eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Flood Map Service Center website at msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website.

Communities annexing land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM Index. These may be ordered directly from the Flood Map Service Center at the number listed above.

For community and countywide map dates refer to the Flood Insurance Study Report for this jurisdiction.

To determine if flood insurance is available in this community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

Base map information shown on this FIRM was derived from digital orthophotography provided by the NAIP. The imagery was flown in 2018 and was produced at 0.6 meter resolution.

SCALE

N

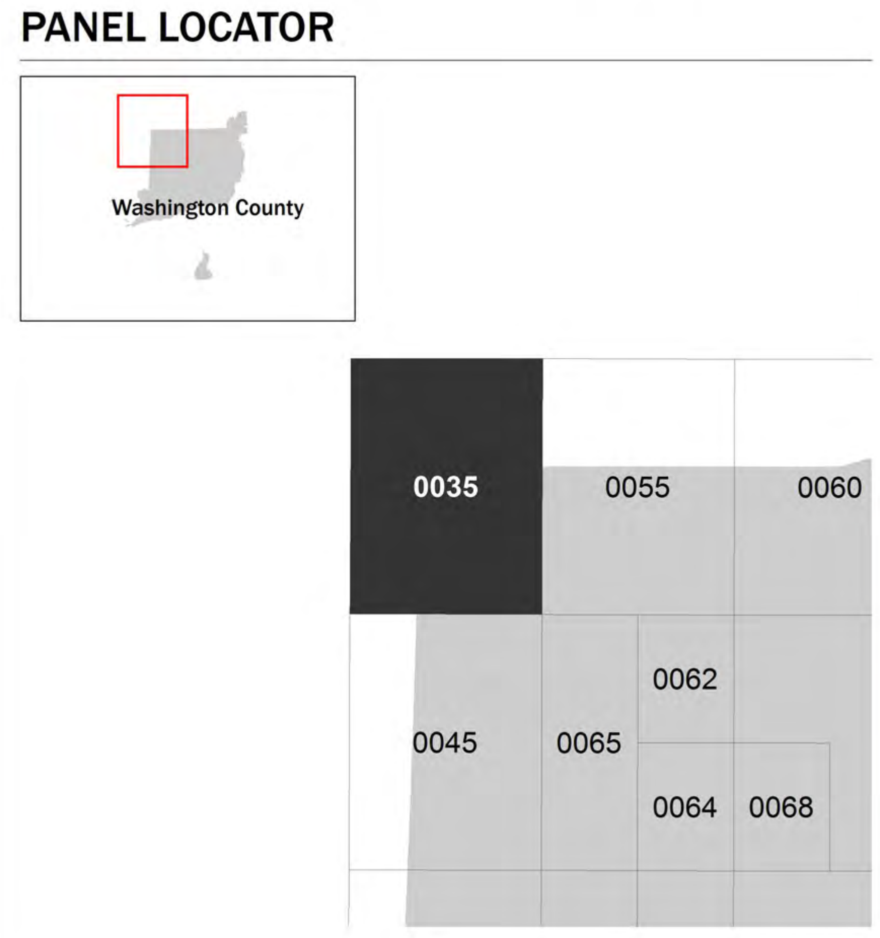
Map Projection:
State Plane Rhode Island FIPS 3800 Feet; North American 1983; Western Hemisphere; Vertical Datum: NAVD 88

1 inch = 1,000 feet **1:12,000**

0 1,000 2,000 4,000 feet

0 250 500 1,000 meters

PANEL LOCATOR



*PANEL NOT PRINTED

FEMA

National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP

WASHINGTON COUNTY, RHODE ISLAND
All Jurisdictions

PANEL **35** OF **368**

FEMA

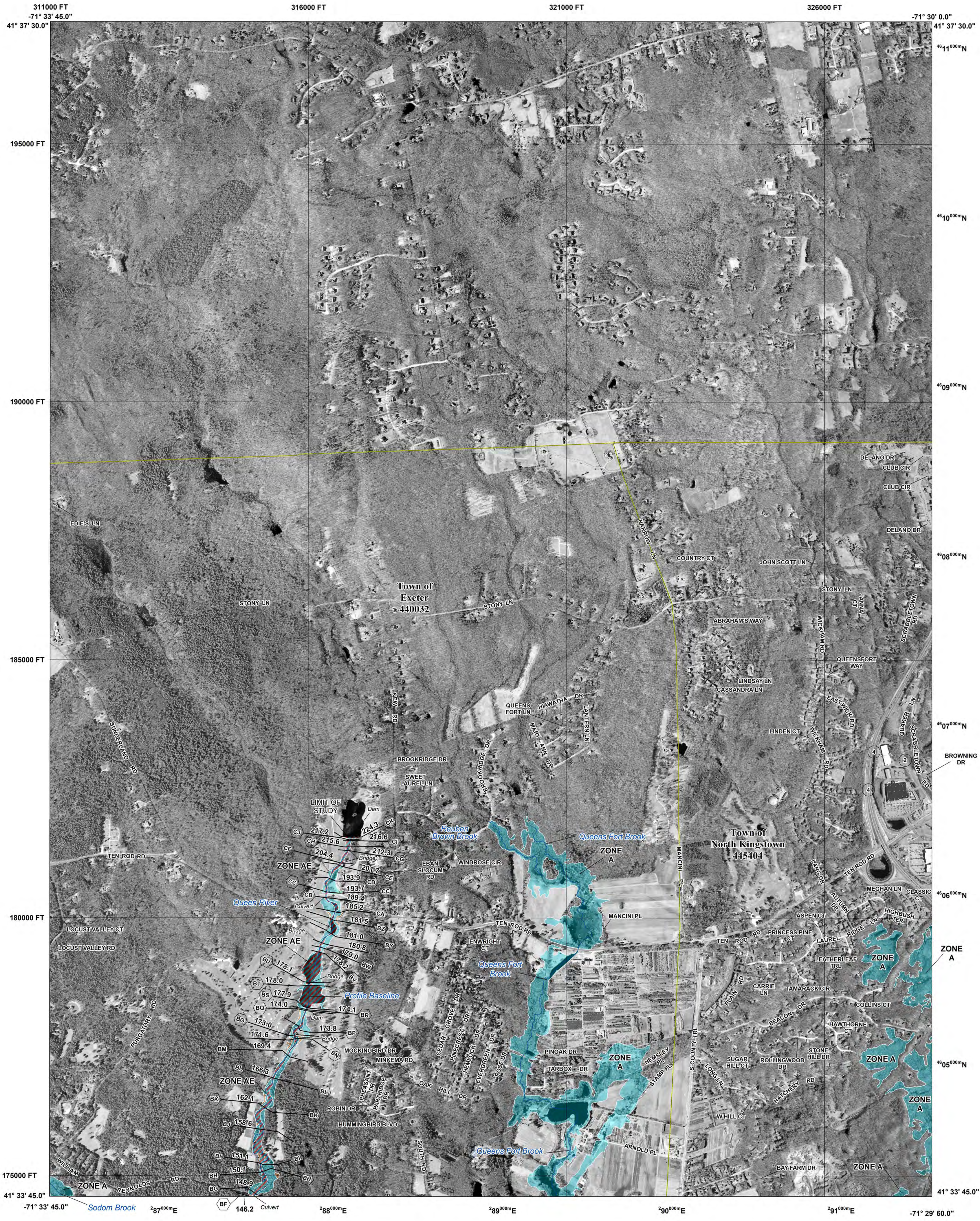
Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
EXETER, TOWN OF	440032	0035	K

VERSION NUMBER
2.6.3.6

MAP NUMBER
44009C0035K

MAP REVISED
JULY 19, 2023



FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT HTTP://MSC.FEMA.GOV

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) *Zone A,V, A99*
		With BFE or Depth *Zone AE, AO, AH, VE, AR*
		Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD		0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
		Future Conditions 1% Annual Chance Flood Hazard *Zone X*
		Area with Reduced Flood Risk due to Levee See Notes. *Zone X*
OTHER AREAS	NO SCREEN	Areas Determined to be Outside the 0.2% Annual Chance Floodplain *Zone X*
		Area of Undetermined Flood Hazard *Zone D*
GENERAL STRUCTURES		Channel, Culvert, or Storm Sewer
		Accredited or Provisionally Accredited Levee, Dike, or Floodwall
		Non-accredited Levee, Dike, or Floodwall
OTHER FEATURES	E 18.2 17.5	Cross Sections with 1% Annual Chance Water Surface Elevation (BFE)
	8	Coastal Transect
		Coastal Transect Baseline
		Profile Baseline
		Hydrographic Feature
	513	Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary

NOTES TO USERS

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For community and countywide map dates refer to the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in the community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

Base map information shown on this FIRM was provided in digital format by the U.S. Geological Survey and Rhode Island GIS at a 0.3-meter resolution, dated 2015.

SCALE

N

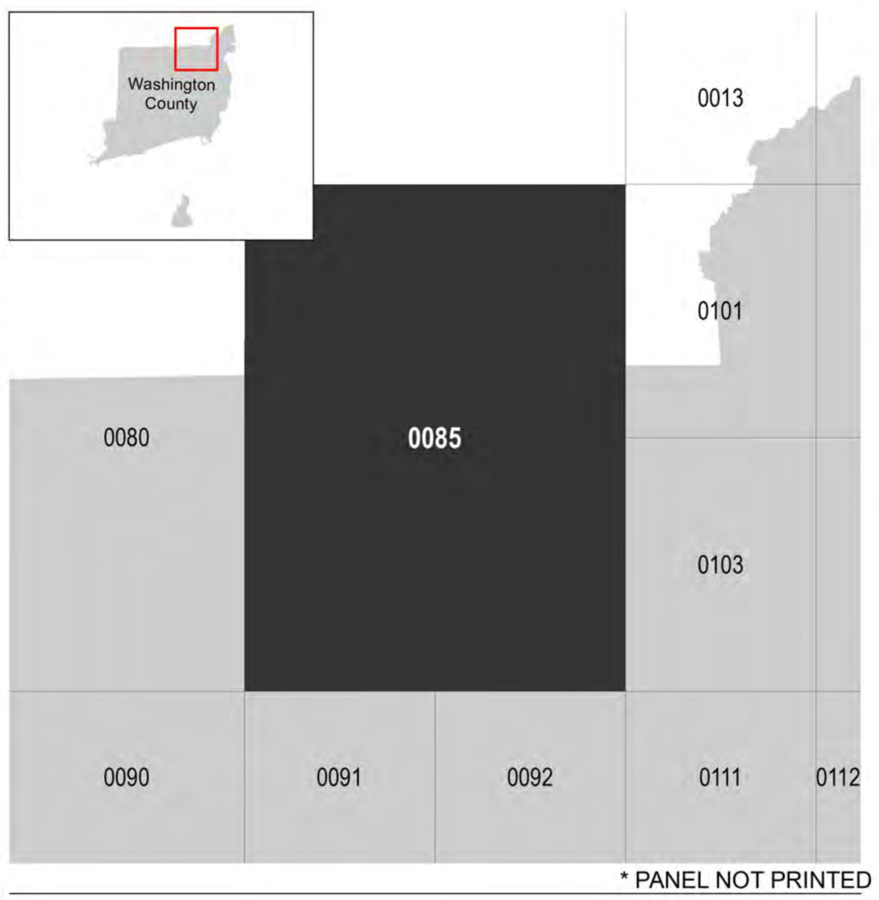
Map Projection:
Rhode Island State Plane (FIPSZONE 3800); North American Datum 1983; Western Hemisphere; Vertical Datum: NAVD 88

1 inch = 1,000 feet **1:12,000**

0 1,000 2,000 4,000 Feet

Meters
0 250 500 1,000

PANEL LOCATOR



* PANEL NOT PRINTED

FEMA

National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP

WASHINGTON COUNTY, RI
(ALL JURISDICTIONS)

PANEL **85 OF 368**

FEMA

Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
EXETER , TOWN OF	440032	0085	J
NORTH KINGSTOWN , TOWN OF	445404	0085	J

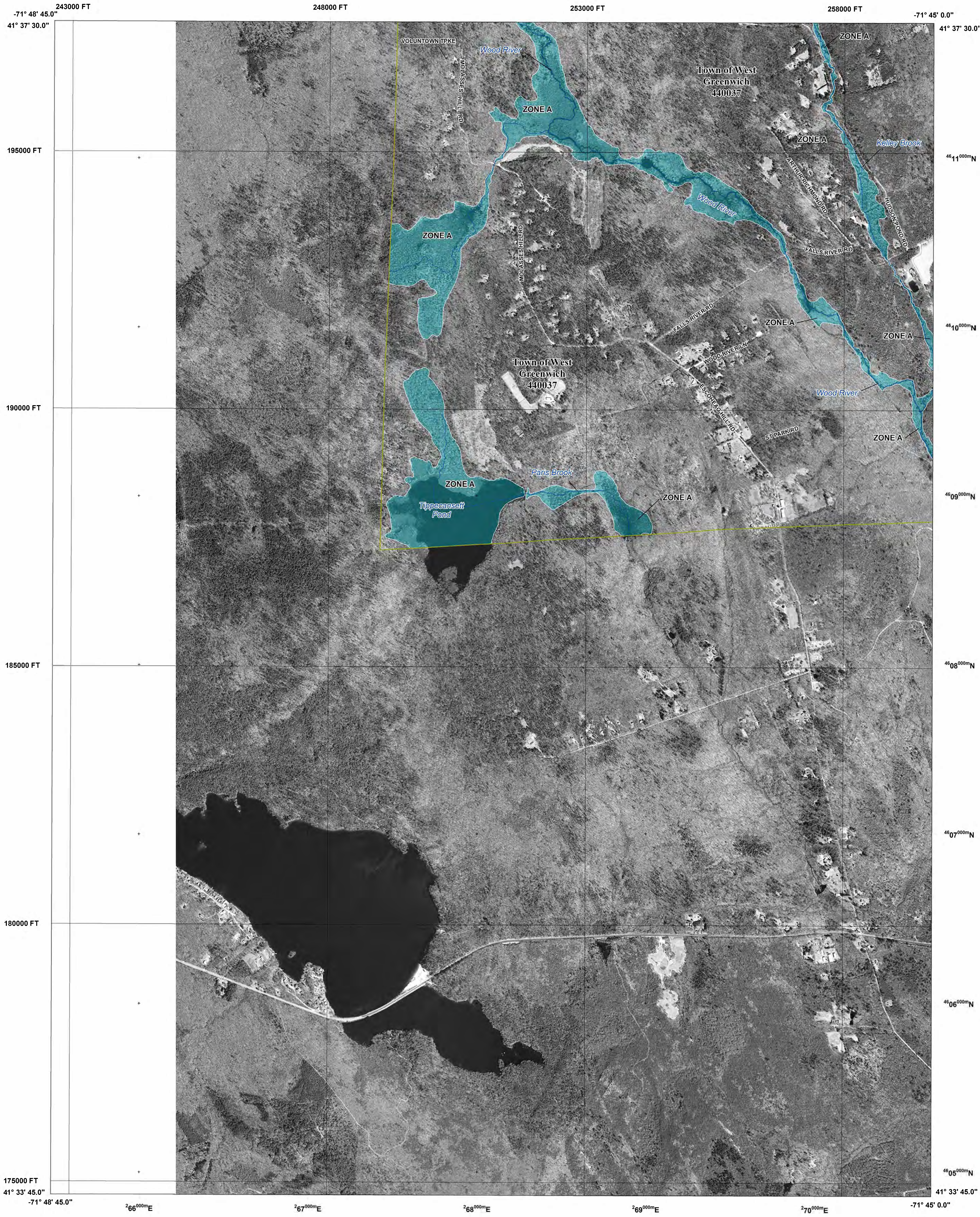
VERSION NUMBER
2.3.3.2

MAP NUMBER
44009C0085J

MAP REVISED
April 3, 2020

Flood Insurance Rate Maps for the
Town of West Greenwich

Last Revised: 7/19/2023



FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT HTTP://MSC.FEMA.GOV

SPECIAL FLOOD HAZARD AREAS	Without Base Flood Elevation (BFE) *Zone A, V, A99*
	With BFE or Depth *Zone AE, AO, AH, VE, AR*
	Regulatory Floodway
	0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
OTHER AREAS OF FLOOD HAZARD	Future Conditions 1% Annual Chance Flood Hazard *Zone X*
	Area with Reduced Flood Risk due to Levee See Notes. *Zone X*
OTHER AREAS	NO SCREEN Areas Determined to be Outside the 0.2% Annual Chance Floodplain *Zone X*
	Area of Undetermined Flood Hazard *Zone D*
GENERAL STRUCTURES	Channel, Culvert, or Storm Sewer
	Accredited or Provisionally Accredited Levee, Dike, or Floodwall
	Non-accredited Levee, Dike, or Floodwall
	E 18.2 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation (BFE)
	8 Coastal Transect
	Coastal Transect Baseline
	Profile Baseline
	Hydrographic Feature
	513 Base Flood Elevation Line (BFE)
OTHER FEATURES	Limit of Study
	Jurisdiction Boundary

NOTES TO USERS

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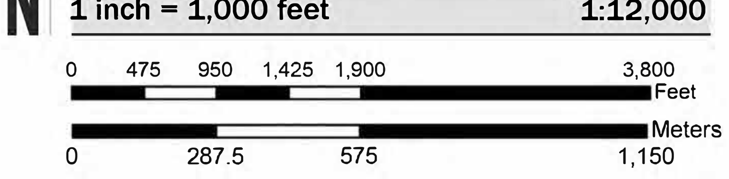
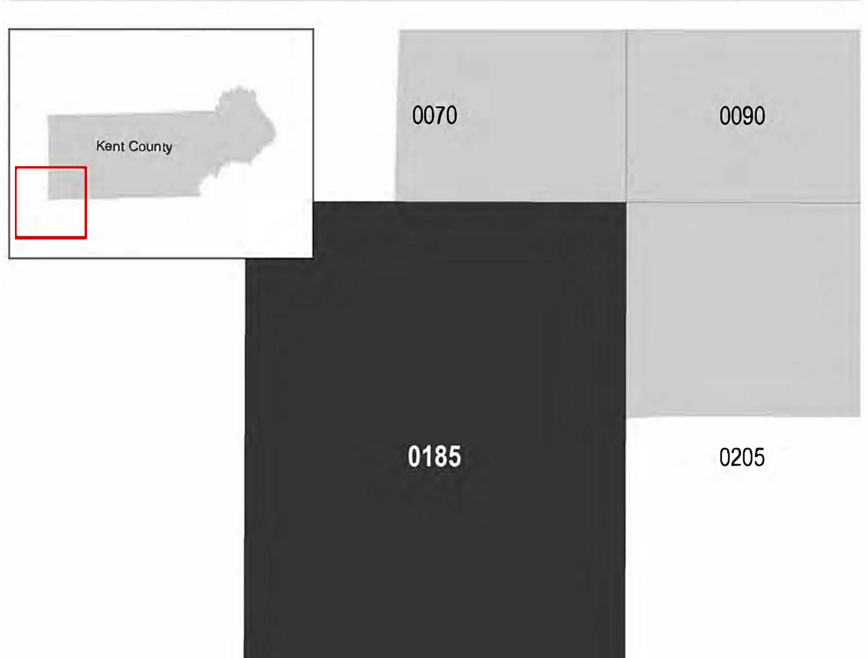
SCALE

Map Projection:
Rhode Island State Plane (FIPSZONE 3800); North American Datum 1983; Western Hemisphere; Vertical Datum: NAVD 88

1 inch = 1,000 feet 1:12,000



PANEL LOCATOR



* PANEL NOT PRINTED

FEMA
National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP

KENT COUNTY, RI
(ALL JURISDICTIONS)

PANEL 185 OF 251

FEMA

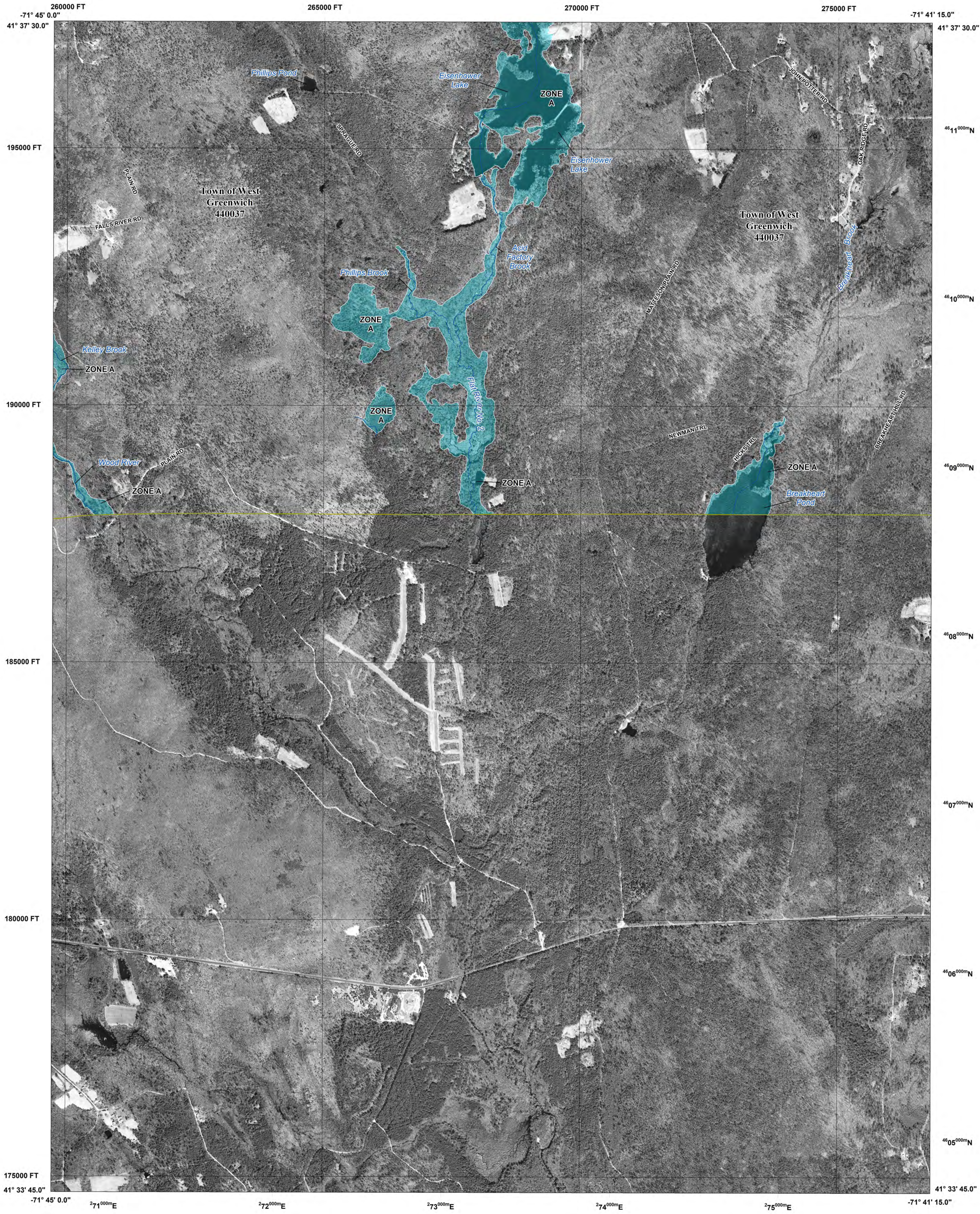
Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
WEST GREENWICH , TOWN OF	440037	0185	H

VERSION NUMBER
2.3.3.2

MAP NUMBER
44003C0185H

MAP REVISED
April 3, 2020



FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT HTTP://MSC.FEMA.GOV

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		With BFE or Depth *Zone AE, AO, AH, VE, AR*
		Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD		0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
		Future Conditions 1% Annual Chance Flood Hazard *Zone X*
		Area with Reduced Flood Risk due to Levee See Notes. *Zone X*
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		Area of Undetermined Flood Hazard *Zone D*
GENERAL STRUCTURES		Channel, Culvert, or Storm Sewer
		Accredited or Provisionally Accredited Levee, Dike, or Floodwall
		Non-accredited Levee, Dike, or Floodwall
	E 18.2 17.5	Cross Sections with 1% Annual Chance Water Surface Elevation (BFE)
	8	Coastal Transect
		Coastal Transect Baseline
		Profile Baseline
		Hydrographic Feature
	513	Base Flood Elevation Line (BFE)
		Limit of Study
OTHER FEATURES		Jurisdiction Boundary

NOTES TO USERS

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SCALE

Map Projection:
Rhode Island State Plane (FIPSZONE 3800); North American Datum 1983; Western Hemisphere; Vertical Datum: NAVD 88

1 inch = 1,000 feet 1:12,000

0 475 950 1,425 1,900 3,800 Feet

0 287.5 575 1,150 Meters

PANEL LOCATOR

* PANEL NOT PRINTED

FEMA

National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP

KENT COUNTY, RI
(ALL JURISDICTIONS)

PANEL 205 OF 251

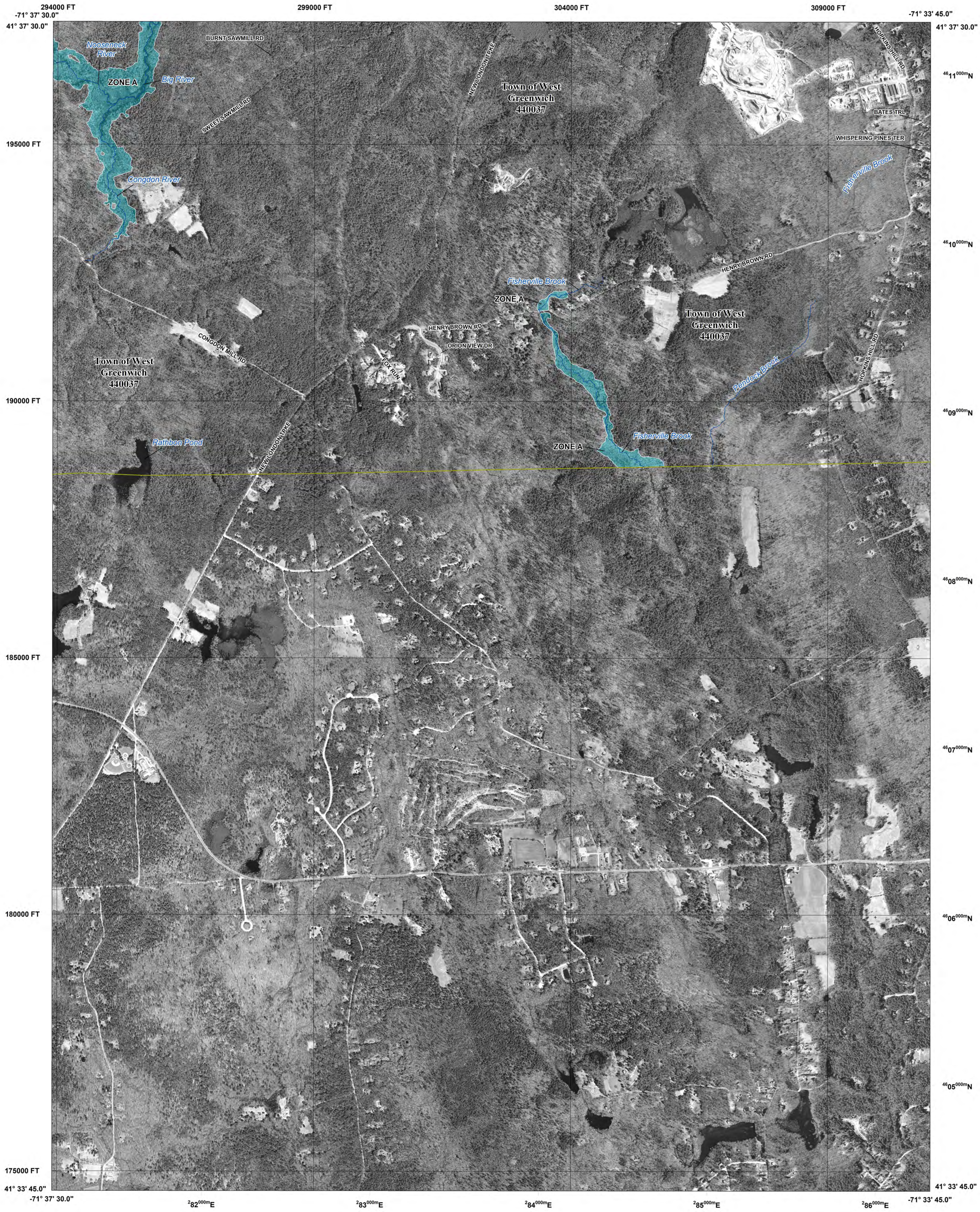
Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
WEST GREENWICH , TOWN OF	440037	0205	H

VERSION NUMBER
2.3.3.2

MAP NUMBER
44003C0205H

MAP REVISED
April 3, 2020



FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT HTTP://MSC.FEMA.GOV

SPECIAL FLOOD HAZARD AREAS	Without Base Flood Elevation (BFE) *Zone A,V, A99*
	With BFE or Depth *Zone AE, AO, AH, VE, AR*
	Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD	0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
	Future Conditions 1% Annual Chance Flood Hazard *Zone X*
	Area with Reduced Flood Risk due to Levee See Notes. *Zone X*
OTHER AREAS	NO SCREEN Areas Determined to be Outside the 0.2% Annual Chance Floodplain *Zone X*
	Area of Undetermined Flood Hazard *Zone D*
GENERAL STRUCTURES	Channel, Culvert, or Storm Sewer
	Accredited or Provisionally Accredited Levee, Dike, or Floodwall
	Non-accredited Levee, Dike, or Floodwall
	E 18.2 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation (BFE)
	8 Coastal Transect
	Coastal Transect Baseline
	Profile Baseline
	Hydrographic Feature
	513 Base Flood Elevation Line (BFE)
OTHER FEATURES	Limit of Study
	Jurisdiction Boundary

NOTES TO USERS

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For community and countywide map dates refer to the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in the community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

Base map information shown on this FIRM was provided in digital format by the U.S. Geological Survey and Rhode Island GIS at a 0.3-meter resolution, dated 2015.

SCALE

N

Map Projection:
Rhode Island State Plane (FIPSZONE 3800); North American Datum 1983; Western Hemisphere; Vertical Datum: NAVD 88

1 inch = 1,000 feet 1:12,000

0 475 950 1,425 1,900 3,800 Feet

0 287.5 575 1,150 Meters

PANEL LOCATOR

* PANEL NOT PRINTED

FEMA

National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP

KENT COUNTY, RI
(ALL JURISDICTIONS)

PANEL 230 OF 251

FEMA

Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
WEST GREENWICH , TOWN OF	440037	0230	H

VERSION NUMBER
2.3.3.2

MAP NUMBER
44003C0230H

MAP REVISED
April 3, 2020

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures.** Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Rhode State Plane island zone (FIPSZONE 3800). The **horizontal datum** was NAD83, GRS1980 spheroid. Differences in datum, spheroid, projection or State Plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of the FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum.** For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC–3, #9202
1315 East–West Highway
Silver Spring, MD 20910–3282

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713–3242,** or visit its website at http://www.ngs.noaa.gov/.

Base map information shown on this FIRM was provided in digital format by Rhode Island Geographic Information System (RI GIS). This information was derived from digital natural color orthophotos produce at a scale of 1:5,000 with 2-foot pixel resolution. Orthoimages were collected from 2003 through 2004.

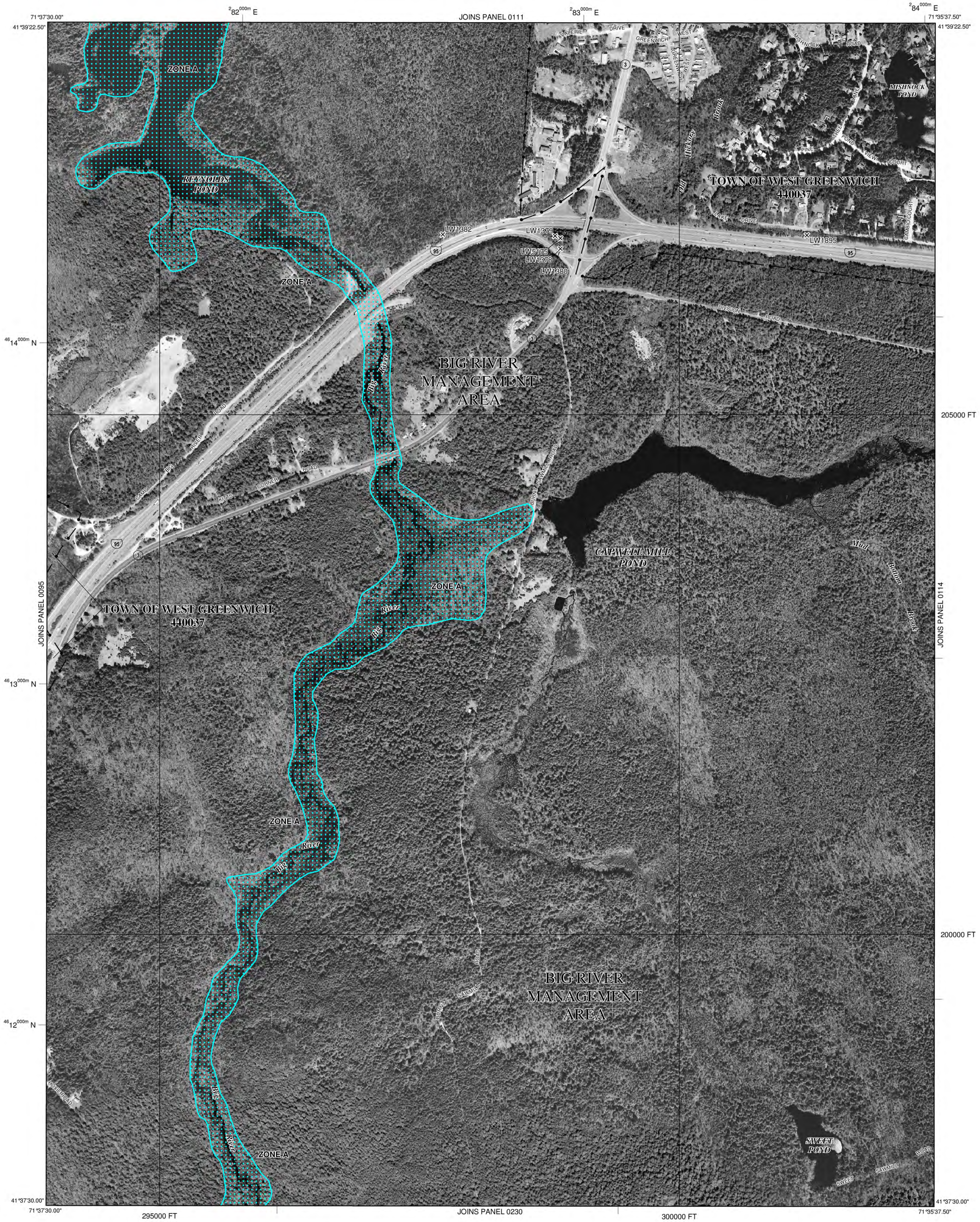
This map reflects more detailed and up–to–date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables *in the Flood Insurance Study report (which contains authoritative hydraulic data*) may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de–annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1–800–358–9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, *a Flood Insurance Study report*, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1–800–358–9620 and its website at http://www.msc.fema.gov/.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1–877–FEMA MAP** (1–877–336–2627) or visit the FEMA website at http://www.fema.gov/.



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% annual chance floodplain boundary
0.2% annual chance floodplain boundary
Floodway boundary
Zone D boundary
CBRS and OPA boundary
Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.

~~ 513 ~~~~	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988 (NAVD 88)

(A)———(A)	Cross section line
(23)- - - - -(23)	Transect line
97°07'30", 32°22'30"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
$^{42}75^{000m}$N	1000-meter Universal Transverse Mercator grid ticks, zone 19
6000000 FT	5000-foot grid values: Rhode State Plane coordinate system, island zone (FIPSZONE 3800), Transverse Mercator
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
• M1.5	River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
December 3, 2010
EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1–800–638–6620.

N

MAP SCALE 1" = 500'

250 0 500 1000 FEET

150 0 150 300 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0113G

FIRM
FLOOD INSURANCE RATE MAP

KENT COUNTY, RHODE ISLAND (ALL JURISDICTIONS)

PANEL 113 OF 251

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
WEST GREENWICH, TOWN OF	440037	0113	G

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER 44003C0113G

EFFECTIVE DATE DECEMBER 3, 2010

Federal Emergency Management Agency

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) Report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS Report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study Report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study Report for this jurisdiction.

The AE Zone category has been divided by a **Limit of Moderate Wave Action (LiMWA)**. The LiMWA represents the approximate landward limit of the 1.5-foot breaking wave. The effects of wave hazards between the VE Zone and the LiMWA (or between the shoreline and the LiMWA for areas where VE Zones are not identified) will be similar to, but less severe than those in the VE Zone.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study Report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Rhode Island State Plane Zone (FIPS zone 3800). The **horizontal datum** was NAD 83, GRS 1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713- 3242**, or visit its website at http://www.ngs.noaa.gov.

Base map information shown on this FIRM was derived from digital orthophotography. Base map files were provided in digital form by the USGS. Ortho imagery was produced at a scale of 1:2,400. Aerial photography is dated April and May 2011.

The **profile baselines** depicted on this map represent the hydraulic modeling baselines that match the flood profiles in the FIS report. As a result of improved topographic data, the **profile baseline**, in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

Based on updated topographic information, this map reflects more detailed and up-to-date **stream channel configurations and floodplain delineations** than those shown on the previous FIRM for this jurisdiction. As a result, the Flood Profiles and Floodway Data tables for multiple streams in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on the map. Also, the road to floodplain relationships for unrevised streams may differ from what is shown on previous maps.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

For information on available products associated with this FIRM visit the **Map Service Center (MSC)** website at http://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the MSC website.

If you have **questions about this map,** how to order products, or the National Flood Insurance Program in general, please call the **FEMA Map Information eXchange (FMIX)** at **1-877-FEMA-MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip.

LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Areas formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% Annual Chance Floodplain Boundary

0.2% Annual Chance Floodplain Boundary

Floodway boundary

Zone D boundary

CBRS and OPA boundary

Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.

Limit of Moderate Wave Action

Limit of Moderate Wave Action coincident with Zone Break

513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

A — A	Cross section line
23 - - - 23	Transect line
	Culvert
	Bridge
45° 02' 08", 93° 02' 12"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) Western Hemisphere
$^{49}89^{000m}$ N	1000-meter Universal Transverse Mercator grid values, zone 19
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
• M1.5	River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
DECEMBER 3, 2010

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

October 02, 2015 - to update corporate limits, to add roads and road names to change Base Flood Elevations and Special Flood Hazard Areas, to change zone designations

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

250 0 500 1000 FEET

150 0 150 300 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0111H

FIRM
FLOOD INSURANCE RATE MAP
Kent County, Rhode Island
(ALL JURISDICTIONS)

PANEL 111 OF 251
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
COVENTRY,TOWN OF	440004	0111	H
WEST GREENWICH,TOWN OF	440037	0111	H

MAP NUMBER 44003C0111H

MAP REVISED OCTOBER 2, 2015

Federal Emergency Management Agency

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures.** Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Rhode State Plane island zone (FIPSZONE 3800). The **horizontal datum** was NAD83, GRS1980 spheroid. Differences in datum, spheroid, projection or State Plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of the FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum.** For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, MD 20910-3282

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242,** or visit its website at http://www.ngs.noaa.gov/.

Base map information shown on this FIRM was provided in digital format by Rhode Island Geographic Information System (RI GIS). This information was derived from digital natural color orthophotos produce at a scale of 1:5,000 with 2-foot pixel resolution. Orthoimages were collected from 2003 through 2004.

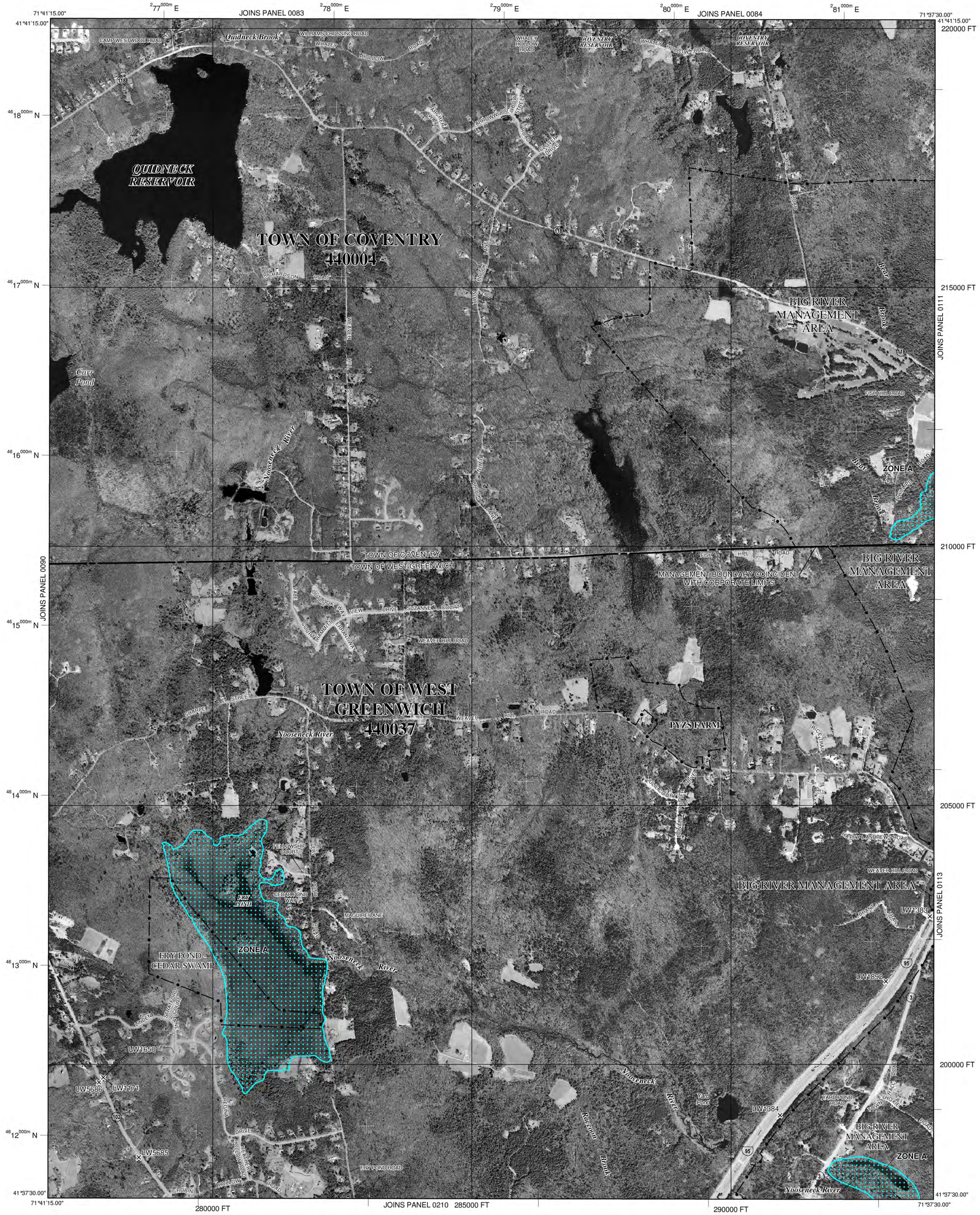
This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables *in the Flood Insurance Study report (which contains authoritative hydraulic data)* may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, *a Flood Insurance Study report*, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at http://www.msc.fema.gov/.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/.



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% annual chance floodplain boundary
0.2% annual chance floodplain boundary
Floodway boundary
Zone D boundary
CBRS and OPA boundary
Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.

~~ 513 ~~~~	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988 (NAVD 88)

A —— A	Cross section line
23 - - - - 23	Transect line
97°07'30", 32°22'30"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
$^{42}75^{000m}$N	1000-meter Universal Transverse Mercator grid ticks, zone 19
6000000 FT	5000-foot grid values: Rhode State Plane coordinate system, island zone (FIPSZONE 3800), Transverse Mercator
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
• M1.5	River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
December 3, 2010
EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

N

MAP SCALE 1" = 1000'

500 0 1000 2000 FEET
300 0 300 600 METERS

NFIP

PANEL 0095G

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

KENT COUNTY,
RHODE ISLAND
(ALL JURISDICTIONS)

PANEL 95 OF 251
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
COVENTRY, TOWN OF	440004	0095	G
WEST GREENWICH, TOWN OF	440037	0095	G

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
44003C0095G

EFFECTIVE DATE
DECEMBER 3, 2010

Federal Emergency Management Agency

FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT **HTTPS://MSC.FEMA.GOV**

SPECIAL FLOOD HAZARD AREAS	Without Base Flood Elevation (BFE) *Zone A,V, A99*
	With BFE or Depth *Zone AE, AO, AH, VE, AR*
	Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD	0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
	Future Conditions 1% Annual Chance Flood Hazard *Zone X*
	Area with Reduced Flood Risk due to Levee See Notes. *Zone X*
	Area with Flood Risk due to Levee *Zone D*
OTHER AREAS	NO SCREEN Area of Minimal Flood Hazard *Zone X*
	Area of Undetermined Flood Hazard *Zone D*
GENERAL STRUCTURES	Channel, Culvert, or Storm Sewer
	Levee, Dike, or Floodwall
OTHER FEATURES	E 18.2 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
	8 Coastal Transect
	Coastal Transect Baseline
	Profile Baseline
	Hydrographic Feature
	513 Base Flood Elevation Line (BFE)
	Limit of Study
	Jurisdiction Boundary

NOTES TO USERS

For information and questions about this Flood Insurance Rate Map (FIRM), available products associated with this FIRM, including historic versions, the current map date for each FIRM panel, how to order products, or the National Flood Insurance Program (NFIP) in general, please call the FEMA Mapping and Insurance eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Flood Map Service Center website at msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website.

Communities annexing land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM Index. These may be ordered directly from the Flood Map Service Center at the number listed above.

For community and countywide map dates refer to the Flood Insurance Study Report for this jurisdiction.

To determine if flood insurance is available in this community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

Base map information shown on this FIRM was derived from digital orthophotography provided by the NAIP. The imagery was flown in 2018 and was produced at 0.6 meter resolution.

SCALE

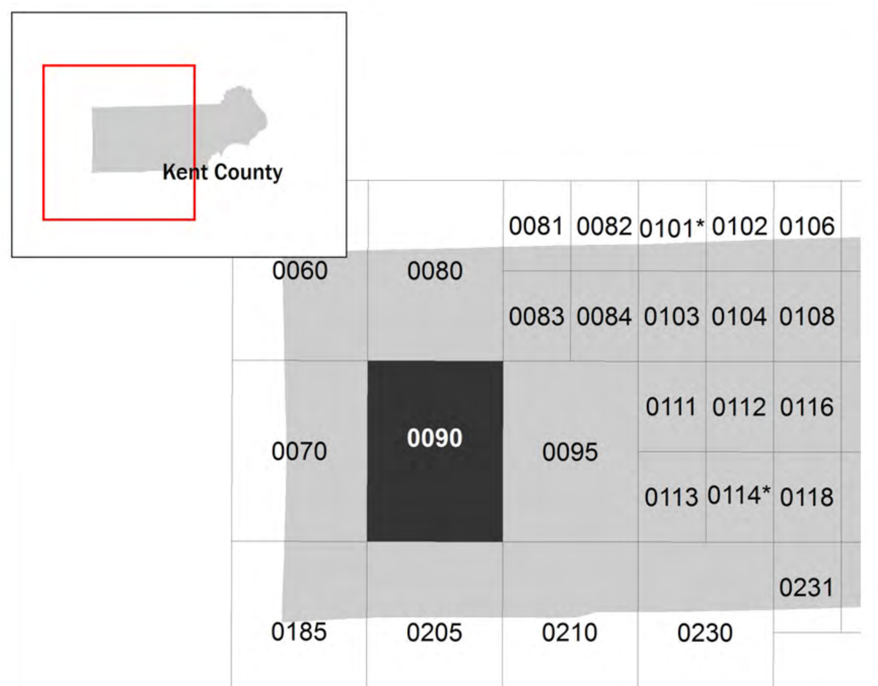
Map Projection:
State Plane Rhode Island FIPS 3800 Feet; North American 1983; Western Hemisphere; Vertical Datum: NAVD 88

1 inch = 1,000 feet **1:12,000**

0 1,000 2,000 4,000 feet

0 250 500 1,000 meters

PANEL LOCATOR



*PANEL NOT PRINTED

FEMA

National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP

KENT COUNTY, RHODE ISLAND
All Jurisdictions

PANEL **90** OF **251**

FEMA

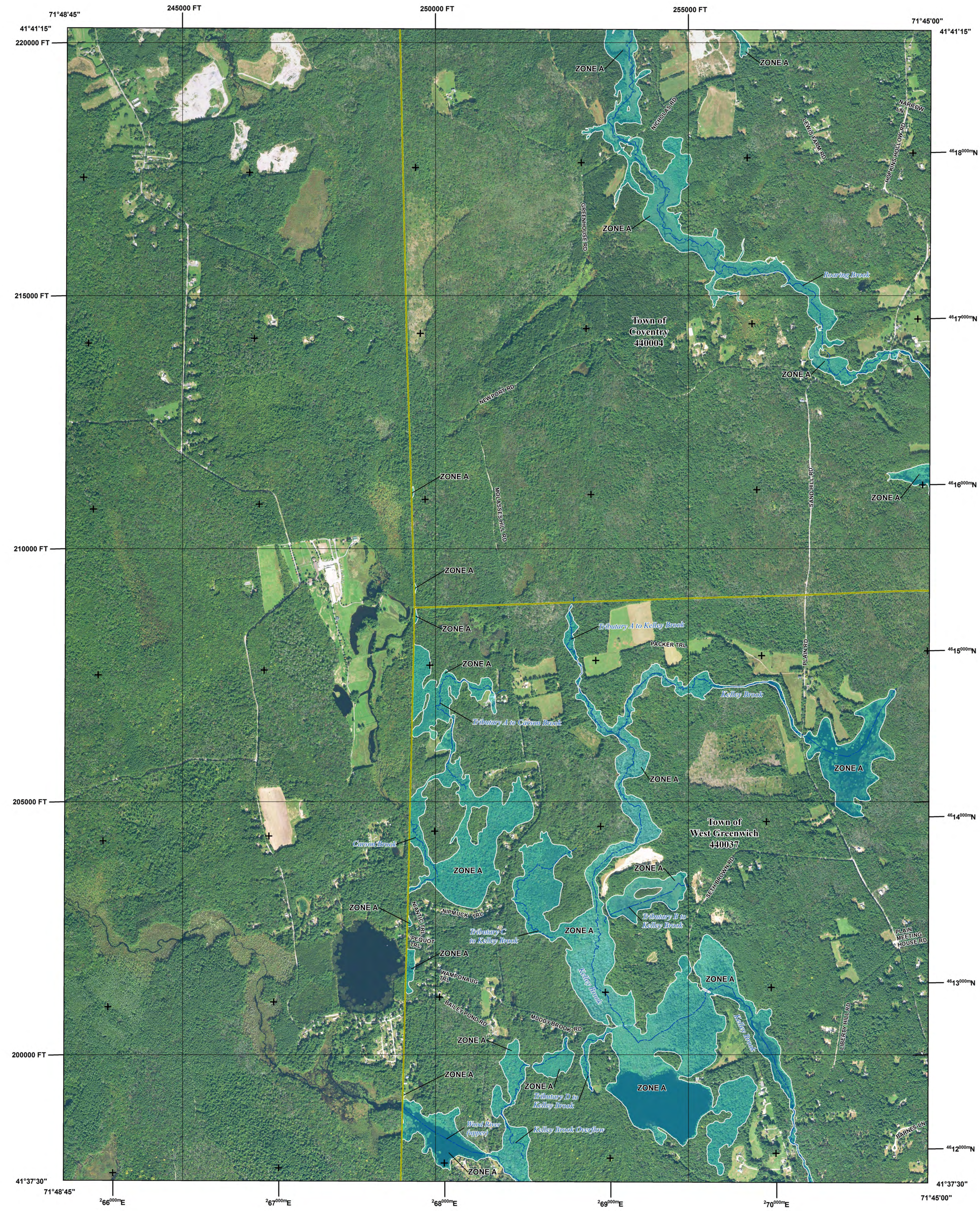
Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
COVENTRY, TOWN OF	440004	0090	J
WEST GREENWICH, TOWN OF	440037	0090	J

VERSION NUMBER
2.6.3.6

MAP NUMBER
44003C0090J

MAP REVISED
JULY 19, 2023



FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT

HTTPS://MSC.FEMA.GOV

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A,V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- E 18.2 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
- 8 Coastal Transect
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary

NOTES TO USERS

For information and questions about this Flood Insurance Rate Map (FIRM), available products associated with this FIRM, including historic versions, the current map date for each FIRM panel, how to order products, or the National Flood Insurance Program (NFIP) in general, please call the FEMA Mapping and Insurance eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Flood Map Service Center website at msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website.

Communities annexing land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM Index. These may be ordered directly from the Flood Map Service Center at the number listed above.

For community and countywide map dates refer to the Flood Insurance Study Report for this jurisdiction.

To determine if flood insurance is available in this community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

Base map information shown on this FIRM was derived from digital orthophotography provided by the NAIP. The imagery was flown in 2018 and was produced at 0.6 meter resolution.

SCALE

N

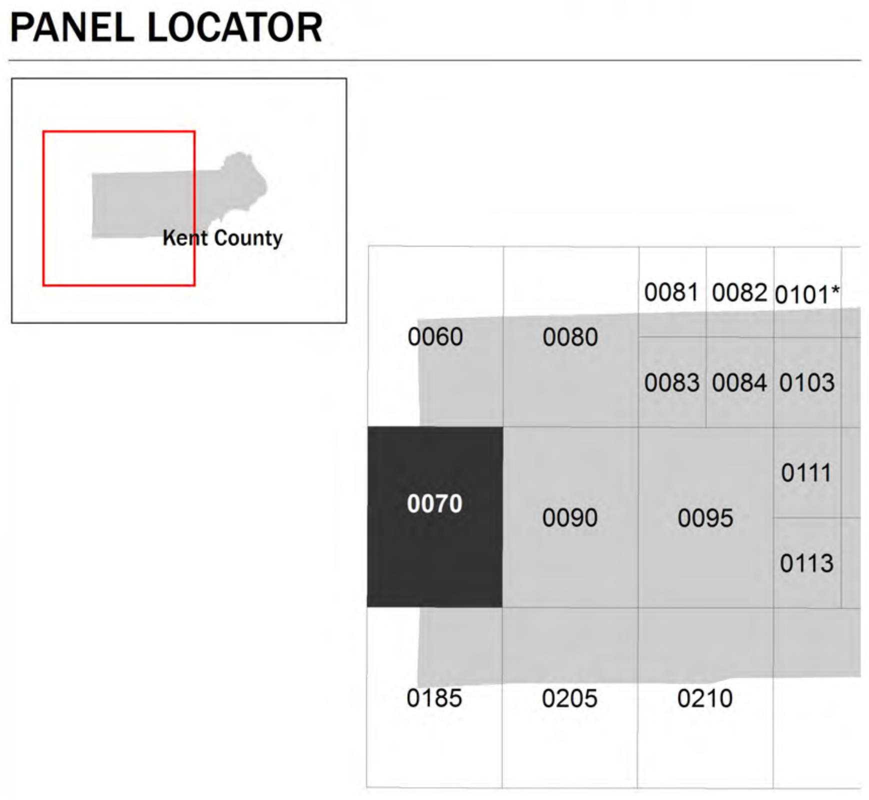
Map Projection:
State Plane Rhode Island FIPS 3800 Feet; North American 1983; Western Hemisphere; Vertical Datum: NAVD 88

1 inch = 1,000 feet **1:12,000**

0 1,000 2,000 4,000 feet

0 250 500 1,000 meters

PANEL LOCATOR



*PANEL NOT PRINTED

FEMA

National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP

KENT COUNTY, RHODE ISLAND
All Jurisdictions

PANEL **70** OF **251**

FEMA

Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
COVENTRY, TOWN OF	440004	0070	J
WEST GREENWICH, TOWN OF	440037	0070	J

VERSION NUMBER
2.6.3.6

MAP NUMBER
44003C0070J

MAP REVISED
JULY 19, 2023

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures.** Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Rhode State Plane island zone (FIPSZONE 3800). The **horizontal datum** was NAD83, GRS1980 spheroid. Differences in datum, spheroid, projection or State Plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of the FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum.** For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, MD 20910-3282

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242,** or visit its website at http://www.ngs.noaa.gov/.

Base map information shown on this FIRM was provided in digital format by Rhode Island Geographic Information System (RI GIS). This information was derived from digital natural color orthophotos produce at a scale of 1:5,000 with 2-foot pixel resolution. Orthoimages were collected from 2003 through 2004.

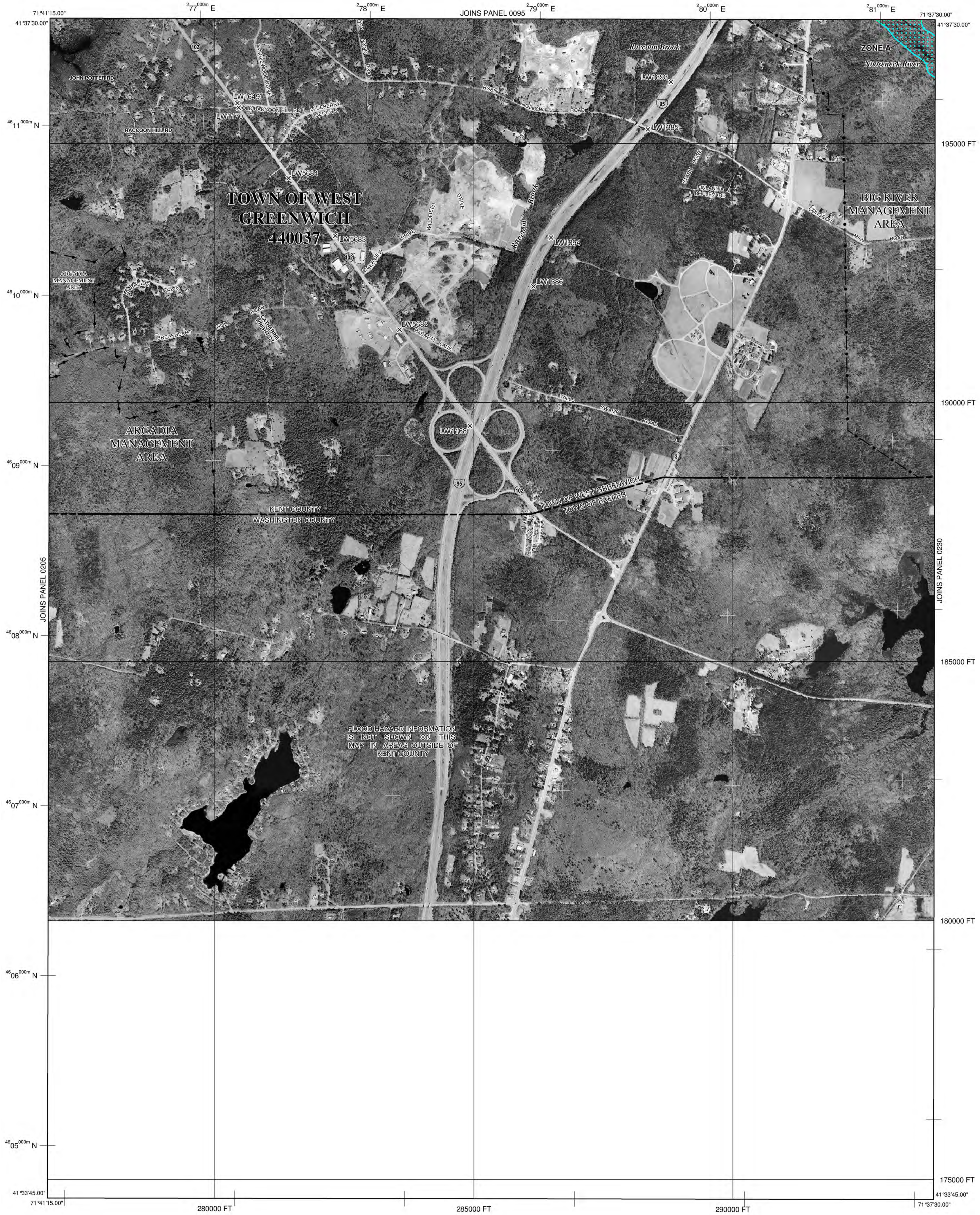
This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables *in the Flood Insurance Study report (which contains authoritative hydraulic data*) may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, *a Flood Insurance Study report*, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at http://www.msc.fema.gov/.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/.



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% annual chance floodplain boundary
0.2% annual chance floodplain boundary
Floodway boundary
Zone D boundary
CBRS and OPA boundary
Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.

513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988 (NAVD 88)

A — A	Cross section line
23 - - - 23	Transect line
97°07'30", 32°22'30"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
$^{42}75^{000m}$N	1000-meter Universal Transverse Mercator grid ticks, zone 19
6000000 FT	5000-foot grid values: Rhode State Plane coordinate system, island zone (FIPSZONE 3800), Transverse Mercator
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
• M1.5	River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
December 3, 2010
EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

N

MAP SCALE 1" = 1000'

500 0 1000 2000 FEET
300 0 300 600 METERS

NFIP

PANEL 0210G

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

KENT COUNTY,
RHODE ISLAND
(ALL JURISDICTIONS)

PANEL 210 OF 251
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
WEST GREENWICH, TOWN OF	440037	0210	G

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
44003C0210G

EFFECTIVE DATE
DECEMBER 3, 2010

Federal Emergency Management Agency

Appendix M- Hazus Results

HAZUS™ FEMA

Quick Assessment Report

RiskMAP Increasing Resilience Together

December 30, 2024

100 yr flood- Exeter

Study Region :	Exeter_RI
Scenario :	100yr
Return Period:	100
Analysis Option:	0

Regional Statistics

Area (Square Miles)	3
Number of Census Blocks	231
Number of Buildings	
Residential	2,455
Total	2,742
Number of People in the Region (x 1000)	6
Building Exposure ($ Millions)	
Residential	952
Total	1,304

Scenario Results

Shelter Requirements

Displaced Population (# Households)	32
Short Term Shelter (# People)	

Economic Loss

Residential Property (Capital Stock) Losses ($ Millions)	2
Total Property (Capital Stock) Losses ($ Millions)	5
Business Interruption (Income) Losses ($ Millions)	13

HAZUS™ FEMA

Quick Assessment Report

RiskMAP
Increasing Resilience Together

December 30, 2024

100 yr flood- West Greenwich

Study Region :	WestGreenwich_RI
Scenario :	100-yr
Return Period:	100
Analysis Option:	0

Regional Statistics

Area (Square Miles)	2
Number of Census Blocks	127
Number of Buildings	
Residential	1,938
Total	2,106
Number of People in the Region (x 1000)	7
Building Exposure ($ Millions)	
Residential	1,224
Total	1,489

Scenario Results

Shelter Requirements

Displaced Population (# Households)	25
Short Term Shelter (# People)	

Economic Loss

Residential Property (Capital Stock) Losses ($ Millions)	2
Total Property (Capital Stock) Losses ($ Millions)	2
Business Interruption (Income) Losses ($ Millions)	1

Quick Assessment Report

December 29, 2024

Hurricane similar to 1954 Carol- Exeter

Study Region : ExeterRI
Scenario : 1954-CAROL

Scenario Description : Historic

Peak Gust Wind Speed (mph) : 99

Regional Statistics

Area (Square Miles)	58
Number of Census Tracts	1
Number of People in the Region	6,460

General Building Stock

Occupancy	*Building Count*	*Dollar Exposure ($ M)*
Residential	2,455	952
Commercial	186	199
Other	101	153
Total	2,742	1,304

Scenario Results

Number of Buildings Damaged

*FEMA PDA**	*Residential*	*Commercial*	*Other*	*Total*
Affected	300	10	<10	320
Minor	30	<10	<10	50
Major	0	0	0	0
Destroyed	0	0	0	0
Total	330	20	20	370

Shelter Requirements

Displaced Households (# Households)	<10
Short Term Shelter (# People)	<10

Economic Loss ($ Millions)

Capital Stock		18
Residential Property	16	
Commercial Property	<1	
Other Property	<1	
Business Interruption (Income)		<1
Total Direct Economic Loss		19

**Hazus damage estimates are presented using FEMA Preliminary Damage Assessment (PDA) categories. These estimates should be used for planning purposes and may not reflect actual observed damages from the PDA process.*

Disclaimer:

The estimates of social and economic impacts contained in this report were produced using HAZUS loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Hurricane. These results can be improved by using enhanced inventory data.

Quick Assessment Report

December 29, 2024

Hurricane similar to 1954 Carol- West Greenwich

Study Region : WestGreenwichRI
Scenario : 1954-CAROL

Scenario Description : Historic

Peak Gust Wind Speed (mph) : 97

Regional Statistics

Area (Square Miles)	51
Number of Census Tracts	1
Number of People in the Region	6,528

General Building Stock

Occupancy	*Building Count*	*Dollar Exposure ($ M)*
Residential	1,938	1,225
Commercial	90	76
Other	78	188
Total	2,106	1,489

Scenario Results

Number of Buildings Damaged

*FEMA PDA**	*Residential*	*Commercial*	*Other*	*Total*
Affected	200	<10	<10	220
Minor	20	<10	<10	40
Major	0	0	0	0
Destroyed	0	0	0	0
Total	220	20	20	260

Shelter Requirements

Displaced Households (# Households)	<10
Short Term Shelter (# People)	<10

Economic Loss ($ Millions)

Capital Stock		25
Residential Property	24	
Commercial Property	<1	
Other Property	<1	
Business Interruption (Income)		<1
Total Direct Economic Loss		25

**Hazus damage estimates are presented using FEMA Preliminary Damage Assessment (PDA) categories. These estimates should be used for planning purposes and may not reflect actual observed damages from the PDA process.*

Disclaimer:

The estimates of social and economic impacts contained in this report were produced using HAZUS loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Hurricane. These results can be improved by using enhanced inventory data.