

**Town of Norwich, Vermont**  
**2021 Local Hazard Mitigation Plan**

**Prepared by the Two Rivers-Ottauquechee Regional Commission and  
the Town of Norwich**

**01/27/21**

**Date of Town Adoption**

**02/26/2021**

**Date of Final Approval by FEMA**

CERTIFICATE OF ADOPTION  
<<DATE>> JAN 27, 2021  
TOWN OF Norwich, Vermont Selectboard  
A RESOLUTION ADOPTING THE Norwich, Vermont 2020 Local Hazard Mitigation Plan

WHEREAS, the Town of Norwich has historically experienced severe damage from natural hazards and it continues to be vulnerable to the effects of the hazards profiled in the **2020 Norwich, Vermont Local Hazard Mitigation Plan**, which result in loss of property and life, economic hardship, and threats to public health and safety; and

WHEREAS, the Town of Norwich has developed and received conditional approval from Vermont Emergency Management (VEM) for its **2020 Norwich, Vermont Local Hazard Mitigation Plan (Plan)** under the requirements of 44 CFR 201.6; and

WHEREAS, the **Plan** specifically addresses hazard mitigation strategies, and Plan maintenance procedures for the Town of Norwich; and

WHEREAS, the **Plan** recommends several hazard mitigation actions (projects) that will provide mitigation for specific natural hazards that impact the Town of Norwich with the effect of protecting people and property from loss associated with those hazards; and

WHEREAS, adoption of this **Plan** will make the Town of Norwich eligible for funding to alleviate the impacts of future hazards; now therefore be it

RESOLVED by Town of Norwich Selectboard:

1. The **2020 Norwich, Vermont Local Hazard Mitigation Plan** is hereby adopted as an official plan of the Town of Norwich;
2. The respective officials identified in the mitigation action plan of the **Plan** are hereby directed to pursue implementation of the recommended actions assigned to them;
3. Future revisions and **Plan** maintenance required by 44 CFR 201.6 and FEMA are hereby adopted as part of this resolution for a period of five (5) years from the date of this resolution; and
4. An annual report on the process of the implementation elements of the Plan will be presented to the Selectboard by the Emergency Management Director or Coordinator.

IN WITNESS WHEREOF, the undersigned have affixed their signature and the corporate seal of the Town of Norwich this 27<sup>TH</sup> day of JAN ~~2020~~ 2021

John Langhus

Mary Laytin

Robert Gere

Claudette Brochu

Selectboard Chair

Roger Arnold

Selectboard Member

ATTEST

\_\_\_\_\_  
Town Clerk

Signature: Claudette Brochu  
Claudette Brochu (Jan 26, 2021 10:25 EST)  
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U.S. Department of Homeland Security  
FEMA Region I  
99 High Street, Sixth Floor  
Boston, MA 02110-2132

**FEMA**

February 26, 2021

Stephanie A. Smith, State Hazard Mitigation Officer  
Vermont Emergency Management  
45 State Drive  
Waterbury, Vermont 05671-1300

Dear Ms. Smith:

As outlined in the FEMA-State Agreement for FEMA-DR-4474, your office has been delegated the authority to review and approve local mitigation plans under the Program Administration by States Pilot Program. Our Agency has been notified that your office completed its review of the Town of Norwich, Vermont 2020 Local Hazard Mitigation Plan and approved it effective **February 24, 2021** through **February 23, 2026** in accordance with the planning requirements of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act), as amended, the National Flood Insurance Act of 1968, as amended, and Title 44 Code of Federal Regulations (CFR) Part 201.

With this plan approval, the jurisdiction is eligible to apply to Vermont Emergency Management 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 the 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 I 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 future disaster losses. Should you have any questions, please contact Melissa Surette at (617) 956-7559 or [Melissa.Surette@fema.dhs.gov](mailto:Melissa.Surette@fema.dhs.gov).

Sincerely,

**PAUL F FORD** Digitally signed by PAUL F FORD  
Date: 2021.02.26 08:38:12 -05'00'

Paul F. Ford  
Acting Regional Administrator  
DHS, FEMA Region I

PFF:ms

cc: Ben Rose, Recovery and Mitigation Section Chief, VEM

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## I. Introduction

Natural and human-caused hazards may affect a community at any time. They are not usually avoidable; however, their impact on human life and property can be reduced through community planning.

Accordingly, this Local Hazard Mitigation Plan (hereafter referred to simply as the Plan) seeks to provide an all-hazards mitigation strategy that will make the community of Norwich more disaster resistant.

“Mitigation” is defined as any sustained action that reduces or eliminates long-term risk to people and property from natural and human-caused hazards and their effects. Previous Federal Emergency Management Agency (FEMA), State and Regional Project Impact efforts have demonstrated that it is less expensive to anticipate disasters than to repeatedly ignore a threat until the damage has already been done. While hazards cannot be eliminated entirely, it is possible to identify prospective hazards, anticipate which might be the most severe, and recognize local actions that can be taken ahead-of-time to reduce the damage. These actions, also known as ‘hazard mitigation strategies’ can (1) avert the hazards through redirecting impacts by means of a structure or land treatment, (2) adapt to the hazard by modifying structures or standards or, (3) avoid the hazard through improved public education, relocation/removal of buildings in the flood zone, or ensuring development is disaster resistant.

## II. Purpose of the Plan

The purpose of this Plan is to assist Norwich in identifying all hazards facing the town, ranking them, and identifying strategies to reduce risks from known priority hazards.

The Town of Norwich seeks to be in accordance with the strategies, goals, and objectives of the State Hazard Mitigation Plan.

The 2020 Norwich Local Hazard Mitigation Plan is the second stand-alone mitigation plan drafted for the Town. Previously, the Town had a 2015 stand-alone mitigation plan as well as a town-specific 2011 Annex in the Regional Pre-Disaster Mitigation Plan. New information has been added to make the plan stronger and more useful for the Norwich town officials and residents who will implement the hazard mitigation strategies in the future.

### III. Community Profile

The Town of Norwich is located in the northeast corner of Windsor County on the Connecticut River, bordering the State of New Hampshire along approximately 8.5 miles of the Town's southeastern border. The Town has an area of approximately 44.8 square miles. The Town borders the Vermont towns of Thetford to the north, Sharon to the west, and Hartford to the south, and the New Hampshire town of Hanover. In addition to the Village of Norwich, the Town includes the villages or hamlets of Lewiston, Goodrich Four Corners, Pompanoosuc, Beaver Meadow, and New Boston.

The topography of the town rises from east to west from a mean elevation along the Connecticut River of 380 feet above mean sea level to highlands along the border of Sharon. Several hills exceed 1,700 feet in elevation. The Connecticut River is the dominant geographic feature of the town. The Ompompanoosuc River, which drains upland areas in Vershire, West Fairlee and Thetford, enters the Connecticut River in Norwich, one and one-half miles south of the Thetford town line. The Blood Brook<sup>1</sup> watershed, which includes Charles Brown and New Boston Brooks, is about 18 square miles.

Approximately 80 percent of the land area of the Town of Norwich is forested. A few small farms currently operate in town. Commercial areas include Norwich Village, Lewiston Village, and sections of Route 5. Residential housing is, in addition to the village area, along the five major roads, including Beaver Meadow Road, Turnpike Road, New Boston Road, Main Street/Union Village Road and Church Street/US Route 5. The south-central and southwest edge of town is accessible by road only through Hartford.

According to the U.S. Census Reports, population levels have increased in Norwich since 1970. In 2000, the Town had its highest ever-recorded population with 3,544 residents. The 2000 population numbers for the Town are 80% higher than the 1970 figure of 1,966 residents, which demonstrates the marked increase in residents at a pace far higher than many other towns in the region. There was a slight decline in the number of residents in 2010 when the population dropped to 3,414 (a 3.7% decline overall), meaning that there was roughly 76% growth in population numbers in the forty years between 1970 and 2010. The 76% rate of growth in Norwich far exceeded the rate of growth Windsor County or the State of Vermont experienced over the same time period (29% and 41%, respectively).

Norwich is home to a varied population. According to American Community Survey data, 8.5% of Norwich's population lives with a disability, and 4.3% of the population falls within the poverty rate. These populations are more vulnerable, as are the town's elderly residents. The share of the Norwich population that is 62 or older has increased from 13% in 2000 to an estimated 22.5% in 2011-15. The current trend in Norwich and the state of Vermont is an overall aging of the population.

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<sup>1</sup> The name of the stream is Blood Brook but it is often referred to as Bloody Brook.



Census data from 2010 shows that town-wide, 62% of residents live in a home owned with a mortgage or loan, 20% live in homes owned free and clear, and 18% live in rented homes. Residents' housing and economic situations can impact how they are impacted by a hazard.

The writers of this plan acknowledge that Norwich's population groups have different needs, and social and economic considerations must be included in the implementation of this plan.

There were 1,553 housing units in Norwich in 2010, according to the U.S. Census Reports. In 2000 there were 1,505 units, and in 1990 there were 1,382 housing units. The average annual rate of housing growth over the 2000s was 3.2%, a marked decrease from the 8.9% growth experienced over the 1990s.

The increase of 4.8 units per year, including second-homes, was roughly a third of the State's rate of growth of 9.6%, and was also significantly lower than Windsor County's rate of 7.9%. Compared with its neighboring towns in the Two Rivers-Ottawquechee region (Thetford 8%, Sharon 10.9%, and Hartford 5.7%), Norwich had the lowest level of housing growth in the 2000s.

The Town lies within the service area of Green Mountain Power, which supplies electrical power to all sections of town.

The Norwich Fire Department, a municipal department, provides fire protection services to the Town of Norwich. The Town participates in the Upper Valley Regional Emergency Services Association, a mutual aid system. Norwich has a part-time salaried fire chief and between 30-40 paid-on-call members, some of whom are certified emergency medical technicians. The department has one station that houses two engines, one tanker, one quint and one forestry truck. The fire department is dispatched by Hanover dispatch.

Established in 1973, the Norwich Police Department is available 24-hours a day, and is comprised of a full-time police chief, three full-time officers, and a full-time administrative assistant. The police department also has part-time officers to help cover needed hours and is dispatched by Hartford dispatch.

Medical emergencies are handled by the First Aid Stabilization Team (FAST) Squad. The FAST Squad has approximately 18 members, who are trained at or above the EMT level and provide emergency care before the arrival of an ambulance. Norwich has a contractual agreement with neighboring town of Hanover to provide first-response ambulance and emergency medical services. This agreement is funded by both a per-capita payment from the Town of Norwich as well as user fees. The closest hospital is Dartmouth-Hitchcock Medical Center in Lebanon, NH. Medivac services are available by the DHART helicopter.

The Town of Norwich is located on the banks of the Connecticut River. Norwich is also located just north of the Town of Hartford, a major economic and commercial hub of the Upper Connecticut River Valley. As a result, Norwich may experience some additional development pressures that may not be present in other nearby towns. In fiscal year 2019, there was 1 permit issued for new home development, 16 permits issued for building additions, and 14 permits issued for accessory structures.

## IV. The Planning Process

### A. Plan Developers

Jessica Richter and Kimberly Gilbert, both Planners at the Two Rivers-Ottawaquechee Regional Commission (TRORC), assisted the Town of Norwich with updating its Hazard Mitigation Plan. Committee members who assisted with the revisions include:

Name	Role/Organization	How Participation Was Solicited
Alex Northern	Fire Chief/Deputy Emergency Director	In April 2020, Jessica Richter, Peter Gregory, and Tory Littlefield (TRORC Staff), coordinated an introductory meeting on Zoom with Herb Durfee, Rod Francis, and Alex Northern (Town of Norwich). During this meeting, TRORC Staff reviewed the update process and worked with Norwich town officials to determine a hazard mitigation planning team. TRORC then held a kick-off meeting on May 14, 2020, followed by additional public meetings which are discussed in further detail below.
Larry Wiggins	Director of Public Works	
Jennifer Frank	Police Chief, Norwich Police Department	
Mary Layton	Selectboard Member	
Bonnie Munday	Public Health	
Herb Durfee	Town Manager/Emergency Management Director	
Rod Francis	Director, Planning and Zoning	

## B. Plan Development Process

The 2020 Norwich Mitigation Plan is an update from the 2015 Plan, which was originally drafted by Two Rivers-Ottauquechee Regional Commission, and approved by FEMA on August 4, 2015. The 2015 Plan was not integrated into other planning mechanisms.

Several sections have been updated to include all necessary information. This version of the Plan reflects changes in priorities from the 2015 Plan. New priorities of Cyber Attack/Security Breach and Pandemic/Infectious Disease Outbreak hazards are addressed that did not appear in the 2015 Plan. These have been prioritized in 2020 due to the Town's recent experiences with an online security breach and the ongoing Covid-19 pandemic. Norwich's top 5 identified hazards of the 2015 Plan all remain priority areas of focus in this 2020 Plan.

The changes to this Plan include:

- **General**
  - Data updates: New hazard incidents and emergency declarations;
  - Hazards have been reevaluated with the hazard ranking system used by the Vermont Division of Emergency Management and Homeland Security;
  - Updates on the status of 2015 Mitigation Strategies;
  - New 2020 Mitigation Strategies.
- **Hazards Analysis**
  - Flooding/Flash Flooding/Fluvial Erosion; Hazardous Material Spills/Water Supply Contamination; Severe Weather; and Structure Fire remain on the list of "top hazards," which reflects the belief of local officials that their town is still vulnerable to these hazards;
  - Cyber Attack/Security Breach and Pandemic/Infectious Disease Outbreak have been added to the list of "top hazards," which reflects the intention/priorities of local officials to expand their analysis of hazards that the Town is or may be vulnerable to in the next five years.

The following represent the avenues taken to draft the Norwich Local Hazard Mitigation Plan:

- **Activities**
  - 05/14/2020: TRORC held a kick-off meeting with Norwich HMP planning team to introduce the plan update and discuss the plan development process. A timeline of the update was also reviewed.
  - 05/26/2020: TRORC held a public meeting with the Norwich HMP planning team in order to discuss and rank the hazards that affect the Town of Norwich.

- 6/17/2020: TRORC held a public meeting with the Norwich HMP planning team in order to finalize the hazard ranking.
- 7/28/20: TRORC held a public meeting with the Norwich HMP planning team to update the mitigation strategies and actions.
- **Public participation and involvement (44 CFR 201.6(b)(1))**
  - Notices were posted to the Valley News in order to alert the Upper Valley community to the public meetings that were taking place. Notices ran on the following dates: 5/22/2020, 6/9/2020, and 7/28/2020.
  - Notices for each of the three public meetings were also posted on the TRORC website, the Town of Norwich website, and were sent to the Norwich Listserv and the Norwich Town email list on the following dates: 5/21/2020, 6/8/2020, and 7/24/2020.
  - 8/12/2020 The Plan was presented at a Selectboard meeting to inform those in attendance about the work that had been done to update the Town's Local Hazard Mitigation Plan. The Selectboard agenda is posted at the Town Office, and on the Town's website. A digital copy of the draft Plan was posted on the Town's website prior to the meeting and asked for comments. No substantive comments were received.
  - All 3 meetings were open and advertised to the public; no members of the public apart from the Plan Developers attended or offered feedback.
- **Governmental participation and involvement (44 CFR 201.6(b)(2))**
  - Sent revised draft to Norwich Selectboard and provided contact information for receiving comments — 9/3/2020
  - Sent revised draft to Planning Commission Chair and provided contact information for receiving comments — 9/3/2020
  - Sent revised draft to Division of Emergency Management and Homeland Security— 9/3/2020
- **Neighboring community participation and involvement (44 CFR 201.6(b)(2))**
  - Notices were posted to the Valley News in order to alert the members of the Upper Valley to the public meetings that were taking place. Notices ran on the following dates: 5/22/2020, 6/9/2020, and 7/28/2020. Contact information was provided in the notice to allow those interested in Norwich's efforts to receive more information and how to find out about upcoming meetings. No comments were received.
  - Sent revised draft to neighboring towns' Selectboards for comment and provided contact information for receiving comments —9/3/2020
    - Towns of: Thetford, and Sharon
    - No comments were received

- Sent revised draft to the Town Manager and Planning & Development Director for the Town of Hartford and provided contact information for receiving comments —9/3/3030
  - No comments were received
- Sent revised draft to the Town Manager and Planning Board Chair for the Town of Hanover, New Hampshire and provided contact information for receiving comments—9/3/2020
  - No comments were received
- **Review of existing plans, studies, reports, and technical information (44 CFR 201.6(b)(3))**
  - State of Vermont Hazard Mitigation Plan, 2018
  - Norwich Hazard Mitigation Plan (Adopted 8/4/2015)
    - This Plan was referenced extensively during the plan development process, especially with regard to the worst threats and mitigation action strategies identified in 2011.
  - Norwich Town Plan (Adopted 3/7/2020)
    - The Town Plan provided TRORC’s staff with background information on the community, as well as more detail on their emergency services.
  - Norwich Zoning Bylaws (Adopted 12/03/2008, last revision 7/1/2009)
    - The Zoning Bylaws were referenced for general knowledge and for Norwich’s Flood Hazard Regulations.
  - Norwich Subdivision Regulations (Adopted 08/06/2002, last revision 7/3/2013)
    - The Subdivision Regulations were referenced for general knowledge of the Town’s regulations.
  - Phase 1 and 2 Stream Geomorphic Assessment, Blood Brook Watershed, Norwich, VT
    - Phase 1 Stream Geomorphic Assessment (10/2006)
    - Phase 2 Stream Geomorphic Assessment (02/27/2007)
    - This information was incorporated into the mapping/GIS components of this Plan; specifically in determining the number of structures that are vulnerable to fluvial erosion hazards.
  - Basin 14 Tactical Basin Planning Documents, Norwich Direct Drainages & Lower Ompompanoosuc River
    - 2009 Basin 14 Water Quality Management Plan
    - 2015 Stevens, Wells, Waits, and Ompompanoosuc Basin Plan
    - 2020 Draft Basin 14 Tactical Basin Plan
  - Ompompanoosuc River Corridor Plan, Thetford to Norwich, Vermont (01/10/2014)
    - The lower reaches and convergence of the Ompompanoosuc River with the Connecticut River are located in the Town of Norwich. This River Corridor Plan provided background information and was also reviewed for projects that could be incorporated into the ‘hazard mitigation strategies’ identified in this Hazard Mitigation Plan.

### C. Status Update on Mitigation Actions Identified in 2015

The following table outlines the mitigation actions that were proposed in Norwich's 2015 Hazard Mitigation Plan.

Participants in the new Plan update process reviewed these actions and reported on the status of each.

<b>Mitigation or Preparedness Action identified in 2015 Plan</b>	<b>Local Leadership</b>	<b>Prioritization (in 2015)</b>	<b>Time Frame</b>	<b>2020 Status of Mitigation Action</b>
Ensure that Norwich's Local Emergency Operations Plan (LEOP) is kept up-to-date and identifies vulnerable areas and references this Plan.	Emergency Management Director	High	1 year from date of Plan Approval	Yes - LEMP (formerly LEOP) is submitted by State each year
Consistently document infrastructure damage after weather events.	Public Works Director/DPW	High	As needed	Yes - Town consistently documenting damage; documents using time sheets, equipment, materials used, etc.
Research and establish a system to alert residents of emergencies.	Emergency Management Deputy Director	High	1 year from date of Plan Approval	Yes - Vermont Alert; Red Alert (Hanover Dispatch)
Develop a program to maintain and update town bridge and culvert inventories. Regularly inspect and maintain town bridges and culverts; and develop a schedule to replace undersized culverts.	Public Works Director/DPW	High	Annually/As needed	Yes – town has developed a program to maintain and update; Culvert Inventory in place; Bridge inventory is currently being worked on.

Adopt fluvial erosion hazard (FEH)/river corridor regulations which will incorporate VT ANR's river corridor maps.	Planning Director; Planning Commission; Selectboard	High	6 months - 1 year	No - Town has made a conscious decision not to adopt river corridor regulations. No commitment to revisiting topic in next 5 years. Town has own stream buffer regulation in zoning regs & follows wetland regulations. These meet or exceed state designated distances.
Identify areas of fluvial erosion that could benefit from river/stream corridor plantings on both public and private property.	Conservation Commission; Planning Dept.; DPW	Medium	2-4 years	In progress - Conservation Commission working on this to be included in next Plan update
Complete the following culverts projects:	Department of Public Works	Medium-High	1-4 years	
· Replace 3 wooden bridges on Tigertown Road with 60" HDPE culverts.				2/3 bridges in engineering stages of being replaced
· Replace one undersized steel culvert on Bragg Hill with a new precast concrete box culvert: 5' x 10' x 52'.				No replacement to note.

· Replace an old cement box-type culvert on Route 132 with a 117" x 79" metal pipe arch with concrete headwalls.				In engineering stage to replace by end of 2020
· Replace a wooden bridge on Olcott Road with a 60" HDPE culvert.				No replacement to note.
· Replace an undersized culvert on Four Wheel Drive with a new 24" HDPE culvert.				No replacement to note.
Develop a program to clear and maintain town road rights-of-way, and work with local utilities to request that utility corridors are cleared and maintained, as needed	Norwich Department of Public Works	High	1 year from date of Plan Approval	Yes - ongoing as routine maintenance
Ensure that fire department personnel maintain their Firefighter certifications.	Norwich Fire Department	Medium	As needed	Yes - certifications maintained every year
Complete a comprehensive survey of potential dry hydrant sites to determine the need for additional sites and potential location, and install dry hydrants.	Norwich Fire Department	Medium	2-4 years <i>from date of Plan Approval</i>	Added one dry hydrant site last year, and going to add an additional site this year



Promote installation of sprinklers in new buildings	Norwich Fire Department	High	Annually	Yes - ongoing
Inspect public buildings for potential fire hazards and conduct a voluntary home inspection program.	Norwich Fire Department	Medium	Annually/As needed	Yes - ongoing
Conduct a public education program on fire prevention and disseminate information at the school and on the Town's listserv.	Norwich Fire Department	Medium	Annually/As needed	Active fire education and prevention program with local schools and organizations; on-going
Continue to maintain and update the Town's Source Protection Plan.	Water Operations Manager for the Norwich Fire District and Municipal Water Department; Planning Director	Medium-High	At least every 3 years	Yes - ongoing
Install motion-detection equipment that is connected to dispatch to prevent/discourage intrusion at the reservoir.	Water Operations Manager	High	1 year from date of Plan Approval	Installed alarms and a camera
Install an effective fire alarm system at the pump house that is connected to Hanover Dispatch.	Water Operations Manager	High	1 year from date of Plan Approval	No

Install a sprinkler system or remotely monitored fire alarm system at the Norwich Fire District and Municipal Water Department's pump house.	Water Operations Manager	High	1 year from date of Plan Approval	Yes - remotely monitored fire alarm installed. No sprinkler system installed.
Install a generator at the Norwich Fire District and Municipal Water Department's pump house.	Water Operations Manager	High	1 year from date of Plan Approval	Yes - completed
Ensure that all emergency response and management personnel continue to receive HAZMAT Operations training at a minimum.	Norwich Fire Department	High	As needed	Yes - ongoing
Continuously stock gear to help contain small spills when they occur (booms, absorbent materials, etc.).	Norwich Fire Department	Medium	As needed	Yes - ongoing
Use flood hazard maps to determine the need and plan for response in HAZMAT response in flood hazard areas.	Norwich Fire Department; Planning Department; Emergency Management Coordinator	Medium	2-4 Years from Date of Plan Approval	Yes - ongoing

## D. Existing Hazard Mitigation Programs, Projects, & Activities

The Town of Norwich is currently engaged in the following hazard mitigation programs, projects and activities:

	<b>Type of Existing Authority /Policy / Program / Action</b>	<b>Resources: Staffing &amp; Funding</b>	<b>Ability to Expand/Improve On</b>
<b>Community Preparedness Activities</b>	Program—Annual update of Norwich’s Local Emergency Management Plan (LEMP)	Staff time from the Town Manager and Norwich Fire Chief, with assistance from TRORC. Funding from Vermont DEMHS	Current program works well, no need to expand or improve on. Last updated and approved on 03/30/2015.
	Program—Participation/attendance in the Local Emergency Planning Committee District 12 (LEPC 12)	Staff/volunteer time from the Norwich Fire Department; meetings convened by TRORC. Funding from Vermont DEMHS.	There is no need to expand or improve on attendance as it is considered satisfactory.
	Completed Action—Designated Red Cross Shelter. Formerly at the Town Hall but since relocated to the Hartford High School.	Staff time from the Town Manager and perhaps other emergency management personnel. Funding from American Red Cross.	This was a one-time action.

<b>Insurance Programs</b>	Authority/ Program— participation in National Flood Insurance Program (NFIP). [Note: This section of the Plan satisfies the requirements of 44 CFR 201.6(c)(3)(ii).]	The Norwich Planning Director serves as the NFIP Administrator. Assistance from TRORC and Vermont ANR. Funding from local resources— annual town budget.	Norwich’s initial Flood Hazard Boundary Map was identified on 10/18/74. The Town’s initial Flood Insurance Rate Map (FIRM) was dated 6/15/88. The Town’s FIRM and Flood Insurance Study (FIS) have both been updated, and the current effective date for both is 9/28/07. The Town continues its participation in the NFIP by administering and enforcing its Zoning Regulation which includes a Flood Hazard Overlay District. These regulations were last amended on 07/01/2009. These regulations apply to new construction in the areas of special flood hazard.
<b>Land Use Planning</b>	Policy/Program— Norwich Town Plan. Adopted on 3/7/2020, includes a “Floodplain” section within the Resilience element.	Planning Director, volunteer time from Planning Commission, and assistance from TRORC on specific subject matter. Funding from Municipal Planning Grants.	The Town Plan is updated every eight years, as required by statute. The Planning Commission may expand or improve on any section it deems necessary, or that is required by changes in state statute.
	Authority— Norwich Zoning Regulations. Last amended/adopted on 07/01/2009, and includes a “Flood Hazard Overlay” (FHO) zoning district.	Volunteer time from the Planning Commission, funding from Municipal Planning Grants.	There is no need to expand or improve upon this.

	Policy/Program—Norwich Hazard Mitigation Plan. Adopted on 8/9/2015	Staff/volunteer time from Town officials; assistance from TRORC and Vermont DEMHS. Funding from FEMA; Vermont DEMHS; TRORC.	The 2020 Norwich Local Hazard Mitigation Plan will replace the 2015 Plan. The 2020 LHMP has evolved from the 2015 Plan and has greatly expanded and improved upon it. Future iterations of the Town’s LHMP will be updated by the Town at least every five years.
<b>Hazard Control &amp; Protection of Critical Infrastructure &amp; Facilities</b>	Program— Culvert inventory in 2018. This culvert inventory includes georeferenced locations for all Norwich culverts and recommendations for culvert upgrades to reduce vulnerabilities to flooding.	Staff time from the Public Works Director; assistance from TRORC. Funding from Better Backroads grant; local personnel time and funding.	The Town is currently using the culvert inventory to further its culvert improvement program, and seeking funding through the Better Backroads grant program for implementation projects.
	Authority— Town Road and Bridge Standards (Adopted 03/13/2013). Certificate of Compliance issued 01/08/2014	Adopted by the Selectboard, implemented by the Road Foreman, assistance from TRORC. Funding from VTrans and the local budget to implement.	Specifies minimum construction standards for roadway, ditches, culverts and bridges and guardrails. VTrans updates the Town Road and Bridge Standards on a fairly regular basis. The Town has the authority to require above-and-beyond what is written in the policy.
<b>Education/Public Outreach</b>	Ongoing Action—Citizen Handbook at Town Clerk’s Office	Staff time from the Town Office/Funding from local budgets.	There is no need to expand or improve on this action.
	Program—Fire District Emergency Operations Plan (different from the LEMP referenced above)	Staff/volunteer time from the Norwich Fire District. Funding from the fire district budget.	This Emergency Management Plan is updated regularly, and there is no need to expand or improve on this Plan.

	Program—Fire Safety Education provided by Norwich Fire Department	Staff/volunteer time from the Norwich Fire District. Funding from the fire district budget.	There is no need to expand or improve on this action.
	Program—A Consumer Confidence Report is distributed to consumers connected to the Norwich Fire District #1 water system.	Staff time from the Norwich Fire District #1's staff. Assistance provided by Vermont Department of Environmental Conservation's Drinking Water and Groundwater Protection Division. Funding from the Norwich Fire District #1.	A Consumer Confidence Report is distributed each year. There is no need to expand or improve on this program.

## E. Plan Maintenance

A hazard mitigation planning team will be responsible for maintenance of the Norwich Local Hazard Mitigation Plan. The team will report and make recommendations, through the Town Manager, to the Selectboard on the status of plan implementation and any necessary changes to the Local Hazard Mitigation Plan.

This Plan (the Norwich Local Hazard Mitigation Plan) will be updated and evaluated, by discussing its effectiveness and making note to incorporate any necessary revisions in the update process, annually at an April meeting, along with the review of the Local Emergency Management Plan (LEMP). At this meeting, the team will monitor the implementation of the hazard mitigation strategies outlined in this Plan, by noting those that have been completed, are in the process of completion, or any issues with initiating the activity. Any comments from local officials and the public will be incorporated when relevant. This meeting will constitute an opportunity for the public and other town officials to hear about the town's progress in implementing mitigation strategies and to give input on future activities and Plan revisions. The public will be given the opportunity to comment at this meeting, and the comments will be incorporated when relevant.

Updates and evaluation of this Plan by the team and the local Emergency Coordinator/Director will also occur within three months after every federal disaster declaration directly impacting the Town of Norwich. The Town will monitor, evaluate and update this Local Hazard Mitigation Plan at every April at a meeting and after every federally declared disaster according to the graphic in Appendix B. The Town shall reference the Local Hazard Mitigation Plan when working on Town Plan amendments or changes to the Town's bylaws.

At least one year before the Plan expires, the update process will begin (though annual updates, monitoring of progress and evaluation will occur at the April meeting). For this next Plan update, the Two Rivers-Ottawaquechee Regional Commission (TRORC) will help with Plan updates if the Town of Norwich requests assistance and if funding is available. If TRORC is unable to assist the Town, then Norwich's Town Manager/Emergency Management Director will update the Plan with the assistance of the hazard mitigation planning team. Ultimately, it will be the Town's responsibility to update their Local Hazard Mitigation Plan.

The process of evaluating and updating the plan will include continued public participation through public notices posted on the municipal website, notice within the municipal building, and notice in Valley News of White River Junction, and the TRORC newsletter and blog, inviting the public to the scheduled Selectboard (or specially scheduled) meeting. The public will be given the opportunity to comment during the public meeting(s). Additional stakeholders will be invited to the meeting; these include: Norwich Fire District #1, VTrans, and the Vermont Agency of Natural Resources (VT ANR). VT ANR will be invited because they can provide assistance with NFIP outreach activities in the community, models for stricter floodplain zoning regulations, delineation of fluvial erosion hazard areas, and other applicable initiatives. These efforts will be coordinated by the Town Manager.

Updates may include changes in community mitigation strategies; new town bylaws, zoning and planning strategies; progress on the implementation of initiatives and projects; effectiveness of implemented projects or initiatives; and evaluation of challenges and opportunities. If new actions are identified in the interim period, the plan can be amended without formal re-adoption during regularly scheduled Selectboard meetings.

Norwich will also incorporate mitigation planning into their long-term land use and development planning documents<sup>2</sup>. To do so, flood hazard and fluvial erosion hazards will be identified, and strategies and recommendations will be provided to mitigate risks to public safety, critical infrastructure, historic structures and public investments. The Local Hazard Mitigation Plan helps Norwich comply with the community flood resiliency requirement for town plans.

The Town will review and incorporate elements of the Local Hazard Mitigation Plan into updates for the municipal plan, zoning regulations, and flood hazard/ fluvial erosion hazards (FEH) bylaws. The incorporation of the goals and strategies listed in the Local Hazard Mitigation Plan into the municipal plan, zoning regulations and flood hazard/FEH bylaws will also be considered after declared or local disasters. The Town will also consider reviewing any future TRORC planning documents for ideas on future mitigation projects and hazard areas.

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<sup>2</sup> 24 V.S.A § 4302 requires all towns to incorporate flood resiliency elements into their town plans as of July 2014.



## V. Community Vulnerability by Hazard

### A. Hazard Identification

Mitigation efforts are grounded in a rational evaluation of hazards to the area and the risks these hazards pose. This was done through a process, which in essence asked and answered three basic questions:

- What bad things can happen?
- How likely are they to occur?
- How bad could they be?

This process, which is laid out in the table below, is an attempt to inventory known hazards, establish the likelihood of them occurring in the future, and then assess the community's potential vulnerability to each. In performing this analysis, Norwich will prioritize actions that are designed to mitigate the effects of each of these disaster types and ultimately make Norwich a safer place.

Disasters that have occurred within the Town of Norwich, the larger region, and the State of Vermont provides good information about the types of disasters that can be expected in the future and what kinds of damage they might cause. This historical data can inform us of what might happen in the future, but it is not predictive. While Norwich might not have been impacted by a specific hazard in the past, this does not necessarily mean it will never be affected in the future. Indeed, climate change may mean that historic weather patterns may not be predictive of future weather patterns. For instance, in recent years, Vermonters have seen an increase in the number and severity of storms, especially rainfall events. Armed with historical data and information on climate change and the unknown, we have tried to identify hazards and prepare for the future.

The following table reflects the hazards that can be expected, or are at least possible, in the Norwich, Vermont area. We have considered factors such as frequency of occurrence, warning time and potential community impact to rank each and determine which hazards pose the greatest threats to life and property in Norwich<sup>3</sup>. The worst threats (bolded in the table, below) are then followed-up with discussion and mitigation strategies throughout the rest of this Plan<sup>4</sup>. It should be noted that hazards assigned with the same "Hazard Score" are not in order and their placement in the table should not be assumed to reflect their potential to create hazards for the town.

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<sup>3</sup> The ranking methodology used in this Plan (see Appendix A) is closely modeled on that which is used by the Vermont Division of Emergency Management & Homeland Security (VDEMHS). The only changes made were intended to reflect the more limited geographical scope of this analysis, which is focused on a small, rural town rather than the entire State of Vermont (which is the focus of VDEMHS).

<sup>4</sup> It is important to note that those hazards which were not found to pose the greatest threats may still occur in Norwich's future; however, they are not the focus of this Plan.

<b>Hazard</b>	<b>Frequency of Occurrence</b>	<b>Warning Time</b>	<b>Potential Impact</b>	<b>Hazard Score</b>
<b>Flash Flood/Flood/Fluvial Erosion</b>	<b>Highly Likely</b>	<b>3-6 Hours</b>	<b>Moderate</b>	<b>10</b>
<b>Cyber Attack/Security Breach</b>	<b>Occasionally/Likely</b>	<b>None-Minimal</b>	<b>Moderate/Major</b>	<b>9.5</b>
<b>Severe Weather (Thunderstorm, Lightning, High Wind, Hail)</b>	<b>Highly Likely</b>	<b>6-12 Hours</b>	<b>Moderate</b>	<b>9</b>
<b>Extreme Cold/Snow/Ice Storm</b>	<b>Highly Likely</b>	<b>6-12 Hours</b>	<b>Moderate</b>	<b>9</b>
<b>Winter Storm</b>	<b>Highly Likely</b>	<b>6-12 Hours</b>	<b>Moderate</b>	<b>9</b>
<b>Public Water Supply Contamination/Hazardous Material Spill</b>	<b>Occasionally /Likely</b>	<b>None-Minimal</b>	<b>Moderate</b>	<b>9</b>
<b>Structural Fire</b>	<b>Likely</b>	<b>None-Minimal</b>	<b>Minor</b>	<b>9</b>
Active Shooter	Occasionally	None-minimal	Moderate	9
Tornado	Occasionally	3-6 Hours	Moderate	8
<b>Pandemic/Infectious Disease Outbreak</b>	<b>Likely</b>	<b>&gt;12 hrs</b>	<b>Major</b>	<b>8</b>
Hurricanes/Tropical Storms	Likely	>12 Hours	Major	8
Wildfire	Occasionally	None-Minimal	Minor/Moderate	8.5
Dam Failure	Occasionally	None-Minimal	Minor-Moderate	8-9
Invasive Species/Infestation	Highly Likely	>12 Hours	Negligible	6
Landslides/Mudslides/Rockslides	Unlikely	None-Minimal	Negligible	6
Extreme Heat	Likely	>12 Hours	Negligible	5
Ice Jams	Occasionally	6-12 Hours	Negligible	5
Drought	Occasionally	>12 Hours	Minor	5
Earthquake	Unlikely	None-Minimal	Negligible	5

The Norwich HMP Planning team discussed the results of the hazard ranking activity and decided to focus on hazards that had the potential to impact the Town on a town-wide scale and/or had the potential to occur frequently. These are the hazards the team chose to focus on in detail. The other remaining hazards will not be addressed in detail because they are less likely to majorly impact the Town. Refer to Appendix A for definitions of the hazard ranking terms used in the above chart.

The team decided to group formerly separate weather categories together into “Severe Weather” and to group hazardous material spills with water supply contamination. They also decided to discuss Pandemic/Infectious Disease Outbreak as a top hazard due to the Covid-19 pandemic that is happening at the time of writing this Plan.

After engaging in discussions using their best available knowledge, the Town of Norwich identified the following “top hazards” that they believe their community is most vulnerable to:

- Flash Flood/Flood/Fluvial Erosion
- Cyber attack/security breach
- Severe Weather
- Water Supply Contamination/ Hazardous Material Spill
- Structural Fire
- Pandemic/Infectious Disease Outbreak

Each of these “top hazards” are discussed in the following sections. Within each section, previous occurrences of each hazard are listed, including the County-wide FEMA Disaster Declarations (DR-#), where applicable. Hazards information was gathered from local sources (ex., town history book), the National Climatic Data Center’s (NCDC’s) Storm Events Database, the Spatial Hazard Events and Losses Database for the United States (SHELDUS), and Special Reports produced by the National Weather Service in Burlington, Vermont. This section also includes a description of each “top hazard” and a hazard matrix that also includes the following information (please see each hazard profile for a hazard-specific matrix):

<b>Hazard</b>	<b>Location</b>	<b>Vulnerability</b>	<b>Extent</b>	<b>Observed Impact</b>	<b>Likelihood/Probability</b>
Type of hazard.	General areas in community that may be vulnerable to the hazard.	Community structures affected by hazard.	Strength or magnitude, and details of a notable event(s).	Dollar value or percentage of damages.	<u>Occasionally</u> : 1–10% probability of occurrence per year, or at least one chance in next 100 years <u>Likely</u> : >10% but <100% probability per year, at least 1 chance in next 10 years <u>Highly Likely</u> : 100% probable in a year

## B. Hazard Profiles for “Top Hazards”

### 1. Flash Flood/Flood/Fluvial Erosion

Flooding is one of the worst threats to Norwich’s residents and infrastructure. Past instances of flooding in Norwich have included rain and/or snowmelt events that cause flooding in the major rivers’<sup>5</sup> floodplains and intense rainstorms over a small area that cause localized flash- flooding and flooding in the tributaries to the major rivers.

Both kinds of events can be worsened by the build-up of ice or debris, which can contribute to the failure of important infrastructure (such as culverts, bridges, and dams).

Norwich, like many of the towns in Windsor County bordering the Connecticut River and state of New Hampshire, saw lower precipitation totals than did numerous towns in the interior of the county. The flooding that occurred as a result of Tropical Storm Irene is considered to be greater than a 1% flood event, and was likely closer to a 0.2% flood.

During Tropical Storm Irene, the Town suffered moderate damage, which was largely confined to roadways and infrastructure. Many of Norwich’s roads and bridges were damaged by the storm, including parts of: Bragg Hill Road, Mitchell Brook Road, Tigertown Road, Cossingham Road, Hickory Ridge, Hawk Pine Road, Colton Drive, Chapel Hill North, and Bridges 32, 39, 40 and 41. Additionally, clean-up projects occurred in a number of other areas across the Town. With respect to damage to property, Saint Francis of Assisi Catholic Church and a few other properties experienced some minor flooding issues. The county-wide damage for Windsor County totaled over \$32.5 million. The damage in Norwich exceeded \$1.2 million. Following the flood damage, the State of Vermont and FEMA have been coordinating on the home buy-out process across the state. Norwich was spared property losses that warrant buy-outs in the wake of the storm.

Unfortunately, flooding is very common across the region, with many events impacting the Town of Norwich specifically. Flooding is one of the worst threats to Norwich’s residents and infrastructure, owing to the prevalence of rivers, streams, and brooks throughout the Town, and the dispersed settlement pattern often close to known hazards. The following list indicates the history of occurrence with regard to this hazard in Windsor County (given the small population of Norwich, town-specific data is limited).

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<sup>5</sup> Connecticut River and Ompompanoosuc River

**History of Occurrences:**

Date	Event	Location	Extent
4/15/2019	Flash Flood	Windsor County	Widespread 0.5 to 1.5 inches of rain and significant melting snow at mid and upper elevations caused flash flooding across portions of southern and central Vermont
7/27/2018	Flash Flood	Windsor County	A cold front moved across New York into Vermont during the afternoon hours of July 27th. Scattered thunderstorms in moderated instability caused isolated wind damage in the form of downed trees and localized flash flooding in nearby Springfield.
7/17/2017	Flash Flood	Windsor County	A weak surface and mid-level wave moved across Vermont in a moderately unstable (very cool aloft) air mass during the afternoon of July 17th. Scattered thunderstorms developed with a few containing large hail (> .75 inch in diameter) and some winds. Heavy rain additionally produced some isolated Flash Flooding.
7/1/2017	Flash Flood	Windsor County	Flash flooding damaged roads across northern Windsor County. Flowing water covered Route 132 in Sharon, and multiple residences were cut off by high water and damaged roads throughout the area. Residences along Sargent Road in Norwich were damaged.

7/28/2014	Flash Flood	Windsor County	Stationary thunderstorms developed in the early evening of July 28 over south central Windsor County Vermont in the headwaters of the Williams River. Rainfall totals were two to three inches in a little over an hour.
8/28/2013	Flash Flood	Windsor County	Severe thunderstorms with heavy rainfall hit the region, resulting in isolated flash flooding. Portions of Routes 4 and 5 in nearby White River Junction were flooded with two feet of water.
06/25/2013-07/11/2013 (DR-4140)	Severe Storms & Flooding	Windsor County	Severe storms over this period caused flooding in places, property damage, intermittent power losses, etc. Two to three inches fell in Windsor County on 7/2 alone, flooding many roadways. No major damage in Norwich.
08/28/2011-08/29/2011 (DR-4022)*	Flood, Tropical Storm Irene	Norwich, Windsor County	Tropical Storm Irene brought winds in excess of 60 mph in places and heavy rains to the state, causing significant flooding in places. Homes, businesses and roads were flooded throughout Windsor County along the Ottauquechee River. Norwich was recorded as having 4-6" of rainfall over the course of the storm in a matter of hours. A total of \$32.5m in damage was reported for Windsor County. \$1,234,340.21 for Norwich from FEMA's Public Assistance database (captures at least 70% of total damage).
4/27/2011	Flood	Windsor County	High temperatures, snowmelt and rainfall combined to produce significant flooding in places throughout the region.

08/07/2008*	Flash Flood	Norwich, Windsor County	Heavy rains combined with previously saturated soils resulted in scattered flash flooding, washing out several driveway culverts.
07/21/2008-08/12/2008 (DR-1790)*	Severe Storms & Flooding	Norwich, Windsor County	Severe storms and flooding hit Windsor County and other parts of Vermont, leaving damage in their wake. Storms on 8/6 caused over \$100k in damage alone in Windsor County. Scattered flash flooding occurred in West Norwich.
07/09/2007-07/11/2007 (DR-1715)	Severe Storms & Flooding	Windsor County	Severe storms and flooding struck a number of counties in Vermont, including Windsor.
04/15/2007-04/21/2007 (DR-1698)	Severe Storms & Flooding	Windsor County	Severe storms and flooding hit Windsor and other counties throughout Vermont.
5/14/2006	Flood	Windsor County	Strong storms brought 3-6" of rainfall to Windsor County, causing flooding and minor washouts on several roads. \$25k in damages reported throughout the county.
10/07/2005-10/9/2005	Heavy Rain	Windsor County	Heavy rains reached over 6" in portions of Windsor County, causing flooding, mudslides, and clogged culverts in places
07/21/2003-08/18/2003 (DR-1488)	Severe Storms & Flooding	Windsor County	Severe storms and flooding hit Windsor County and other portions of the state, causing damage.
04/13/2002-4/14/2002	Flood	Windsor County	A combination of snowmelt and rainfall of 1-3" across the area caused flooding in areas. \$50k in damage reported throughout the county.



12/17/2000-12/18/2000	Flash Flood	Windsor County	Small streams overflowed their banks, causing some road and low-land flooding. \$5k in damage reported throughout Windsor County.
7/31/2000	Flash Flood	Windsor County	A strong storm brought heavy rainfall to the region, causing many smaller rivers to reach or exceed bankfull conditions. \$10k in damage reported in Windsor County.
07/14/2000-07/18/2000 (DR-1336)	Flash Flood	Windsor County	Strong showers and thunderstorms across the state resulted in especially heavy rainfall. \$500k in reported damage throughout the county
4/4/2000	Flash Flood	Windsor County	Mild temperatures and steady rains resulted in melting mountain snows, which led to many rivers and streams rising up bankfull or above and some flooding in areas. \$5k in damage reported in Windsor County.
3/28/2000	Flash Flood	Windsor County	Steady rain and melting snow resulted in rising water levels on country rivers and streams. \$5k in damage reported in the county.
09/16/1999-09/21/1999 (DR-1307)	Tropical Storm	Windsor County	Tropical Storm Floyd brought heaving rains, high winds, and flooding to many counties in Vermont, including Windsor.
6/27/1997	Flash Flood	Windsor County	Heavy rains brought 3 to 6 inches of rainfall to northern portions of Windsor County, causing extensive flood damage. \$1m in damages were reported throughout the county.
01/19/1996-1/20/1996	Flood	Windsor County	Rainfall, strong winds, and above-normal temperatures precipitated snowmelt, leading to deadly flooding in places. Two fatalities were associated with the storm, and there were numerous power outages reported.
07/06/1973 (DR-397)	Severe Storms, Flooding, Landslides	Norwich, Windsor County	Extensive rains fell on already soaked watersheds, including the Ottauquechee. Recorded data of select Windsor County towns shows that many experienced between 5-9" of rainfall over the course of the storm, forcing evacuations. Rivers and streams throughout the town reached or breached bankfull conditions, causing widespread damage.
11/03/1927-11/04/1927*	Flood	Norwich, Windsor County	The greatest recorded flood disaster in Vermont history devastated the state, losing countless homes, 1,285 bridges, hundreds of miles of roadways and railway tracks, and taking a total of 84 lives, including then- Lt. Gov. S. Hollister Jackson. Rain totals over the 3rd and 4th reached 6-7" in Norwich.

The Town has flood hazard regulations that are integrated into the Norwich's Zoning Bylaws. The Town's Flood Hazard Overlay (FHO) district restricts development in flood-prone areas within the designated FHO overlay district, in part to minimize and prevent the loss of life and property resulting from flood events.

Norwich has 56 structures in the Special Flood Hazard Area (SFHA). Twenty-five percent of these structures have flood insurance. Approximately 50 of these structures are dwelling units. There are no repetitive loss properties identified by the NFIP in Norwich. There are no critical or public facilities located in the SFHA.

Across Vermont, most child and elder care facilities are not registered with the State. Norwich has five licensed childcare facilities. There are no elder care facilities in the Town of Norwich. Finally, low income housing is not registered with the State, and currently there are no mobile home parks located in Norwich that are registered with the State.

Recent studies have shown that the majority of flooding in Vermont is occurring along upland streams, as well as along road drainage systems that fail to convey the amount of water they are receiving. These areas may not be recognized as being flood prone, and property owners in these unmapped areas are not required to have flood insurance (DHCA, 1998). While small, mountainous streams may not be mapped by FEMA in NFIP FIRMs (Flood Insurance Rate Maps), flooding along these streams is possible, and should be expected and planned for. Flash flooding in these reaches can be extremely erosive, causing damage to road infrastructure and to topographic features including stream beds and the sides of hills and mountains. The presence of undersized or blocked culverts can lead to further erosion and stream bank/mountainside undercutting. Furthermore, precipitation trend analysis suggests that intense, local storms are occurring more frequently.

Norwich maintains an up-to-date list of culverts and culvert condition, and has engaged in culvert upgrading since before the 2011 Norwich Annex was drafted. The process of upgrading culverts happens routinely, and the latest culvert inventory was completed in 2018 with assistance from Two Rivers-Ottauquechee Regional Commission.

There are two home-addition projects in Norwich that are located in the Special Flood Hazard Area, one currently under construction and one currently being reviewed by the state floodplain management office. Due to their location in the Special Flood Hazard Area, both of these projects are or could be vulnerable to flooding. There are no repetitive loss properties in the Town of Norwich on FEMA's NFIP list. There has not been development in vulnerability locations that increase vulnerability in town. Since the previous plan, vulnerability in Norwich has remained the same for natural disasters because of this. Norwich's vulnerability to cyber attacks/security breaches increases as scammers increase their efforts.

<b>Hazard</b>	<b>Location</b>	<b>Vulnerability</b>	<b>Extent</b>	<b>Observed Impact</b>	<b>Likelihood/ Probability</b>
Flooding/ Flash Flood/ Fluvial Erosion	Along the Connecticut River, southern section of Kendall Station Road and all of River Edge Lane. Low areas adjacent to Blood Brook.	Culverts, bridges, road infrastructure. There are 56 structures located in the Special Flood Hazard Zone	Flooding: Tropical Storm Irene- 4-7" across the county (4-6" in Norwich).  Fluvial Erosion: extent data unavailable.	From TS Irene: \$1,234,340.21 for Norwich from FEMA's Public Assistance database (captures at least 70% of total damage).	Highly Likely

## 2. Cyber Attack/Security Breach

Cyberattacks against municipalities are increasingly common as more local governments adopt new technologies. Unlike private businesses, municipalities are less prepared for an attack as local governments typically have limited budgets for upgrading networks and security systems, often use outdated technology and may not have dedicated IT staff to implement organizational safeguards to protect against the risk of a cyberattack.

In 2019, Town of Norwich staff fell victim to an e-mail scam resulting in four Automated Clearing House payments totaling nearly \$250,000 being made without approval to a perpetrator imitating the email address of the Town Manager. This kind of scam is known as a business email compromise (BEC) attack. Between January 2014 and October 2019, the Internet Crime Complaint Center received complaints totaling more than \$2.1 billion in actual losses from BEC scams. BEC scams have been reported in all 50 states and in 177 countries. Small and medium-size organizations, or those with limited IT resources, are most vulnerable to BEC scams because of the costs of robust cyber defense.

Another common method of attack against municipalities is ransomware, which is a malware that locks users out of their devices or blocks access to files until a sum of money or ransom is paid. If defenses fail, a city could be stuck paying the cost of a ransom or losing vital information needed to provide services to the community.

The Norwich Selectboard will develop policies to charge the Town Manager to ensure regular updates of the Town of Norwich computers, servers, local area network, firewall, software, hardware, accessibility protocols and codes, and any other cyclical maintenance required to secure the Town's systems. In addition, the Selectboard will require the Town Manager to train all staff in order to minimize data and security breaches that are caused by human error. The Selectboard will appropriately budget for voter approval at Town Meeting funding through the annual budget and capital budget to support the security measures.

The Town Manager will assess the condition and operations of the Town's computers, local area network, firewalls, hardware, software, staff development and any other relevant security components with the help of consultants, and determine how to phase in security measures within a reasonable but expedient time frame. He will work with the Selectboard to determine how to incorporate this plan into the annual and capital budgeting processes.

<b>Hazard</b>	<b>Location</b>	<b>Vulnerability</b>	<b>Extent</b>	<b>Observed Impact</b>	<b>Likelihood/Probability</b>
Cyber attack/ security breach	Online	Municipal funds and confidential or sensitive information	Observed impact: business email compromise scam	\$250,000 transferred to scam perpetrator	Occasionally/ Likely

### 3. Severe Weather

More common than hurricanes or tropical storms are severe thunderstorms (usually in the summer), which can cause flooding as noted above, and are often associated with lightning, high winds, hail and tornadoes. Hailstorms have occurred in Vermont, usually during the summer months. While local in nature, these storms are especially significant to area farmers, who can lose entire fields of crops in a single hailstorm. Large hail is also capable of property damage. Tennis ball-sized hail was reported in the town of Chittenden during a storm in the summer of 2001. Thunderstorms can generate high winds, such as hit the region on July 6, 1999, downing hundreds of large trees in a few minutes.

In Norwich, severe weather is quite common, typically in the late spring and summer months when the region experiences high temperatures. Severe thunderstorms tend to bring other hazards, such as high winds, hail, and lightning, and flooding. These hazards are often experienced in combinations that create many unique weather and emergency management situations. Over the years, Norwich has been hit with high winds that have downed and uprooted numerous trees, and knocked out electricity to residents in the Town. Town-specific wind data could not be found, but the “Remarks” section of NCDC Database helps to illuminate the impact strong winds can have on the Town of Norwich. Sizeable hail has also accompanied storms moving through the Town and region.

Winter storms and extreme cold are a regular occurrence in Vermont. Severe winter storms can cause serious damage, including collapse of buildings due to overloading with snow or ice, brutal wind chills, downed trees, downed power lines, and stranded vehicles. People can be at risk of freezing in extended power outages if they lack wood heat or backup power, and individuals shoveling large accumulations of snow can also be at risk from frostbite, hypothermia and heart attacks due to cold and overexertion. While snow removal from the transportation system is standard fare in Vermont winters, extreme snow or ice can close rail and road systems, further jeopardizing any stranded persons that are in danger of freezing or needing medical assistance.

The following list indicates the history of occurrence for the past 10 years regarding severe weather in Windsor County (given that small population of Norwich, town-specific data is limited). In an attempt to capture the individual hazards that may arise, and the different circumstances caused by the hazards in concert, the separate hazards are documented in the table below.

#### History of Occurrences:

Date	Event	Location	Extent
3/23/2020	Winter Storm	Windsor County	A period of heavy snow with 2-3 inches per hour rates moved through during the evening hours with storm total snowfall of 7-10 inches. This led to some minor, isolated power outages.
11/1/2019	Strong Wind	Windsor County	Strong winds with wind gusts in excess of 50 mph at times caused numerous downed tree limbs and subsequent power outages.

6/20/2019	Thunderstorm Wind	Windsor County	Thunderstorm winds knocked tree on power lines.
3/22/2019	Winter Storm	Windsor County	A heavy wet snow fell across Windsor county with snowfall totals of 8 to 12 inches with the higher totals in the higher elevations.
2/25/2019	Strong Wind	Windsor County	Strong west-southwest winds of 20 to 30 mph with gusts up to 45 mph occurred behind a strong storm system in Canada. Power outages across the county were in the hundreds.
2/12/2019	Winter Storm	Windsor County	A widespread 5 to 10 inches of snow fell across Windsor county, mixed with freezing rain at times.
1/29/2019	Winter Storm	Windsor County	A widespread 5 to 8 inches of snow fell across Windsor county.
1/19/2019	Winter Storm	Windsor County	A widespread snowfall of 10 to 18 inches occurred across Windsor county
1/8/2019	Winter Storm	Windsor County	A widespread 6 to 10 inches of snow fell across Windsor county. The snow was a denser, wetter snow that led to scattered power outages.
11/26/2018	Winter Storm	Windsor County	Light rain changed to a pasty, heavy wet snow that resulted in downed tree limbs and power outages across VT. In Windsor county, snow accumulated 3 to 6 inches in the valleys but quickly rose to 12 to 20 inches above 1000 feet
11/3/2018	Strong Wind	Windsor County	Most wind gusts in the mid 30s to lower 40s mph. The combination of these winds and saturated soils accounted for more than 8000 outages.
10/16/2018	Strong Wind	Windsor County	Strong down slope westerly winds of 35 to 50 mph caused scattered to numerous tree and utility line damage, especially immediately along the eastern slopes of Vermont's southern Green Mountains.
3/13/2018	Winter Storm	Windsor County	Long duration snowfall event eventually delivered 10 to 20 inches across Windsor county, with the heaviest occurring the afternoon of March 13th into the morning hours of the 14th.
3/7/2018	Winter Storm	Windsor County	A long duration snow event deposited 12 to 26 inches across Windsor county, with the highest totals along the southern Green mountains.
2/7/2018	Winter Storm	Windsor County	A widespread 6 to 10 inches of snow fell across Windsor county
2/4/2018	Winter Storm	Windsor County	A widespread 5 to 10 inches of snow fell across Windsor count
12/25/2017	Winter Storm	Windsor County	A widespread 5 to 9 inches of snow fell.
12/22/2017	Winter Storm	Windsor County	Snowfall amounts of 5 to 10 inches were reported.
12/12/2017	Winter Storm	Windsor County	A widespread 8 to 16 inches of snow fell across Windsor county

10/30/2017	Strong Wind	Windsor County	Scattered tree damage and power outages with measured wind gusts in the 40-50 mph range.
5/5/2017	Strong Wind	Windsor County	Several wind gusts estimated to be 45-55 mph occurred sporadically across the higher elevations.
4/1/2017	Winter Storm	Windsor County	Widespread 8 to 16 inches of a heavy, wet snow fell across the region
3/31/2017	Winter Storm	Windsor County	Widespread 8 to 16 inches of a heavy, wet snow fell across the region
3/14/2017	Winter Storm	Windsor County	Snowfall totals across Windsor county generally ranged from 12 to 24 inches
2/12/2017	Winter Storm	Windsor County	Widespread 6 to 10 inches of snowfall reported
12/29/2016	Winter Storm	Windsor County	A widespread 6 to 12 inches of snow was observed.
5/27/2015	Thunderstorm Wind	Norwich	Trees on power lines at the intersection of Union Village and Bradley Hill roads
5/10/2015	Thunderstorm Wind	Norwich	Multiple trees and power lines downed by thunderstorm winds.
2/7/2015	Winter Storm	Windsor County	Widespread snowfall reports of 5 to 9 inches with some localized 12 inch amounts in Windsor county.
2/2/2015	Winter Storm	Windsor County	Snowfall across Windsor county was 6 to 15 inches with this event.
1/27/2015	Winter Storm	Windsor County	Snowfall across Windsor county was 6 to 10 inches.
1/7/2015	Extreme Cold/Wind Chill	Windsor County	Temperatures by early evening of January 7th were zero to 10 above zero with winds of 15 to 30 mph that created wind chills colder than 20 to 30 below zero through the overnight into the morning hours of January 8th. Actual morning low temperatures on January 8th were 10 below to 20 below zero in Windsor county,
12/9/2014	Winter Storm	Windsor County	Heavy, wet snowfall totals across Windsor county ranged from 6 to 18 inches.
11/26/2014	Winter Storm	Windsor County	Snowfall totals of 10 to 12 inches were common
3/12/2014	Winter Storm	Windsor County	Snowfall totals across Windsor county ranged from 4 to 24+ inches
2/13/2014	Heavy Snow	Windsor County	Snowfall across Windsor county was 12 to 20+ inches
2/5/2014	Heavy Snow	Windsor County	Eight to twelve inches of snow fell across Windsor county.
1/2/2014	Winter Storm	Windsor County	A widespread 6 to 9 inches of snow fell across Windsor county.
12/29/2013	Winter Storm	Windsor County	A wet, heavy 6 to 10 inches of snow fell across Windsor county.
12/14/2013	Winter Storm	Windsor County	A widespread 10 to 15 inches of snow fell across Windsor county.
10/7/2013	Strong Wind	Windsor County	Several reports of tree branches on utility lines in several communities in Windsor county
6/2/2013	Thunderstorm Wind	Norwich	Several trees down.

3/18/2013	Winter Storm	Windsor County	Eight to 14 inches of snow fell across the county, the lower amounts in the valleys and higher amounts above 1000 feet. Numerous vehicle accidents, some involving tractor trailers.
2/27/2013	Winter Storm	Windsor County	A general 6 to 12 inches of snow fell above 1200 feet.
2/8/2013	Winter Storm	Windsor County	Eight to sixteen inches of snow fell across Windsor county.
1/20/2013	Strong Wind	Windsor County	Scattered reports of tree limbs, tree branches down and power outages across the region.
12/29/2012	Winter Storm	Windsor County	Snowfall totals across Windsor county were generally 5 to 8 inches.
12/26/2012	Winter Storm	Windsor County	Snowfall totals of 6 to 12 inches were common in Windsor county
10/29/2012	Strong Wind	Windsor County	East-northeast winds of 15 to 30 mph sustained with frequent gusts in excess of 40 mph caused scattered damage to tree limbs, branches and a few small trees.
3/1/2012	Winter Storm	Windsor County	Widespread 4 to 8 inches of snowfall occurred in Windsor county
2/29/2012	Winter Storm	Windsor County	Snow arrived during the evening hours of February 29th and continued through the day of March 1st
1/18/2012	Strong Wind	Windsor County	Strong south to southwest winds with frequent gusts in excess of 40 mph and a few gusts to 50 mph knocked down some tree limbs and caused some scattered power outages.
11/22/2011	Winter Storm	Windsor County	Six to twelve inches of a heavy, wet snow mixed with rain and sleet at times fell across Windsor county
10/29/2011	Winter Storm	Windsor County	Snowfall reports between 6 and 10 inches
8/28/2011	Strong Wind	Windsor County	Frequent wind gusts of 40 to 55 mph, especially across exposed higher terrain, along with saturated soils caused widespread downed and uprooted trees.
4/16/2011	Strong Wind	Windsor County	Several reports of trees down and scattered power outages along elevated hillsides within the county.
3/6/2011	Winter Storm	Windsor County	Snowfall amounts of 4 to 16 inches were reported in Windsor county
2/25/2011	Winter Storm	Windsor County	Snowfall amounts of 7 to 14 inches were observed in Windsor county.
2/19/2011	Strong Wind	Windsor County	Strong west to northwest winds of 20 to 30 mph with gusts of 40 to 50 mph accompanied the colder air and produced numerous but scattered power outages
2/2/2011	Winter Storm	Windsor County	Snowfall totals across Windsor county were 10 to 15 inches.
1/18/2011	Winter Storm	Windsor County	Combined snowfall and sleet accumulations ranged from 6 to 10 inches across Windsor county
1/12/2011	Winter Storm	Windsor County	Generally 8 to 15 inches of snow fell across Windsor county



12/26/2010	Winter Storm	Windsor County	Snowfall totals of 6 to 15 inches with localized higher amounts occurred as well as considerable blowing and drifting of the snow due to north winds of 15 to 25 mph with gusts approaching 40 mph.
2/26/2010	High Wind	Windsor County	Strong easterly winds of 80 to 100 mph along the peaks of the Vermont's Green Mountains
2/23/2010	Winter Storm	Windsor County	A heavy wet snow fell across Vermont that resulted in snowfall accumulations of 6 to 30 inches

Hazard	Location	Vulnerability	Extent	Observed Impact	Likelihood/Probability
Severe Weather	Town-wide	Severe weather: private and public property, power, utility infrastructure, town services  Severe winter weather: bridges and roads, vulnerable populations like elderly or those without heat, travelers on roads	Severe weather: June/July 2013 storms damaged nearly 20% of the town's road, downed trees. TS Irene brought 4-6" of rain and caused over \$1,234,340.21 in damage (from FEMA's Public Assistance Database, capturing at least 70% of total damage); high winds at 60+ mph  Severe winter storm: 26 inches of snowfall	Often minimal, but severe weather has the potential to cause significant damage.	Highly likely

\*Note: The main hazard caused by severe weather is typically flooding (though not always). In addition, flooding is often the most expensive hazard caused by severe weather. Therefore, the Extent and Impact categories for Severe Weather will reflect the data reported in the Flash Flood/Flood/Fluvial Erosion, as it represents the higher limits of damage caused by severe weather.

#### 4. Public Water Supply Contamination/Hazardous Material Spill

The majority of towns and individuals in Vermont use groundwater as their primary source of water.

While groundwater is more protected from contamination than surface water and is generally of a high quality, groundwater is still at risk of contamination from a number of point and non-point sources, as a result of microbial, organic, inorganic, and radioactive contaminants, or pesticides and herbicides. Sources of surface contamination located directly above the aquifer may leach through the soil and into the groundwater, or groundwater contamination from another distant source may migrate, and, consequently, contaminate a town or individual's water supply.

The migration of contaminants is made more complex because the patterns of groundwater movement, and their relationship to surface water movement, are not completely understood. This creates the potential for groundwater supplies to become contaminated from discrete and unknown sources. It is important to protect groundwater supplies from contamination to the greatest extent possible, because, once contaminated, it is difficult and expensive to clean them to the point where they are again suitable for drinking water.

Water sources can also be contaminated by perfluorooctanoic acid (PFOA). PFOA is a manufactured chemical that belongs to a group of chemicals used to make household and commercial products that resist heat and chemical reactions, and repel oil, stains, grease and water. These chemicals are widely found in nonstick cookware, stain-resistant carpets and fabrics, water repellant clothing, paper and cardboard food packaging and fire-fighting foam. PFOA does not break down easily and therefore persists for a very long time in the environment, especially in water. Its toxicity and persistence in the environment means it is a potential danger to human health and the environment.

Based on available VT Tier II data, there are multiple sites in town that have sufficient types and/or quantities of hazardous materials to require reporting, including Dan & Whits, King Arthur Flour, Norwich DPW, the Norwich Inn, and cell towers throughout town. Norwich is predominantly located along Route 5, running parallel to the Connecticut River. Further, Interstate 91 and an active rail line also run parallel to Route 5 and the river along the eastern edge of the Town. There are a total of 23 Tier II Critical Facilities in the Town, with no hazardous material storage facilities. There are 636 residential (600 single family dwellings, 45 multi-family dwellings, 17 mobile homes, and one other residential property) and 63 commercial, industrial or public buildings within 1,000 feet of a potential HAZMAT spill on major roads, such as Route 5 and Interstate 91. This includes the Town Office, the Fire Department, the Police Station, and Marion Cross Elementary School. In the event that 5% of these structures were involved in a HAZMAT incident, the estimated damage would be approximately \$16,000,000, using figures from the Vermont Department of Taxes. It should also be noted that the State of Vermont currently has a FEMA Type I HAZMAT Team with 27 members and with the three HAZMAT Response Vehicles, broad range of instruments and chemical protective suits and highly trained and experienced technicians.

The following data was retrieved from the Vermont Department of Environmental Conservation's Spill List.

**History of Occurrences:**

<b>Date</b>	<b>Event</b>	<b>Location</b>	<b>Extent</b>
1/2/2020	Motor Oil spill	Lyons Residence	Motor oil release to driveway; <1 gallon
8/23/2019	Diesel spill	Hilltop Farm	Log in hay field punctured tractor's fuel tank, 20 gallons
5/7/2019	Hydraulic Oil spill	Roadside	Hydraulic Equipment Failure, 4-5 gallons
8/1/2018	Hydraulic Oil spill	roadway	hydraulic reservoir failed, 25 gallons
2/8/2018	#2 Fuel Oil leak	Corum Residence	Pinhole leak in base of AST due to corrosion, amount unknown
1/16/2018	#2 Fuel Oil spill	Norwich Town Hall (Tracy Hall)	Ice drove product out of UST, 1 gallon
9/25/2017	Unknown	Montshire Museum	Drum found in lagoon near Montshire Museum, <55 gallons
7/25/2017	Hydraulic Oil spill	Roadside/vegetation	Blown vehicle hydraulic hose, <1 gallon
7/19/2017	Hydraulic Oil leak	Roadside	leaking hydraulic hose, <1 gallon
1/17/2017	#2 Fuel Oil spill	Scott Residence	Above Ground Tank overfill, <1 gallon
6/3/2016	#2 Fuel Oil leak	Freeman Property	slow drip, <2 gallons
1/14/2016	Gasoline spill	Dan & Whits General Store	Cause of release unknown., 5 gallons
8/11/2015	Bio-Diesel spill	Dan and Whits General Store	In place closure of bio diesel tank, amount unknown
4/16/2015	#2 Fuel Oil leak	Hoffman Property	contamination found during UST closure, amount unknown
5/28/2014	#2 Fuel Oil leak	private residence	Above Ground Tank line (piping), fitting, filter leak, amount unknown

11/12/2013	Diesel Spill	I-91 NW	A tractor trailer accident on I-91 led to ruptured saddle tanks that spilled 100-200 gallons of diesel in the shoulder/against the ledge. Contaminated soils were excavated from the shoulder and replaced with clean brown sand, per VTrans, before being graded and secured.
2/13/2013	Chromium Contamination	New Boston Road	Elevated chromium levels were found in a phase II evaluation in soil borings at 21 feet below ground surface where the Norwich Communication Tower was installed. Determined soils may need to be managed.
9/2/2010	Unspecified Spill	Ompompanoosuc River	Sheens were seen on the river. FD Chief investigated, but the sheens dissipated before the source of contamination could be identified
4/15/2008	Oil Spill	Marion Cross School	Oily water was being pumped from the school basement, discharging in range of a nearby stream. FD responded, shutting down the pump and disconnecting the water heater. On 4/16, 2 gallons of oil were found on the groundwater due to sump pump failure. Drums tipped over in the boiler room when water levels rose
9/13/2006	Unspecified Spill	Route 5	A private resident was concerned her well was contaminated. Water was sampled and ultimately found to contain no high levels of toxic/hazardous substances
5/17/2004	Oil Spill	Route 5	Oil was reported in the sump at a private residence. A water supply sample was taken. Months later, the oil persisted in the sump, being pumped onto the lawn though the source of the oil was not identified.
2/6/2004	Diesel Spill	Church Street	A 20 gallon diesel spill occurred at the Agway Bulk Plant due to a piping leak.
12/16/2005	Diesel Spill	Turnpike Road	A vehicle accident on Turnpike Road led to a 10 gallon diesel spill, which Norwich FD responded to.

9/1/2005	Diesel Spill	I-91 Exit 3	A backhoe overturned, spilling 50 gallons of diesel. Contained the spill with SpeediDri.
8/29/2002	Fuel Oil Spill	Route 132	20 gallons of fuel oil spilled at a private residence, which was cleaned up with sand by the fire department before being disposed of in 5 drums
3/8/2002	Unspecified Spill	Route 5	Norwich Water Department had an overflow shutoff failure, resulting in a 197 gallon spill. Some contaminants went to the floor drain and outside.
9/11/1998	Diesel Spill	Butternut Lane	An AST was punctured, leaking 200 gallons of diesel. Required excavation and polywrapping of soil.
5/22/1997	Unspecified Spill	Route 5	An excavator hose failure at the Farrell Gravel Pit led to a 25 gallon spill of an unspecified substance.
1/29/1997	Unspecified Spill	Route 12	200 gallons of an unspecified substance spilled during a transfer at the Agway Facility. Presumably gas/diesel.
1/7/1997	Diesel Spill	Route 5	A saddle tank at the Agway Bulk Facility leaked overnight, causing a 100 gallon diesel spill. Soil had to be excavated and shipped off-site
9/6/1995	Unspecified Spill	Hawk Pine	An AST leak in a private residence's basement led to a 40 gallon spill.
4/22/1992	Waste Oil Spill	L H Cook Inc.	440 gallons of waste oil was illegal dumped at L H Cook Inc.
10/13/1990	Kerosene Spill	Beaver Meadow Road	A kerosene tank tipped over after being delivered, leading to a 100 gallon spill.
4/13/1989	Unspecified Spill	Elm Street	A tank was accidentally overfilled, leading to a 200 gallon spill of an unspecified substance.
6/13/1983	Road Oil Spill	Cossingham Property	Town Selectmen approved road oiling, but the process ultimately led to a 300 gallon accidental spill of oil.
8/25/1980	Asbestos Spill	I-91	A truck accident led to a 1 cubic yard asbestos spill on the highway, which was cleaned by the Highway Dept.
1/20/1976	Unspecified Spill	Johnson & Dix	A valve on a tank froze in the open position during winter, causing a 50 gallon spill of the substance it contained.

Norwich has a public community water system, operated by the Norwich Fire District #1, which provides potable water to approximately 310 homes and 20 commercial businesses throughout the Town.

Residents and businesses not hooked-up to the community water system may be reliant on private water wells. The system that is in place is a closed well system that is permitted to operate is for 252,000 gallons per day at rate of 350 gallons a minute for 12 hours a day. Historically, while there have been threats to the Town's water supplies, there have not yet been any actual contamination incidents that have severely impacted the municipal water supply. Any threats that do exist are typically man-made in nature. Due to the water system being a high-pressure system, the overriding belief is that there is less likelihood of malicious tampering with the water system.

Norwich Fire District #1's Source Protection Plan identifies potential sources of contamination for the Town's water supply, denotes actions that have been taken to minimize the risk of groundwater contamination, and creates a Source Protection Area. This Area operates similar to a zoning district overlay, and prohibits certain activities that may contaminate the wellhead area, such as using herbicides. Property owners located in the Norwich Fire District #1 vicinity are informed of that fact, and offered assistance in the ways they can help minimize contamination into the groundwater supply. The list of hazardous materials spills, particularly on or near Route 5 and Interstate 91, demonstrates the threat of contamination facing the Town's municipal supplies. These transportation corridors, along with railways, are amongst the main threats noted within the Source Protection Plan, along with residential septic tanks and the Connecticut River (given the latter provides 80 to 90% of the recharge for the Town's water system).

Private well contamination also threatens those residents and business owners who are not located in the area served by the public water supply system, and maintain their own well for drinking water. As private wells are not required to develop a Source Protection Plan or Source Protection Area, the activities nearby a property owner's well are not necessarily regulated. While an individual property owner may only be affected by his or her wellbeing contaminated by a small contamination source, a hazardous material spill may impact multiple wells. The list of hazardous material spills in the Town of Norwich demonstrates the ease with which private wells could be contaminated, even with a few gallons of hazardous material.

It is important to note that groundwater supplies can also become contaminated by bacteria from a number of sources. These sources may include: a poorly designed leach field, a ruptured septic tank, or over-application or improper storage of manure or fertilizer.

HAZMAT team is requested through Vermont Emergency Management. The vehicles are located in Essex, Putney and Pittsford. The HAZMAT crew chief is available within minutes of a call for the team, but on-scene response could be a matter of hours. In the event of a serious incident in Town, the Norwich Fire Department, with assistance from the mutual aid system and other agencies, would respond.

Hazard	Location	Vulnerability	Extent	Impact	Likelihood/Probability
Hazardous Material Spill	Route 5 and Interstate 91 running along the Connecticut River and the Ompompanoosuc River.	Road and rail infrastructure, nearby structures (ex. Town Office or fire department if fuel tank struck), Connecticut River, and Ompompanoosuc River.	Initially, local impacts only; but depending on material spilled, extent of damage may spread (ex. into groundwater)	Within 1,000 feet of Route 5, Interstate 91 and other Class 2 roads, 636 residential (600 single family dwellings, 45 multi-family dwellings, 17 mobile homes, and one other residential property) and 63 commercial, industrial or public buildings. In the event that 5% of these structures were involved in a HAZMAT incident, the estimated damage would be approximately \$16,000,000.	Likely
Water Supply Contamination	Private homes and businesses located throughout the Town of Norwich.	Approximately 310 homes and 20 commercial businesses connected to the Norwich Fire District #1 system.	Depends on the amount of and location of the source of contamination —may impact one individual's well or the public water supply.	For individual homeowners who experience a heating oil spill, and the groundwater becomes contaminated: \$90,000 (according to the Massachusetts Dept. Environmental Protection). For the public water supply, it would depend on the type and extent of contamination. (To clean a very small water system of MTBE (a gasoline additive) over a 10 year period are estimated at \$500,000-\$1,000,000.) A new supply may also be sought (\$3/1000 gallons in small system and community wants a 65,000 gallon capacity) = \$195,000. The costs of medical treatment are not factored in here, but could be substantial.	Occasionally

## 5. Structure Fire

Vermont has one of the highest per capita death rates from fire in the nation. This is, in fact, the deadliest form of disaster throughout the state. In 2018, there were 1,006 structure fires in Vermont.

Structure fires may occur at any point and are typically initiated within a single fuel object. Smoke produced by the burning object forms a smoke plume and rises, creating a layer of smoke while also transporting heat to the smoke layer. Fire then spreads quickly by radiation from the flames, or from the smoke layer. Once other objects are engulfed, more smoke plumes are formed, and heat radiates to other objects. Fire burns and moves across different materials depending on the material's composition, orientation, surface-to-mass ratio, and air supply in the structure/room.

The majority of the Town of Norwich's growth is centered in the village area that extends out from Route 5 along the Connecticut River Valley, skirting along Interstate 91. The Town is typified by a number of old wooden and brick town buildings, residences, and a number of commercial spaces, including the popular Norwich Inn. A review of the fires listed in the "History of Occurrences" chart below demonstrates the potential for structures located in the rural Town of Norwich to be completely or severely destroyed by fire.

Town reports show the number of structure fire responses by the Norwich Fire Department over the past five years as follows:

<b>Fiscal Year</b>	<b>Structure Fire Runs</b>
2019	7
2018	10
2017	15
2016	7
2015	11

The following occurrences were reported by the Committee or obtained from local sources. It is reasonable to assume that more structural fires have occurred in the period of time between the entries listed below, and that such fires have caused varying extents of property damage.



**History of Occurrences:**

Date	Event	Location	Extent
12/12/2019	Structure Fire	Star Lake Ln	Estimated damage/losses: \$10,000
4/28/2019	Structure Fire	Tucker Hill Rd	Barn fire, damage amount unknown
3/2/2019	Structure Fire	Campbell Flat Rd	Estimated damage/losses: \$10,000
11/27/2017	Structure Fire	Sugarhouse Lane	Estimated damage/losses: \$130,000
3/5/2014	House Fire	New Boston Road	Estimated damage/losses: \$240,000. Home completely destroyed.
8/7/2013	Fire at Norwich Water Pump Station	Route 5 North	The investigation showed the cause of this fire to be undetermined. The building damage and contents estimated of \$500,000. There were no reported injuries as a result of this fire.
5/24/2013	Building Fire	Hemlock Road	Estimated damage/losses: \$10,500
9/13/2012	Building Fire	Falcon Lane	Estimated damage/losses: \$120,000
5/29/2012	Building Fire	Route 132	Estimated damage/losses: \$45,000
2/28/2011	Building Fire	Hickory Ridge	Estimated damage/losses: \$11,000
12/20/2010	Building Fire	Turnpike Road	Estimated damage/losses: \$30,000
8/10/2010	Building Fire	Elm Street	Estimated damage/losses: \$25,000
3/6/2010	Building Fire	Blood Hill Road	Estimated damage/losses: \$40,000
6/16/2009	Building Fire	Carpenter Street	Estimated damage/losses: \$500

As noted, recognized fire protection problems for the community include the following: development in areas distant from the village center of the Town, development on class 3 and 4 roads, distance from water sources (rivers, hydrants and/or fire ponds), inaccessibility to fires that may spread from more

forested areas, and inadequate snow removal (for building access). Scouting for additional rural locations for new hydrants in Norwich is an on-going process, and the Town installed one new dry hydrant in 2019. There are additional areas that could potentially be utilized to this end, and a comprehensive survey may prove an effective means of determining if and where more sites are needed.

<b>Hazard</b>	<b>Location</b>	<b>Vulnerability</b>	<b>Extent</b>	<b>Observed Impact</b>	<b>Likelihood/ Probability</b>
Structure Fire	Town-wide	All housing, municipal buildings, retail/commercial sites.	Depends on the location and extent of the fire; up to \$500,000 of damage	Varies depending on the location and extent of the fire.	Highly Likely

## 6. Pandemic/Infectious Disease Outbreak

A pandemic is a global outbreak of disease that occurs when a new virus emerges in the human population, spreading easily in a sustained manner, and causing serious illness. An epidemic describes a smaller-scale infectious outbreak, within a region or population, that emerges at a disproportional rate.

Recent events related to COVID-19 (the illness caused by a novel coronavirus) have brought greater attention to pandemics and their impact on the community. The scale and complexity of COVID-19 has not been seen in this country since the 1918 Spanish Flu. With a major pandemic, the hazard to Norwich is its effect on individuals, vulnerable populations, the medical system, and the economy. The currently evolving situation makes it impossible at this time fully understand and capture in this HMP the short and long-term impacts on the Town.

On March 25, 2020, Governor Scott enacted a 'Stay Home, Stay Safe' order that essentially closed all but essential businesses, required companies to work from home if they can, and to reduce trips outside the home to limit human-to-human contact. On April 10, 2020, this order was extended to last until May 15, 2020, and as of the writing of this plan restrictions on travel and businesses are being lessened.

COVID-19 has made it clear that in major pandemics that affect most of the population, the current medical system is largely inadequate to handle a surge of caseloads and hospitalizations. Vulnerable populations, such as nursing homes and prisons, have been particularly hard hit due to close living quarters.

Risk and Vulnerability Assessment. Since this situation is currently ongoing, there are no specific lists or dollar amounts that explain the impact COVID-19 is having on the town, or on the region/state.

Populations that are currently high risk for pandemics include:

- nursing homes
- elderly housing
- school populations
- individuals 60 and over, and
- individuals with pre-existing health conditions

## VI. Mitigation

### A. Mitigation Goals

- To reduce injury and losses, including loss of life and to infrastructure, structures and businesses, from the natural hazard of flash flooding, flooding and fluvial erosion.
- To reduce injury and losses, including loss of life and to infrastructure, structures and businesses, from the hazard of cyber attacks and security breaches.
- To reduce injury and losses, including loss of life and to infrastructure, structures and businesses, from the natural hazard of severe weather.
- To reduce injury and losses, including loss of life and to infrastructure, structures and businesses, from the hazard of hazardous material spills and water supply contamination.
- To reduce injury and losses, including loss of life and to infrastructure, structures and businesses, from the hazard of pandemics and infectious disease outbreaks.

## B. Excerpted Town Plan Goals & Objectives Supporting Local Hazard Mitigation

- Identify, protect, and preserve important natural and historic features of the Norwich landscape, including: significant natural and fragile areas, outstanding water resources (including rivers, aquifers, shorelands and wetlands), significant roads, waterways and views, important historic structures, sites or districts (including archaeological sites) (pg. 4)
- Increase the resilience of Norwich by avoiding, minimizing and mitigating conflict between land development and natural riparian functions along streams and rivers (pg. 5).
- Mitigate potential flood and erosion hazards, and increase the community's resilience to flooding and other disasters through hazard mitigation planning (pg. 53).
- Prevent increased flood and erosion hazards resulting from inappropriate land use and development practices (pg. 53).
- Protect and restore floodplains and upland forest areas that attenuate and moderate flooding and fluvial erosion (pg. 53).
- Increase the use of flood insurance for structures within the Special Flood Hazard Area (SFHA) (pg. 53).
- Guide development of new structures and impervious areas away from surface waters and encourage landowners to maintain or establish riparian buffers (pg. 53).
- Site public and private critical facilities outside of floodplains where feasible (pg. 53).
- Ensure that any development within the Special Flood Hazard Area (SFHA) fully conforms to the National Flood Insurance Program (NFIP) (pg. 53).
- Provide support to Norwich property owners through membership in the Community Rating System (CRS) of the National Flood Insurance Program (pg. 53).
- Ensure that stormwater runoff from developed land is managed at the source so it will not place an undue burden on public infrastructure, increase flood hazards or reduce water quality (pg. 53).
- Support efforts to reduce the severity of future floods, such as allowing rivers to access their floodplains, providing compensatory flood storage, and replacing/removing infrastructure constricting water flow (pg. 53).
- Update and re-adopt the Norwich All Hazards Mitigation (HMP) and the Emergency Operations Plan (EOP), and ensure consistency with the goals, objectives, and policies of this plan (pg. 54).
- Implement the hazard mitigation programs, projects and activities identified in the Norwich 2015 All Hazard Mitigation Plan and subsequently adopted plans (pg. 54).

The Norwich Town Plan was updated and adopted on 3/7/2020, and has an 8-year lifespan.

## C. Hazard Mitigation Strategies: Programs, Projects, and Activities

Vermont's Division of Emergency Management & Homeland Security encourages a collaborative approach to achieving mitigation at the local level through partnerships with Vermont Agency of Natural Resources, VTrans, Vermont Agency of Commerce and Community Development, Regional Planning Commissions, FEMA Region 1 and others. That said, these agencies and organizations can work together to provide assistance and resources to towns interested in pursuing hazard mitigation projects.

With each mitigation strategy, general details about the following are provided: local leadership, possible resources, implementation tools, and prioritization. The prioritization category is based upon the economic impact of the action, Norwich's need to address the issue, the cost of implementing the strategy, and the availability of potential funding. The cost of the strategy was evaluated in relation to its benefit as outlined in the STAPLEE guidelines (includes economic, political, environmental, technical, social, administrative, and legal criteria). A range of mitigation strategies was vetted by the committee, and those that were determined to be feasible are included in the table below.

Strategies given a "High" prioritization indicate they are either critical or potential funding is readily available, and should have a timeframe of implementation of less than two years. A "Medium" prioritization indicates that a strategy is less critical or the potential funding is not readily available, and has a timeframe for implementation of more than two years but less than four. A "Low" prioritization indicates that the timeframe for implementation of the action, given the action's cost, availability of funding, and the community's need to address the issue, is more than four years.

The Town of Norwich understands that, in order to apply for FEMA funding for mitigation projects, a project must meet more formal FEMA benefit cost criteria, and a project seeking FEMA funds would undergo a full benefit-cost assessment in the FEMA-approved format. The Town must have a FEMA-approved Hazard Mitigation Plan as well.

The following strategies will be incorporated into the Town of Norwich's long-term land use and development planning documents. In addition, the Town will review and incorporate elements of this Local Hazard Mitigation Plan into updates for the municipal plan, zoning regulations, and flood hazard/ fluvial erosion hazards (FEH) bylaws. The incorporation of the goals and strategies listed in the Local Hazard Mitigation Plan into the municipal plan, zoning regulations and flood hazard/FEH bylaws will also be considered after declared or local disasters. The Town shall also consider reviewing any future TRORC planning documents for ideas on future mitigation projects and hazard areas.

Hazard Mitigated	Mitigation or Preparedness Actions	Local Leadership	Prioritization	Possible Resources	Time Frame
All Hazards	Ensure that Norwich's Local Emergency Operations Plan (LEOP) is kept up-to-date and identifies vulnerable areas and references this Plan.	Emergency Management Director	High	Local resources; TRORC; Vermont Division of Emergency Management and Homeland Security	Fall 2020-Fall 2021
	Consistently document infrastructure damage after weather events	Public Works Director/DPW	High	Local resources; Vermont Division of Emergency Management and Homeland Security and FEMA (after a disaster)	As needed
Structural Fire	Ensure that fire department personnel maintain their firefighter certifications	Norwich Fire Department	Medium	Local resources; Vermont Fire Academy	As needed
	Promote installation of sprinklers in new buildings.	Norwich Fire Department	High	Local resources; US Fire Administration; Vermont Division of Fire Safety	Fall 2020-Fall 2021 and yearly
	Inspect public buildings for potential fire hazards and conduct a voluntary home inspection program.	Norwich Fire Department	Medium	Local resources; US Fire Administration; Vermont Division of Fire Safety	Fall 2020-Fall 2021 and Yearly/As needed
	Conduct a public education program on fire prevention and disseminate information at the school and on the Town's listserv.	Norwich Fire Department	Medium	Local resources; Vermont Division of Fire Safety	Fall 2020-Fall 2021 and Yearly/As needed

	Assess and map the community's overall vulnerability to wildfires.	Fire Warden, Norwich Fire Department	Low-Medium	ANR, TRORC, Fire Warden	Fall 2020-Fall 2022
Water Supply Contamination/ Hazardous Material Spill	Continue to maintain and update the Town's Source Protection Plan.	Water Operations Manager for the Norwich Fire District and Municipal Water Department; Planning Director	Medium-High	Local resources; Dept. of Environmental Conservation's Drinking Water and Groundwater Protection Division	Fall 2020-Fall 2023
	Ensure that all emergency response and management personnel continue to receive HAZMAT Operations training at a minimum.	Norwich Fire Department	High	Local Resources; State HAZMAT Team	As needed
	Continuously stock gear to help contain small spills when they occur (booms, absorbent materials, etc.).	Norwich Fire Department	Medium	Local Resources	As needed
Flooding	Review Special Flood Hazard Areas as part of updating Zoning Regulations	Planning Commission	High	Local Resources; TRORC	Fall 2020-Fall 2023
	Participate in the Community Rating System (rewards, lower rates for exceeding minimum NFIP requirements).	Planning Director	High	DEC, TRORC, Local Resources	Fall 2020-Fall 2022
	Update Road and Bridge Standards	Town Manager, DPW Director, Planning Director	Low	Vtrans	Fall 2020-Fall 2021 and Annual Review
	Maintain and update town bridge and culvert inventories	DPW	High	VTrans	Fall 2020-Fall 2021 and Annual Review



	Based on the 2018 culvert inventory, develop a priority schedule to replace undersized culverts in the capital budget & program	DPW Director, Town Manager, Selectboard	High	VTrans	Fall 2020-Fall 2021 and Annual Review
Cyber security	Budget for and implement Network Assessment Plan including possible phasing	Town Manager, Selectboard, Finance Committee	High	VLCT, Local vendors, IT contractor	Fall 2020-Fall 2021 and Annual Review
	Develop a strategic plan for all facets of cyber security, including technology and human-based protections	Town Manager, Selectboard, Finance Committee	High	VLCT, Local vendors, IT contractor, NIST	Fall 2020-Fall 2021
	Implement the new cyber security strategic plan	Town Manager, Selectboard, Finance Committee	High	VLCT, Local vendors, IT contractor, NIST	Fall 2020-Fall 2021 and Annually
Severe Weather	Protect public buildings, town roads and power lines from wind damage through regular tree pruning, maintenance and upkeep.	Tree Warden, DPW, GMP, Police Department, Fire Department	High	DPW, Police Department, Fire Department, GMP	As needed
	Increase public awareness of severe wind by providing information on property maintenance and building retrofits. Preventative and storm-based	Town Manager's office and related departments, Tree Warden, GMP	Medium	Local resources, social media, email lists, town website	As needed

	Continue to plan for, budget and maintain town roads for safe winter travel.	DPW, Selectboard, Town Manager, Police Department, Finance Committee	High	During winter: DPW and Police Department; Ongoing basic road maintenance: Town Manager, Selectboard, DPW	Fall 2020-Fall 2021 and Annually
	Create a strategy to identify town residents who are vulnerable to severe winter hazards, including freezing temperatures and power outages and plan for and organize outreach and assistance, while protecting confidentiality.	First Responders, VT CARES	High	Local resources, TRORC, VEM, self-identification by citizens	Fall 2020-Fall 2022
	As applicable, consider establishing local procedure for tree pruning within town rights-of-way.	Town Manager, DPW Director, Tree Warden	Medium	Town Manager, DPW Director, TRORC, ANR	Fall 2020-Fall 2021
Pandemic	Develop a strategic plan for pandemic response with the Town Health Officer addressing preparedness, response, recovery, and mitigation.	Town Manager, Town Health Officer, Emergency responders, Selectboard, TRORC, Vermont Department of Health, Fire District	High	VEM, Vermont Department of Health, CDC, VOSHA, Town Health Officer and other local resources	Fall 2020-Fall 2022
	Stockpile personal protection equipment	Police and Fire Departments, Planning Director	Medium-High	Police and Fire Departments, Planning Director, FEMA, VEM	Ongoing

	Develop and maintain neighborhood networks to support neighbors and exchange information	Local citizens and churches	Medium	Local citizens and churches	As needed
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## Appendices

### Appendix A: Hazard Ranking Methodology

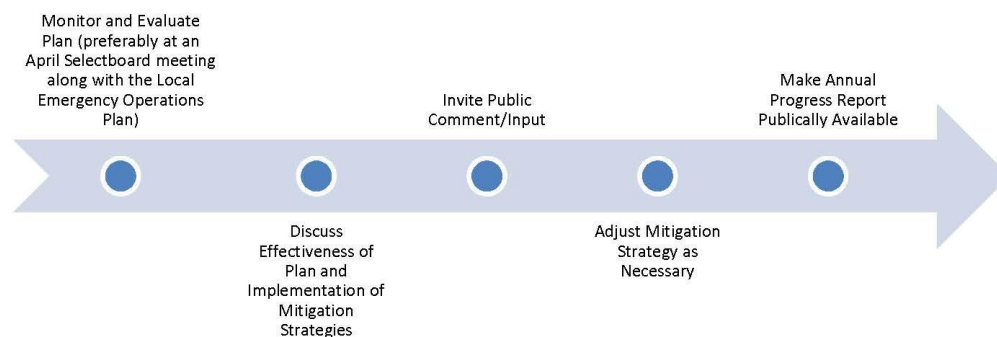
<u>Frequency of Occurrence</u> Probability	<u>Warning Time</u> Amount of time generally given to alert people to hazard	<u>Potential Impact</u> Severity and extent of damage and disruption
<p>1 = <i>Unlikely</i> &lt;1% probability of occurrence in the next 100 years</p> <p>2 = <i>Occasionally</i> 1–10% probability of occurrence per year, or at least one chance in next 100 years</p> <p>3 = <i>Likely</i> &gt;10% but &lt;100% probability per year, at least 1 chance in next 10 years</p> <p>4 = <i>Highly Likely</i> 100% probable in a year</p>	<p>1 = More than 12 hours</p> <p>2 = 6–12 hours</p> <p>3 = 3–6 hours</p> <p>4 = None–Minimal</p>	<p>1 = <i>Negligible</i> Isolated occurrences of minor property damage, minor disruption of critical facilities and infrastructure, and potential for minor injuries</p> <p>2 = <i>Minor</i> Isolated occurrences of moderate to severe property damage, brief disruption of critical facilities and infrastructure, and potential for injuries</p> <p>3 = <i>Moderate</i> Severe property damage on a neighborhood scale, temporary shutdown of critical facilities, and/or injuries or fatalities</p> <p>4 = <i>Major</i> Severe property damage on a metropolitan or regional scale, shutdown of critical facilities, and/or multiple injuries or fatalities</p>

## Appendix B: Five-Year Review and Maintenance Plan

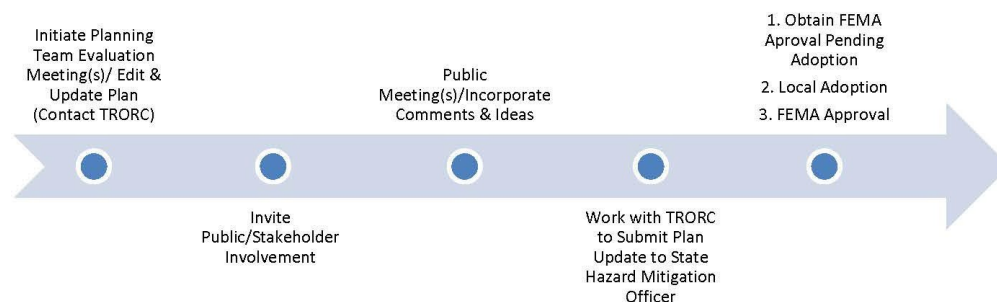
### Five-Year Local Hazard Mitigation Plan Review/Maintenance

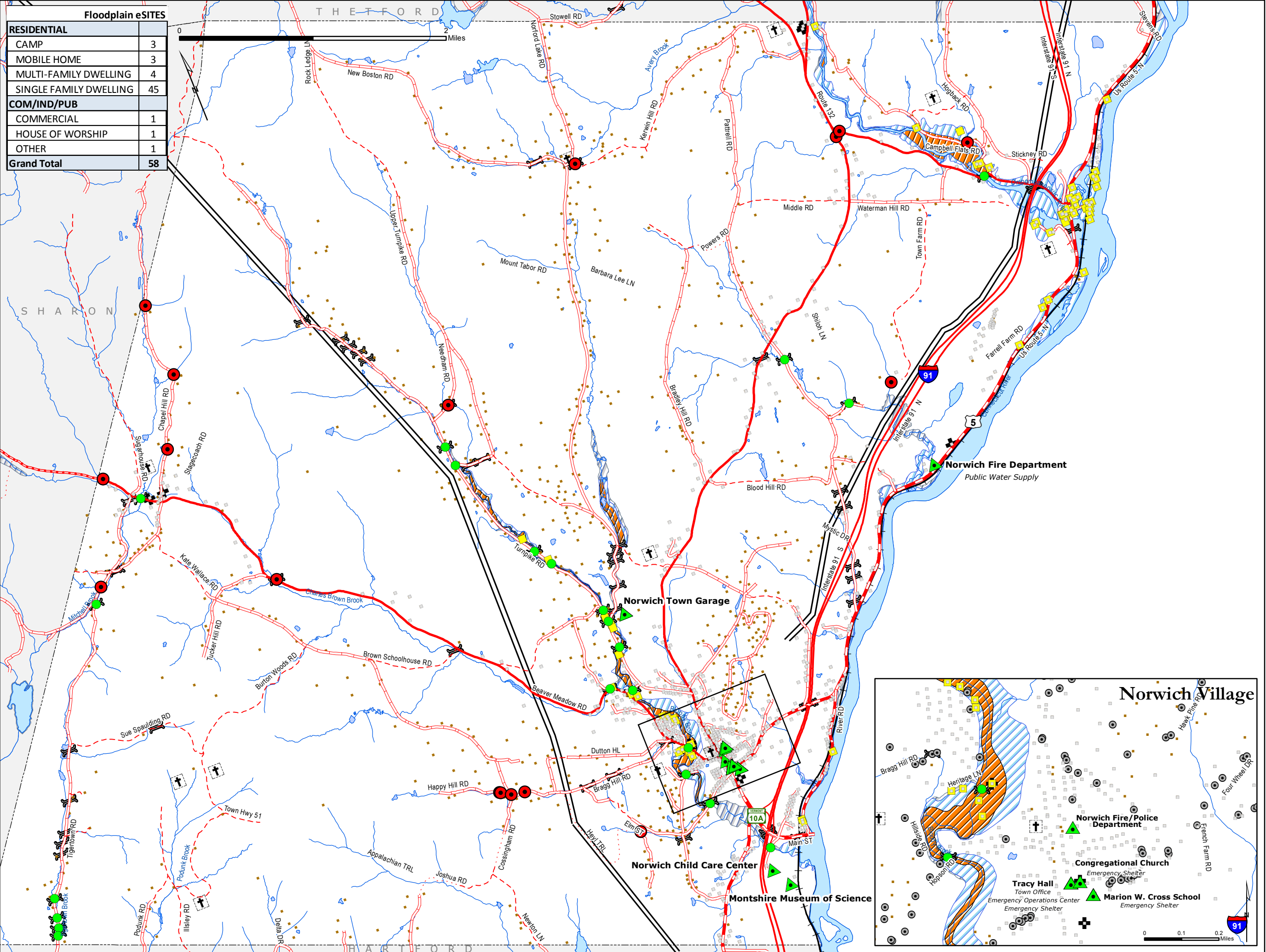


#### After Plan Adoption—Annually Implement & Evaluate



#### Fifth Year, and After a Major or Federally Declared Disaster Directly Impacting the Town Evaluate & Revise





Floodplain eSITES	
RESIDENTIAL	
CAMP	3
MOBILE HOME	3
MULTI-FAMILY DWELLING	4
SINGLE FAMILY DWELLING	45
COM/IND/PUB	
COMMERCIAL	1
HOUSE OF WORSHIP	1
OTHER	1
Grand Total	58

# Hazard Mitigation Plan

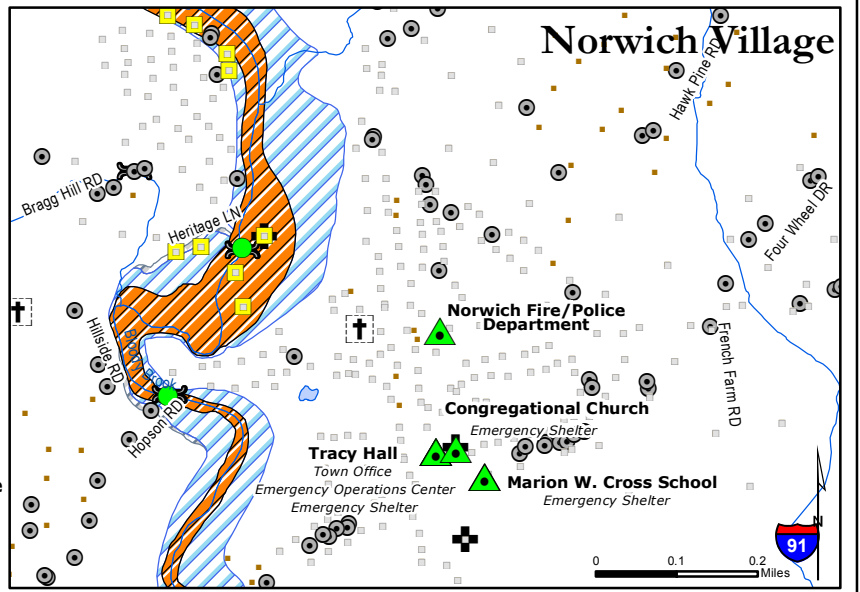
## Essential Services Map

### Norwich, Vermont

- TH cls 1 (village VT rt)
- TH cls 2
- TH cls 2 gravel
- TH cls 3
- TH cls 3 gravel
- TH cls 4 gravel
- TH cls 4 primitive
- TH cls 4 impassable
- VT forest hwy
- trail
- private
- VT route
- US route
- US interstate

- Critical Facility
- Church
- Cemetery
- e911 in Floodplain
- e911 Within 1000' of Major Route
- e911 Address
- Culverts Under 18" Wide
- Critical Stream Crossing
- Significantly Undersized Structure
- Bridge
- Electric Transmission

- 500 Year
- 100 Year
- Floodway
- Village Inset Map



**Culvert Data:**  
Collected Summer 2012

**Flood Region:**  
National Flood Insurance Program  
Digital Flood Insurance Rate Map Data

**Stream Geomorphic Assessment Data:**  
Obtained from the Data Management Sys.  
Maintained by the VANR  
River Management Program

**Village Centers:**  
Designated by the State for  
historic tax credit and other benefits,  
pursuant to 24 VSA sections 2793a

**TWO RIVERS-OTTAUQUECHEE**  
REGIONAL COMMISSION

**GIS Service Center**  
128 King Farm Rd  
Woodstock, VT 05091  
802-457-3188

**trorc.org**