

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

**October 2014 Draft**

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

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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 2014 Norwich Local Hazard Mitigation Plan is the first stand-alone mitigation plan drafted for the Town. Previously, the Town had a town-specific 2011 Annex in the Regional Pre-Disaster Mitigation Plan. This new Plan has been reorganized and new sections have been added:

- Program eligibility subsequent to plan approval
- Authority for plan development
- Participating jurisdictions
- Funding for plan development
- Brief information about the community

Old assumptions have been challenged throughout, and 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).

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-Ottawaquechee 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.

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

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 chief, three full-time officers, two part-time officers, and a full-time clerk-dispatcher. The police department 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.

## IV. The Planning Process

### A. Plan Developers

Samantha Holcomb and Ellie Ray, both Land Use 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:

This section of the Plan satisfies 44 CFR 201.6(b)(1) and 201.6(c)(1) (or, A3.a and A3.b of FEMA's Local Mitigation Plan Review Guide, 2011).

Name	Role/Organization	How Participation Was Solicited
Steve Leinoff	Fire Chief/Deputy Emergency Director	<p>On 01/19/2014, Samantha Holcomb and Ellie Ray (TRORC staff) reached out to the Norwich Selectboard, the Town Manager (Neil Fulton), and the EMD/EMC (Jennie Hubbard). TRORC staff coordinated with Norwich town officials to set up an introductory meeting. The first meeting was scheduled for 04/10/2014. TRORC's staff attended that meeting, followed by many more meetings in which participants revised and developed the HMP. See below for more meeting-specific details.</p>
Andy Hodgdon	Director of Public Works	
Douglas Robinson	Police Chief, Norwich Police Department	
Sam Eaton	Norwich Fire District #1 & Municipal Water Department	
Sam Eaton	Fire District & Muni. Water Department	
Roberta Robinson	Finance Director	
Neil Fulton	Town Manager/Emergency Management Director	
Dani Ligett	Counselor and Director of Admissions, Marion Cross School	
Phil Dechert	Director of Planning	
John Lawe	Town Health Officer	

#### Additional Participants in the Process:

- Brion McMullan, Norwich Fire District #1 & Municipal Water Department (now retired)

## B. Plan Development Process

The 2011 Norwich Annex was originally part of the 2008 multi-jurisdictional Regional Hazard Mitigation Plan, drafted by Two Rivers-Ottawaquechee Regional Commission, and approved by FEMA on September 30, 2008 with its first local annex. The Norwich Annex received subsequent FEMA approval and was formally adopted on December 14, 2011, but, since it was part of a larger plan, FEMA treats its start date as September 30, 2008, meaning the Norwich Annex expired on September 30, 2013.

This Plan has been reconstructed now as a single jurisdiction, stand-alone Norwich Local Hazard Mitigation Plan that will be submitted for individual approval to FEMA. As such, several sections have been added or updated to include all necessary information.

This section of the Plan satisfies the Element A: Planning Process requirements set out in 44 CFR 201.6.

The changes to this Plan include:

- **General**
  - New sections: Plan Development Process, 2011 Mitigation Strategies Status Update chart, Existing Hazard Mitigation Programs, Projects & Activities, Plan Maintenance;
  - Data updates: New hazard incidents, emergency declarations, US Census data;
  - Hazards have been reevaluated with the hazard ranking system used by the Vermont Division of Emergency Management and Homeland Security.
- **Hazards Analysis**
  - Flooding/Flash Flooding/Fluvial Erosion, Hazardous Material Spills, and Structure Fire remain on the list of “top hazards;”
  - Winter/Snow/Ice Storms have been removed from the list of “top hazards;”
  - Severe Weather and Water Supply Contamination have been added to the list of “top hazards;”
  - For each hazard, a location/vulnerability/extent/impact/likelihood table has been added to summarize the hazard description.
- **Maps**
  - A map of the Town of Norwich depicting critical facilities, town infrastructure, and the NFIP designated floodway and 1%- floodplain has been added.

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

- **Activities**
  - 04/10/2014: Met with Norwich HMP committee members to introduce the update/plan development process, reviewed Norwich’s existing Hazard Mitigation Plan (adopted in December 2011), considered the status of various mitigation actions, potential hazards, and the data collection/research process.
  - 06/20/2014: Held a meeting with the Norwich committee to discuss and rank hazards to determine the “Top Hazards” in the Town. Explained to the committee what the next steps in the process are (draft plan, then schedule a meeting to review and discuss it).

- 08/06/2014: Met with committee to discuss first draft. The entire draft was reviewed in detail, with TRORC staff making note of any comments or errors.
- 09/25/2014: Met with the committee to devise a list of hazard mitigation actions to address the Town's top five hazards, as determined during the hazard ranking exercise on 06/20/2014.
- **Public participation and involvement (44 CFR 201.6(b)(1))**
  - October 2014: A notice was placed in the Two Rivers-Ottawaquechee Regional Planning Commission Newsletter alerting recipients that Norwich was engaging in hazard mitigation planning and updating their Hazard Mitigation Plan.
  - Posted a notice in four local papers alerting the public to the Hazard Mitigation Planning process that was taking place.
    - Valley News—ran 3/20/2014
    - The Herald of Randolph—ran 3/20/2014
    - Journal Opinion—ran 3/20/2014
    - Vermont Standard—ran 3/20/2014
  - Public Forums
- **Governmental participation and involvement (44 CFR 201.6(b)(2))**
  - Sent revised draft to Norwich Selectboard—10/14/2014
  - Sent revised draft to Planning Commission Chair—10/07/2014
  - Sent revised draft to Division of Emergency Management and Homeland Security—
- **Neighboring community participation and involvement (44 CFR 201.6(b)(2))**
  - October 2014: A notice was placed in the Two Rivers-Ottawaquechee Regional Planning Commission Newsletter alerting recipients that Norwich was engaging in hazard mitigation planning and updating their Hazard Mitigation Plan.
  - Posted a notice in four local papers alerting the public to the Hazard Mitigation Planning process that was taking place.
    - Valley News—ran 3/20/2014
    - The Herald of Randolph—ran 3/20/2014
    - Journal Opinion—ran 3/20/2014
    - Vermont Standard—ran 3/20/2014
  - Sent revised draft to neighboring towns' Selectboards for comment—10/07/2014
    - Towns of: Thetford, and Sharon
  - Sent revised draft to the Town Manager and Planning & Development Director for the Town of Hartford—10/07/2014
  - Sent revised draft to the Town Manager and Planning Board Chair for the Town of Hanover, New Hampshire—10/07/2014
- **Review of existing plans, studies, reports, and technical information (44 CFR 201.6(b)(3))**
  - Norwich Hazard Mitigation Plan (Adopted 12/14/2011)

- This Plan was referenced extensively during the plan development process, especially with regard to the worst threats and mitigation action strategies identified in 2011.

This section of the Plan satisfies 44 CFR 201.6(b)(3) (or, A4.a and A4.b of FEMA's Local Mitigation Plan Review Guide, 2011).

- Norwich Town Plan (Adopted 12/14/2011)
  - 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.
- Blood Brook Watershed Corridor Plan, Norwich, Vermont (03/27/2008)
  - The Blood Brook Corridor Plan provided information about a small, yet important tributary to the Connecticut River. The entire Blood Brook watershed is located within the Town of Norwich. This Corridor Plan was used for background information and was also reviewed for projects that could be incorporated into the 'hazard mitigation strategies' identified in this Hazard Mitigation 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 2011

The following table outlines the mitigation actions that were proposed in Norwich’s 2011 All-Hazard Pre-Disaster Mitigation Plan for the Town of Norwich (adopted on December 14, 2011 as an appendix to the Two Rivers-Ottawaquechee Regional Commission’s multi-jurisdictional Pre-Disaster Mitigation Plan).

This section of the Plan satisfies the requirements of 44 CFR 201.6(d)(3).

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

Mitigation Action (2011)	Who (Leadership) (2011)	When (Timeframe) (2011)	How (Funding/Support) (2011)	Status of Mitigation Action (2014)
<u>ALL HAZARDS</u> 1. Ensure that the Basic Emergency Operations Plan (BEOP) is current.	Town Manager	April of each year	With TRORC assistance	The new iteration of the BEOP is the Local Emergency Operations Plan (LEOP). The Town updates and adopts this document annually. The current LEOP was adopted on May 1, 2014.
<u>FLOOD</u> 2. Maintain culvert and bridge inventory and continue to keep program up-to-date.	Road Foreman and Town Manager	Inventory is updated each October	With TRORC assistance	On-going. Latest culvert inventory was completed in 2013.
3. Improve flood and fluvial erosion Hazard Identification and Mapping.	Town Manager	December 2012	With TRORC and state assistance	In progress. The Town currently has fluvial erosion hazard data (FEH) for Blood Brook and major tributaries as well as FEH for the Ompompanoosuc River. These data are in the process of being transferred to FEH regulations and should be adopted by the end of 2014 (tentatively). The Town is working with Vermont’s River Management Division on how to handle streams without FEH zones.
4. Consider adopting Fluvial Erosion Hazard regulations	Planning Commission and Selectboard	December 2012	Local resources, TRORC assistance	In progress. See above.

Mitigation Action (2011)	Who (Leadership) (2011)	When (Timeframe) (2011)	How (Funding/Support) (2011)	Status of Mitigation Action (2014)
5. Identify frequently flooded roads and bridges	Road Foreman	December 2012	Local resources	Complete. An assessment of roads and infrastructure has shown that there are not many that are frequently/repeatedly flooded.
6. Pre-planning, tabletop, and field training exercise for major flood events.	EMC	6 times a year	With LEPC12	On-going. This process is not completed every other month; however, it is completed annually. Programs include field exercises (last done in 2011), ICS sessions, and water supply contingency plans.
<u>HAZMAT</u> 7. Identify and create emergency access points to the railroad corridor in locations where access is presently difficult in the event of a derailment.	Emergency Management Coordinator	December 2012	With state transportation agency assistance	Complete. A review of emergency access points demonstrated that railroad corridor access is not really an issue for the Town.
8. Hazmat response training for police, highway and emergency management town personnel.	Fire Dept.	Annual refresher.	Funded by Fire Service Training Academy	On-going. Annual training is completed for HAZMAT response.
<u>FIRE</u> 9. Develop additional dry hydrant sites in rural locations.	Fire Department	Annually identify new locations.	Local resources, work with Dry Hydrant Program.	On-going. A new dry hydrant was installed in fall of 2013, located at Beaver Meadow Road near the Sharon town line.
<u>WINTER STORM</u> 10. Identify areas where trees are encroaching on utilities and trim to prevent snow load.	Road Foreman, Fire Dept.	Annually – December to April	Local resources	On-going. In the last decade, many problem areas have been rectified through collaborative work with utility companies.

The Town of Norwich is located on the banks of the Connecticut River, and is located across the River from the Town of Hanover in New Hampshire. 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 experiences some additional development pressures that may not be present in other nearby towns. Between 2013 and 2014, there were 6 permits issued for new home development. In 2013, 22 permits were issued for home-additions in Norwich, and thus far in 2014, 8 addition permits have been issued. One home-addition to an existing structure, located on River Edge Lane, is currently under construction and located in the Special Flood Hazard Area. Another proposed addition project on Campbell Flats Road, also located in the Special Flood Hazard Area, is currently being reviewed by the state floodplain management office. Aside from home development and/or home-additions, no large scale commercial or multi-unit housing projects have occurred or sought a permit in Norwich in either 2013 or 2014.

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

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

This section of the Plan satisfies the requirements of 44 CFR 201.6(c)(3).

##### **Community Preparedness Activities**

- Participation in the Local Emergency Planning Committee District 12 (LEPC 12).
- Annual update of Norwich’s Local Emergency Operations Plan (LEOP, formerly BEOP)
  - Last updated and approved on 05/01/2014
- Inclusion in the Orange and Windsor Counties Public Works Emergency/Non-Emergency Public Works Mutual Aid group, which provides a framework through which nine municipalities assist each other in times of extraordinary need or emergency circumstances.
- Designated Red Cross Shelter – formerly at the Town Hall but since relocated to the Hartford High School

##### **Insurance Programs**

- Participation in National Flood Insurance Program (NFIP)
  - 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 has been updated, and the current effective map date is 9/28/07.

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.

##### **Land Use Planning**

- Norwich Town Plan
  - Adopted on 12/14/2011, includes “Floodplain” and “Fluvial Erosion” sections within the Natural and Historic Resources element.
  - The Town Plan is reviewed/updated every five years, as required by statute.

- Norwich Zoning Bylaws
  - Adopted on 12/03/2008, includes a “Flood Hazard Overlay” (FHO) zoning district
  - Fluvial Erosion Hazard regulations/updates are currently being drafted, and should be adopted in 2014
  - During the Town Plan review/update period, the Zoning Regulations are also reviewed and updated if needed.

**Hazard Control & Protection of Critical Infrastructure & Facilities**

- Norwich Hazard Mitigation Plan
  - Adopted on 12/14/2011
  - The 2014 Norwich Hazard Mitigation Plan will replace the 2011 Plan. The 2014 HMP has evolved from the 2011 Plan, and has greatly expanded and improved upon it.
- Culvert inventory with TRORC assistance in 2013
  - The Town updates the culvert inventory on a regular basis.

**Education/Public Outreach**

- Citizen Handbook at Town Clerk’s Office
- Fire District Emergency Operations Plan
- Fire Safety Education provided by Norwich Fire Department
- Each year, a Consumer Confidence Report is distributed to consumers connected to the Norwich Fire District #1 water system.

**E. Plan Maintenance**

This Plan (the Norwich Local Hazard Mitigation Plan) will be updated and evaluated annually along with the review of their Local Emergency Operations Plan (LEOP). This annual meeting will be a meeting of the Emergency Management Committee and convened by the Town Manager/Emergency Management Director and 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.

Updates and evaluation of this Plan by the Town Manager/Emergency Management Committee and Emergency Management Committee will also occur within three months after every federal disaster declaration. The Town shall refer to the Local Hazard Mitigation Plan when working on Town Plan amendments or changes to the Town’s bylaws.

This section of the Plan satisfies 44 CFR and 201.6(c)(4)(i), 201.6(c)(4)(ii), and 201.6(c)(4)(iii).

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 Emergency Management Committee.

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. 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. This Local Hazard Mitigation Plan will help Norwich comply with the new community flood resiliency requirement for town plans adopted after July 2014.

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's 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.

Hazard	Frequency of Occurrence	Warning Time	Potential Impact	Hazard Score
<b>Flash Flood/Flood/Fluvial Erosion</b>	<b>Highly Likely</b>	<b>3-6 Hours</b>	<b>Moderate</b>	<b>10</b>
<b>Structural Fire</b>	<b>Highly Likely</b>	<b>None-Minimal</b>	<b>Minor</b>	<b>10</b>
<b>Water Supply Contamination</b>	<b>Occasionally</b>	<b>None-Minimal</b>	<b>Major</b>	<b>10</b>
<b>Hazardous Material Spill</b>	<b>Likely</b>	<b>None-Minimal</b>	<b>Moderate</b>	<b>10</b>
Dam Failure*	Occasionally	None-Minimal	Moderate	9
<b>Severe Weather (Thunderstorm, Lightning, High Wind, Hail, and Flooding)</b>  <b>*Note: We have defined "Severe Weather" to include two or more of the above hazards)</b>	<b>Highly Likely</b>	<b>6-12 Hours</b>	<b>Minor</b>	<b>8</b>
Hurricanes/Tropical Storms	Likely	>12 Hours	Major	8
Wildfire	Occasionally	None-Minimal	Minor	8
Extreme Cold/Snow/Ice Storm	Highly Likely	>12 Hours	Minor	7
Tornado	Occasionally	3-6 Hours	Moderate	7
Landslides/Mudslides/Rockslides	Unlikely	None-Minimal	Negligible	6
Invasive Species/Infestation	Highly Likely	>12 Hours	Negligible	6
Ice Jams	Occasionally	6-12 Hours	Negligible	5
Drought	Occasionally	>12 Hours	Minor	5
Earthquake	Unlikely	None-Minimal	Negligible	5
Extreme Heat	Likely	>12 Hours	Negligible	5
Hail Storms**	N/A	N/A	N/A	N/A

*\*While Dam Failure has historically been an issue for the Town, the dam that posed the most significant risk was located at Charles Brown Brook (also known as "The Pool") and was destroyed during Tropical Storm Irene (while the previous Hazard Mitigation Plan was in force). As a consequence, the Town determined the impacts of dam failure to be less than those of other Severe Weather events going forward.*

*\*\*The Committee viewed Hail Storm events to not impact the Town as a standalone hazard; rather, they are a byproduct of a Severe Weather event.*

The Norwich HMP Committee 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.

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
- Structural Fire
- Water Supply Contamination
- Hazardous Material Spill
- Severe Weather

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 (1950-2014 and 2006-2014), the Spatial Hazard Events and Losses Database for the United States (SHELDUS) 1960-2012, 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.	General details of the most 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).

This section of the Plan satisfies the requirements of 44 CFR 201.6(c)(2)(i), 201.6(c)(2)(ii), and 201.6(c)(2)(iii) for **Flash Flood/Flood/Fluvial Erosion**.

The worst flood disaster to hit the Town of Norwich, as well as the region and the State of Vermont, occurred on November 3, 1927. This event was caused by nearly 10 inches of heavy rain from the remnants of a tropical storm that fell on frozen ground. Eighty-four Vermonters, including the Lieutenant Governor, were killed. The flooding in the Connecticut River valley was particularly violent, with an estimated 136,000 cubic feet/second (cfs) flow in the Connecticut River at West Lebanon, New Hampshire. Like many towns in the region, the Town of Norwich received heavy precipitation, seeing roughly 6-7 inches of rainfall over the storm period.

A more recent flooding event that devastated the region and the state was the result of Tropical Storm Irene, which occurred on August 28, 2011. Record flooding was reported across the state and was responsible for several deaths, as well as hundreds of millions of dollars of home, road, and infrastructure damage. Due to the strong winds, 50,000 Vermont residents were initially without power, and many did not have electricity restored to their homes and businesses for over a week. Despite the damage wrought, the flooding caused by Tropical Storm Irene is considered to be the second greatest natural disaster in 20<sup>th</sup> and 21<sup>st</sup> century Vermont, second only to the Flood of 1927.

The Town of Norwich suffered major damage to property and infrastructure during Tropical Storm Irene, although no lives were lost. It is estimated that Tropical Storm Irene dropped 4-6 inches of rain over the Town of Norwich in a very short span of time with local reports of 9 inches, moderate precipitation totals when compared to Windsor County as a whole (which averaged 4-7 inches over its land area). 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

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

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. 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); an asterisk “\*” denotes the few instances in which town-specific data is available, and federal disaster numbers are listed where appropriate.

**History of Occurrences:**

<b>Date</b>	<b>Event</b>	<b>Location</b>	<b>Extent</b>
08/28/2013	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).
04/27/2011	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.
05/14/2006	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.
10/07/2005-10/09/2005	Heavy Rain	Windsor County	Heavy rains reached over 6” in portions of Windsor County, causing flooding, mudslides, and clogged culverts in places

Date	Event	Location	Extent
07/21/2003-08/18/2003 (DR-1488)	Severe Storms & Flooding	Windsor County	Severe storms and flooding his Windsor County and other portions of the state, causing damage.
04/13/2002-04/14/2002	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.
07/31/2000	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
04/04/2000	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.
03/28/2000	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.
06/27/1997	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.
01/19/1996-01/20/1996	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 or 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, which are currently being updated and are scheduled to be adopted in late 2014. 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.

There are 52 residential (50 residential, and 2 mobile homes) and 3 commercial/industrial/public structures in the 0.2% floodplain, which would equal \$11,847,700 if all properties were damaged/destroyed in a severe flooding event. There are no critical facilities currently sited in the Town’s floodplain.

Across Vermont, most child and elder care facilities are not registered with the State. Most child day care is likely to be private in-home care in Norwich, but there are also six 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. There are 14 single-family homes located in Norwich’s fluvial erosion hazard zone.

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 2013 with assistance from Two Rivers-Ottawaquechee 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.

<b>Hazard</b>	<b>Location</b>	<b>Vulnerability</b>	<b>Extent</b>	<b>Observed Impact</b>	<b>Likelihood/Probability</b>
Flooding	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 52 residential (45 single family dwellings, 4 multi-family dwellings, and 3 mobile homes) and 3 commercial/industrial/public structures in the 0.2% floodplain.	Tropical Storm Irene- 4-7” across the county (4-6” in Norwich).	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. 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 2010, there were 1,956 reported structural fires in the state, which included 5 fatalities and over \$18 million dollars in damage. Although there have been requirements for smoke detectors in rental housing for over 20 years, and requirements for smoke detectors in single-family dwellings since 1994, there was only one building involved in the fatal fires in 2000 that had evidence of working smoke alarms.

This section of the Plan satisfies the requirements of 44 CFR 201.6(c)(2)(i), 201.6(c)(2)(ii), and 201.6(c)(2)(iii) for **Structure Fire**.

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.

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
03/05/2014	House Fire	New Boston Road	Estimated damage/losses: \$240,000. Home completely destroyed.
08/07/2013	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 \$500,000.00. There were no reported injuries as a result of this fire.
05/24/2013	Building Fire	Hemlock Road	Estimated damage/losses: \$10,500
09/13/2012	Building Fire	Falcon Lane	Estimated damage/losses: \$120,000
05/29/2012	Building Fire	Route 132	Estimated damage/losses: \$45,000
02/28/2011	Building Fire	Hickory Ridge	Estimated damage/losses: \$11,000
12/20/2010	Building Fire	Turnpike Road	Estimated damage/losses: \$30,000
08/10/2010	Building Fire	Elm Street	Estimated damage/losses: \$25,000
03/06/2010	Building Fire	Blood Hill Road	Estimated damage/losses: \$40,000
06/16/2009	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 within town limits in the past year (on Beaver Meadow Road in the autumn of 2013). 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.

Hazard	Location	Vulnerability	Extent	Observed Impact	Likelihood/Probability
Structure Fire	Town-wide	All housing, municipal buildings, retail/commercial sites.	Depends on the location and extent of the fire.	Varies depending on the location and extent of the fire.	Highly Likely

### 3. Water Supply Contamination

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.

This section of the Plan satisfies the requirements of 44 CFR 201.6(c)(2)(i), 201.6(c)(2)(ii), and 201.6(c)(2)(iii) for **Water Supply Contamination**.

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.

The following data was retrieved from the Vermont Department of Environmental Conservation’s Spill List. It includes some data copied from the Hazard Materials Spill section of this Plan discussed later because the spilling of any hazardous materials also has the potential to contaminate the water supply for the Town of Norwich.

**History of Occurrences:**

<b>Date</b>	<b>Event</b>	<b>Location</b>	<b>Extent</b>
09/02/2010	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.
04/15/2008-04/16/2008	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.
09/13/2006	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.
05/17/2004	Oil Spill	Route 5	Oil was reported in the sump at a private residence. A water supply sample was taken. Months later, the soil persisted in the sump, being pumped onto the lawn though the source of the oil was not identified.
03/08/2002	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.

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 well being 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.

Hazard	Location	Vulnerability	Extent	Anticipated/Potential Impact	Likelihood/Probability
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

#### 4. Hazardous Material Spill

Based on available VT Tier II data, there are no sites in town that have sufficient types and/or quantities of hazardous materials to require reporting. 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 State’s 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.

This section of the Plan satisfies the requirements of 44 CFR 201.6(c)(2)(i), 201.6(c)(2)(ii), and 201.6(c)(2)(iii) for **Hazardous Materials Spill**.

The following data was retrieved from the Vermont Department of Environmental Conservation’s Spill List and by searching the archives of local newspapers. The table above is used to illustrate the ease with which trucks, trains and the day-to-day activities in the Town have the potential to create a hazardous material spill and dangerous conditions for emergency responders and town residents.

**History of Occurrences:**

Date	Event	Location	Extent
11/12/2013	Diesel Spill	I-91 NW (near MM73) <sup>6</sup>	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.
02/13/2013	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.
02/06/2004	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.
09/01/2005	Diesel Spill	I-91 (Exit 3)	A backhoe overturned, spilling 50 gallons of diesel. Contained the spill with SpeediDri.
08/29/2002	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.
03/08/2002	Unspecified Spill	Route 5	Norwich Water Department had an overflow shutoff failure, resulting in a 197 gallon spill. Some contaminants went to floor drain and outside.
09/11/1998	Diesel Spill	Butternut Lane	An AST was punctured, leaking 200 gallons of diesel. Required excavation and polywrapping of soil.
05/22/1997	Unspecified Spill	Route 5	An excavator hose failure at the Farrell Gravel Pit led to a 25 gallon spill of an unspecified substance.

<sup>6</sup> In Hartford.

<b>Date</b>	<b>Event</b>	<b>Location</b>	<b>Extent</b>
01/29/1997	Unspecified Spill	Route 12	200 gallons of an unspecified substance spilled during a transfer at the Agway Facility. Presumably gas/diesel.
01/07/1997	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.
09/06/1995	Unspecified Spill	Hawk Pine	An AST leak in a private residence's basement led to a 40 gallon spill.
04/22/1992	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.
04/13/1989	Unspecified Spill	Elm Street	A tank was accidentally overfilled, leading to a 200 gallon spill of an unspecified substance.
06/13/1983	Road Oil Spill	Cossingham Property	Town Selectmen approved road oiling, but the process ultimately led to a 300 gallon accidental spill of oil.
08/25/1980	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.
01/20/1976	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.

While fewer than half of the spills recorded in Norwich have consisted of hundreds of gallons of hazardous materials, the potential for a major spill exists. Route 5 and Interstate 91 pose constant threats to the Town and Village of Norwich due to the volume of traffic they see, particularly during rush-hour. These routes serve as the main thoroughfares for trucks and other motor vehicles transporting a wide-range of goods, including a vast array of hazardous materials, within the vicinity of Norwich. A truck accident and a resulting hazardous material spill could be exceedingly disastrous for the Town and its residents. The majority of Routes 5 and Interstate 91 in the Town and Village of Norwich are built very close to the Town's rivers and streams, namely the Connecticut Rivers, which could create additional water contamination issues, were a hazardous material spill to occur along either of these major routes.

In order to prepare for hazardous material spills in Norwich, FAST Squad members are trained at a minimum to the HAZMAT Awareness level and firefighters are trained to both the HAZMAT Operations and Decon levels. The Police Department and the Public Works Department are also trained, at a minimum, to the HAZMAT Awareness level. There is one employee of Marion Cross School that is trained to HAZMAT Awareness level.

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

## 5. 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. Three hundred eighty-two hail events were recorded between 1950 and 2008 in the state, making hail a regular annual occurrence in at least some part of the state. Most of these events had hail measuring 0.75 inches, but some had hail at least 1.5 inches in size. The largest hail during the period was 3-inch hail that fell in Chittenden County in 1968 (NCDC). 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.

This section of the Plan satisfies the requirements of 44 CFR 201.6(c)(2)(i), 201.6(c)(2)(ii), and 201.6(c)(2)(iii) for **Severe Weather (Thunderstorm, Lightning, High Winds, Hail, Flooding)**.

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.

The following list indicates the history of occurrence with regard to this hazard in Windsor County (given that small population of Norwich, town-specific data is limited); an asterisk “\*” denotes the few instances in which town-specific data is available, and federal disaster numbers are listed when appropriate. 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:**

Severe Weather Date	Event					Location	Extent
	Thunderstorm / severe storm	Flooding	Hail	High Winds	Lightning		
09/11/2013	✓		✓	✓		Norwich; County-wide	Severe thunderstorms, hail, and winds of up to 50 kts hit the county. Several trees were downed on I-91 between MMS 62 and 73.
06/25/2013-07/11/2013 (DR-4140)	✓	✓		✓		Norwich; County-wide	Severe storms caused flooding, property damage, intermittent power losses, etc. Two to three inches of rain fell within two hours in early July alone.
09/08/2012	✓			✓		County-wide	Severe thunderstorms and high winds hit the region, with winds reaching 50 kts. Branches and small trees were downed in many places, with \$10k in reported damage for the county.
07/17/2012	✓			✓		County-wide	Severe thunderstorms and high winds hit the region.
06/02/2013 *	✓		✓	✓			Widespread thunderstorms with pockets of damaging winds and large hail hit the region. Nearly 20,000 customers were without power. In Norwich, several trees were downed.
05/28/2012	✓		✓	✓		County-wide	A severe storm brought heavy rains, lightning, high wind, and hail to the region.

Severe Weather Date	Event					Location	Extent
	Thunderstorm / severe storm	Flooding	Hail	High Winds	Lightning		
08/28/2011-08/29/2011 (DR-4022)*	✓	✓		✓		Norwich; County-wide	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 between 4-6" of rainfall over the course of the storm, but escaped the high winds. The Connecticut River in West Lebanon, NH crested at 29.62 feet (4 <sup>th</sup> highest recorded height), though 5 feet below the record crest of 35.00 feet set in the Great Flood of 1927. 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).
08/21/2011	✓			✓		County-wide	Severe storms brought high winds and hail to the region. Microbursts of 70-90mph winds were recorded in neighboring Rutland County.
07/06/2011	✓			✓	✓	Norwich; County-wide	Severe storms, including high winds and lightning, hit the state. Over 15K Vermonters lost power during the storm.
06/09/2011	✓		✓	✓		County-wide	A cold front moved into the region, bringing scattered thunderstorms and reports of high winds up to 59mph and large hail.
05/31/2009	✓		✓	✓		County-wide	A strong cold front moved into the region, bringing 40-55mph winds in places along with heavy rains and reports of hail. Many fallen trees and power outages were recorded in the area.
05/09/2009	✓		✓	✓		County-wide	Severe storms and high winds hit the area. Reports of hail up to 1" diameter were made, and many trees were downed.
08/07/2008 (DR-1719)	✓	✓				County-wide	Heavy rainfall led to flash flooding throughout the region. \$25k in property damage was reported in the county.
07/21/2008-08/12/2008 (DR-1790)	✓	✓				County-wide	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.

Severe Weather Date	Event					Location	Extent
	Thunderstorm / severe storm	Flooding	Hail	High Winds	Lightning		
08/25/2007	✓		✓	✓		County-wide	Numerous thunderstorms produced widespread damaging winds and some large hail throughout the region, and caused \$75k in damage in Windsor County.
07/09/2007-07/11/2007 (DR-1715)	✓	✓				Norwich; County-wide	Severe storms and flooding struck a number of counties in Vermont, including Windsor. As much as 3" of rain fell within two hours in some areas, washing out roads and causing flash flooding.
06/27/2007	✓			✓		County-wide	Severe storms and high winds struck the area, taking down trees and power lines in many places.
04/15/2007-04/21/2007 (DR-1698)	✓	✓				County-wide	Severe storms and flooding hit Windsor and other counties throughout Vermont.
05/14/2006	✓	✓				Norwich; County-wide	Strong storms brought 3-6" of rainfall to Windsor County, causing flooding and minor washouts on several roads.
06/09/2004	✓		✓	✓		Norwich; County-wide	Thunderstorms, damaging winds, and large hail struck the area. In many places, trees and power lines blew down. Widespread power outages were reported.
07/21/2003-08/18/2003 (DR-1488)	✓	✓			✓	County-wide	Severe storms with lightning and flooding hit Windsor County and other portions of the state, causing damage. In Norwich, a lightning strike exploded a large tree, throwing branches about 100 ft. in all directions and causing \$5k in property damage.
07/14/2000-07/18/2000 (DR-1336)	✓	✓				County-wide	Strong showers and thunderstorms across the state resulted in especially heavy rainfall. \$500k in reported damage throughout the county.
09/16/1999-09/21/1999 (DR-1307)	✓	✓		✓		County-wide	Tropical Storm Floyd brought heaving rains, high winds, and flooding to many counties in Vermont, including Windsor.
06/27/1998	✓	✓				County-wide	Heavy rains brought 3 to 6 inches of rainfall to northern portions of Windsor County, causing extensive flood damage. \$1m in property damage was reported throughout the county.

Severe Weather Date	Event					Location	Extent
	Thunderstorm / severe storm	Flooding	Hail	High Winds	Lightning		
07/06/1973 (DR-397)*	✓	✓				Norwich; County-wide	Extensive rains fell on already soaked watersheds, including the Connecticut and Ompompanoosuc. Norwich was recorded to have had 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 *	✓					Norwich; County-wide	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 Connecticut River in West Lebanon, NH crested at its highest ever level of 35.00 feet during the storm.

The main hazard caused by severe weather throughout the Town is flooding. One of the more recent examples of the extent of flooding from severe storms is Tropical Storm Irene in late August 2011. Most damage that occurred during the storm was to roadways and infrastructure in the Town, including: 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. Minor flooding damage was reported for a number of buildings in the village, including the St. Francis of Assisi Catholic Church on Beaver Meadow Road.

Most recently, the spring and early summer of 2013 brought numerous severe storms and flooding to much of the State of Vermont. These storms prompted a federal disaster declaration (DR-4140 VT), covering Orange, Washington and Windsor Counties. Multiple inches of rain fell within a matter of hours in early July. Luckily, the Town of Norwich did not suffer any major damage to road infrastructure.

With assistance from Two Rivers-Ottawaquechee Regional Commission, Norwich completed a full culvert inventory in 2013, which included geo-referenced culvert locations and information on the condition of each culvert. The Town maintains an up-to-date culvert inventory, and its work to upgrade culverts remains in progress. Additionally, Norwich's Planning Department is working to complete fluvial erosion hazard area regulations.

Hazard	Location	Vulnerability	Extent	Observed Impact	Likelihood/Probability
Severe Weather	Town-wide for wind, hail, high winds, lightning and thunderstorm impacts; for flooding:	Town and private buildings, utilities; culverts, bridges, road infrastructure	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).	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.

## 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 structural fire.
- To reduce injury and losses, including loss of life and to infrastructure, structures and businesses, from the hazard of water supply contamination.
- To reduce injury and losses, including loss of life and to infrastructure, structures and businesses, from the hazard of hazardous material spill(s).
- To reduce injury and losses, including loss of life and to infrastructure, structures and businesses, from the natural hazard of severe weather.

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

- Protect the aquifers and groundwater that are the sources of Norwich's present and future drinking water supply (p. 2-4).
- Identify and map all public water supplies and known aquifers in Norwich (p. 2-4).
- Maintain provisions in Norwich's zoning and subdivision regulations to minimize the loss of wetlands to development (p. 2-4).
- Map larger blocks of contiguous forest land and potential travel corridors between those blocks in Norwich and neighboring towns (p. 2-4).
- Consider, as part of a long-term public town planning process, developing wastewater treatment for areas without adequate on-site, soil-based wastewater treatment capacity that are otherwise suitable for higher density development. Alternatives, subject of course to considerations of feasibility and cost-effectiveness, may include a new municipal system, connections to existing systems in neighboring towns, decentralized community systems, or use of new on-site treatment technologies (p. 2-5).
- Limit the rate of residential and commercial development to not exceed the capacity of existing and planned municipal infrastructure, facilities, and services (p. 4-10).
- Maintain roads and bridges in the most cost-effective manner (this may require increased maintenance at an earlier stage of deterioration) (p. 8-12).
- Update the pavement and bridge inventory on an annual basis (p. 8-12).
- Recommend residential sprinkler systems to all homeowners in the rural areas. Consider requiring them for new houses not readily accessible to emergency vehicles (p. 8-12).
- Prohibit the stockpiling of sand, gravel, soil, salt or similar materials in areas adjacent to public water supplies, identified aquifers and surface waters (p. 11-20).
- Protect public safety and private property from flood hazards by maintaining the natural functions of the town's floodplains and stream corridors (p. 11-21).

- Participate in and meet the requirements of the National Flood Insurance Program so that owners within floodplains are eligible for flood insurance (p. 11-21).
- Regulate development in order to prevent loss of life or property by prohibiting further significant development within identified floodways and floodplains (p. 11-21).
- Review any proposed development, alteration of the natural grade or loss of pervious ground cover within identified floodways and floodplains in order to prevent restrictions to the flow of floodwaters or reductions in the natural ability of the land to absorb floodwaters (p. 11-21).
- Complete geomorphic assessments on the town's streams and implement measures to minimize loss of life or property due to fluvial erosion (p. 11-21).

The Norwich Town Plan was updated and adopted on 12/14/2011, and has a 5 year lifespan.

### C. Hazard Mitigation Strategies: Programs, Projects & 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.

This section of the Plan satisfies the requirements of 44 CFR 201.6(c)(3)(ii), 201.6(c)(3)(iii) and 201.6(c)(3)(iv).

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.

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.

<b>Hazard(s) Mitigated</b>	<b>Mitigation Action</b>	<b>Local Leadership</b>	<b>Prioritization</b>	<b>Possible Resources</b>	<b>Time Frame</b>
All Hazards	<i>Ensure that Norwich's Local Emergency Operations Plan (LEOP) is kept up-to-date and identifies vulnerable areas and references this Plan.</i>	<i>Emergency Management Director</i>	<i>High</i>	<i>Local resources; TRORC; Vermont Division of Emergency Management and Homeland Security</i>	<i>Annually</i>
	<i>Consistently document infrastructure damage after weather events.</i>	<i>Public Works Director/DPW</i>	<i>High</i>	<i>Local resources; Vermont Division of Emergency Management and Homeland Security and FEMA (after a disaster)</i>	<i>As needed</i>
	<i>Research and establish a system to alert residents of emergencies.</i>	<i>Emergency Management Deputy Director</i>	<i>High</i>	<i>Vermont Division of Emergency Management and Homeland Security; VT Alert; Code Red</i>	<i>1 year</i>
Flash Flood/ Flood/ Fluvial Erosion// Severe Weather	<i>Maintain and update town bridge and culvert inventories. Regularly inspect and maintain town bridges and culverts; and develop a schedule to replace undersized culverts.</i>	<i>Public Works Director/DPW</i>	<i>High</i>	<i>Local resources; TRORC; VTrans</i>	<i>Annually /As needed</i>
	<i>Adopt fluvial erosion hazard (FEH)/river corridor regulations which will incorporate VT ANR's river corridor maps.</i>	<i>Planning Director; Selectboard</i>	<i>High</i>	<i>Local resources (Planning Dept.); Vermont Agency of Natural Resources (ANR)</i>	<i>6 months-1 year</i>
Flash Flood/ Flood/ Fluvial Erosion// Severe Weather	<i>Identify areas of fluvial erosion that could benefit from river/stream corridor plantings on both public and private property.</i>	<i>Conservation Commission; Planning Dept.; DPW</i>	<i>Medium</i>	<i>Local resources; VT ANR's Rivers Program</i>	<i>2-4 years</i>

Hazard(s) Mitigated	Mitigation Action	Local Leadership	Prioritization	Possible Resources	Time Frame
Flash Flood/ Flood/ Fluvial Erosion// Severe Weather	<p><i>Complete the following culverts projects:</i></p> <ul style="list-style-type: none"> <li>• <i>Replace 3 wooden bridges on Tigertown Road with 60" HDPE culverts.</i></li> <li>• <i>Replace one undersized steel culvert on Bragg Hill with a new precast concrete box culvert: 5' x 10' x 52'.</i></li> <li>• <i>Replace an old cement box-type culvert on Route 132 with a 117" x 79" metal pipe arch with concrete headwalls.</i></li> <li>• <i>Replace a wooden bridge on Olcott Road with a 60" HDPE culvert.</i></li> <li>• <i>Replace an undersized culvert on Four Wheel Drive with a new 24" HDPE culvert.</i></li> </ul>	Department of Public Works	Medium-High	Local resources; TRORC; state grants (Better Backroads; etc.); HMGP and PDM-C grants	1-4 years
Severe Weather (high wind)	<i>Clear and maintain town road rights-of-way, and work with local utilities to request that utility corridors are cleared and maintained, as needed.</i>	Norwich Department of Public Works	High	Local resources	As needed
Structural Fire	<i>Ensure that fire department personnel maintain their Firefighter certifications.</i>	Norwich Fire Department	Medium	Local resources; Vermont Fire Academy	As needed
	<i>Complete a comprehensive survey of potential dry hydrant sites to determine the need for additional sites and potential location, and install dry hydrants.</i>	Norwich Fire Department	Medium	Local resources; Vermont Rural Fire Protection Task Force	2-4 years

<b>Hazard(s) Mitigated</b>	<b>Mitigation Action</b>	<b>Local Leadership</b>	<b>Prioritization</b>	<b>Possible Resources</b>	<b>Time Frame</b>
	<i>Promote installation of sprinklers in new buildings.</i>	Norwich Fire Department	High	Local resources; US Fire Administration; Vermont Division of Fire Safety	Yearly
	<i>Inspect public buildings for potential fire hazards and conduct a voluntary home inspection program.</i>	Norwich Fire Department	Medium	Local resources; US Fire Administration; Vermont Division of Fire Safety	Yearly/ As needed
	<i>Conduct a public education program on fire prevention and disseminate information at the school and on the Town's listserv.</i>	Norwich Fire Department	Medium	Local resources; Vermont Division of Fire Safety	Yearly/ As needed
Water Supply Contamination	<i>Continue to maintain and update the Town's Source Protection Plan.</i>	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	At least every 3 years
	<i>Install motion-detection equipment that is connected to dispatch to prevent/discourage intrusion at the reservoir.</i>	Water Operations Manager	High	Local resources	1 year
	<i>Install an effective fire alarm system at the pump house that is connected to Hanover Dispatch.</i>	Water Operations Manager	High	Local resources	1 year
	<i>Install a sprinkler system at the Norwich Fire District and Municipal Water Department's pump house.</i>	Water Operations Manager	High	Local resources	1 year
	<i>Install a generator at the Norwich Fire District and Municipal Water Department's pump house.</i>	Water Operations Manager	High	Local resources; Hazard Mitigation Grant Program (HMGP)	1 year

<b>Hazard(s) Mitigated</b>	<b>Mitigation Action</b>	<b>Local Leadership</b>	<b>Prioritization</b>	<b>Possible Resources</b>	<b>Time Frame</b>
Hazardous Material Spill	<i>Ensure that all emergency response and management personnel continue to receive HAZMAT Operations training at a minimum.</i>	Norwich Fire Department	High	Local resources; State HAZMAT Team	As needed
	<i>Continuously stock gear to help contain small spills when they occur (booms, absorbent materials, etc.).</i>	Norwich Fire Department	Medium	Local resources	As needed
	<i>Use flood hazard maps to determine the need and plan for response in HAZMAT response in flood hazard areas.</i>	<i>Norwich Fire Department; Planning Department; Emergency Management Coordinator</i>	Medium	<i>Local resources; TRORC</i>	2-4 years

# CERTIFICATE OF ADOPTION

**Selectboard  
Town of Norwich**

A Resolution Adopting the Norwich Hazard Mitigation Plan

WHEREAS, the Town of Norwich has worked with the Two Rivers-Ottawaquechee Regional Commission to identify hazards, analyze past and potential future losses due to natural and human-caused disasters, and identify strategies for mitigating future losses; and,

WHEREAS, the Norwich Hazard Mitigation Plan contains several potential future projects to mitigate damage from disasters with the potential to occur in the Town of Norwich; and,

WHEREAS, a duly-noticed public meeting was held on \_\_\_\_\_, 2014 to formally approve and adopt the Norwich Hazard Mitigation Plan.

NOW, THEREFORE BE IT RESOLVED that the Selectboard adopts the Norwich Hazard Mitigation Plan Update.

ADOPTED by the Norwich Selectboard on \_\_\_\_\_

\_\_\_\_\_  
Selectboard Chair

ATTEST

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

# 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>

**Attachments**

**Attachment A: Map of the Town of Norwich**