Town of Windsor, Vermont: All Hazard Mitigation Plan

Adopted April 12, 2016

Prepared by the Town of Windsor and Southern Windsor County Regional Planning Commission

2016-2021

Last revised 02/17/2016

CERTIFICATE OF ADOPTION

Town of Windsor, VT
Selectboard

A Resolution Adopting the
Town of Windsor 2016-2021 All Hazard Mitigation Plan

WHEREAS, the Town of Windsor has worked with the Southern Windsor County Regional Planning Commission to prepare an updated hazard mitigation plan for the town, to identify natural hazards, analyze past and potential future damages due to natural and man-made caused disasters, and identify strategies for mitigating future damages; and

WHEREAS, duly-noticed public meetings were held by the Windsor Selectboard in March 2015 and on April 12, 2016 to present and receive public comment on the Plan; and

WHEREAS, the updated 2016-2021 Windsor All Hazard Mitigation Plan was submitted to the Division of Emergency Management and Homeland Security and the Federal Emergency Management Agency for review on March 10, 2016; and

NOW, THEREFORE BE IT RESOLVED that the Town of Windsor Selectboard hereby adopts the 2016-2021 Windsor All Hazard Mitigation Plan for municipal use and implementation.

Duly adopted this 12th day of April, 2016.

Selectboard

Chair, Windsor Selectboard

Member

Member

Member

Member

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1. INTRODUCTION

The goal of this stand-alone All Hazard Mitigation Plan is to help the community identify risks and provide local mitigation strategies it can take to make Windsor more disaster resilient.

What is Hazard Mitigation?

Hazard mitigation is an action taken to reduce or eliminate the long-term risk to human life and property from both natural and man-made hazards. The work done to minimize the impact of hazard events to life and property is called Hazard Mitigation Planning.

2. PURPOSE

The Federal Emergency Management Agency (FEMA), the Vermont Division of Emergency Management and Homeland Security (DEMHS), and local towns have come to recognize that it is less expensive to prevent disasters than to repeatedly repair damage after a disaster has struck. Hazards cannot be eliminated, but it is possible to determine what the hazards are, where the hazards are most severe, and identify local actions which can be taken to reduce the severity of the hazard.

Hazard mitigation planning and strategies include the following benefits:

- structural or land improvements
- increased public education and awareness of hazards
- altering the hazard area to remove the hazard occurrence
- reducing the hazard frequency through structure or land treatment
- increased community support for specific actions to reduce future losses
- reduction in financial and physical losses caused by hazard events
- eligibility for hazard mitigation grants and aid
- strengthened partnerships

The Town of Windsor All Hazard Mitigation Plan is a stand-alone plan to assist the town in identifying hazards within the town and identify strategies to reduce or eliminate these hazard risks.

Previously, the Town of Windsor All Hazard Mitigation Plan was an annex to the Southern Windsor County Regional Planning Commission Multi-Jurisdictional All Hazard Mitigation Plan. The updated plan is intended to serve as a 'stand-alone' plan for the Town and will focus on the hazards and mitigation programs best suited for the town.

It is the intent of the town, once this plan is formally approved by FEMA, to incorporate and address recommended mitigation strategies in the town's future comprehensive, emergency operations and disaster response planning, the town plan and in the update of town bylaws and ordinances. The town also intends to continue the cross-board communication in development and implementation of updates to these plans. Windsor encourages hazard mitigation planning to be incorporated into other community planning projects, such as the Town Plan, capital budget planning, and Town Basic Emergency Operation Plan.

3. TOWN PROFILE

Windsor is located within Windsor County in southeastern Vermont, bordered by the Towns of Hartland, Weathersfield, West Windsor, and Cornish, New Hampshire. Vermont state highways including Routes 44

and 44a along with US Route 5 and Interstate-91 connect the town with larger population centers to the north and south. In addition, Bridge Street and County Road are classified as Class 2 town highways and serve as important connections to other towns. Bridge Street is notable as it leads to the historic Cornish – Windsor Covered Bridge, originally built in 1976, and reconstructed in 1988. The covered bridge, which spans the Connecticut River, is the only direct connection between Windsor and New Hampshire. The bridge is owned and maintained by the State of New Hampshire.

The original Cornish-Windsor covered bridge built in 1796 is described as follows:

> *This bridge is universally allowed to be the best and most perfect in AMERICA, and is the first of its kind thrown across the Connecticut River. Later the bridge was even built to be more grand in 1866 as a 'covered bridge.'*[1]

The Ascutney Mill Dam was erected in 1834 by the Ascutney Mill Dam Company and is the first masonry, gravity-arch dam built in the United States. The purpose of the dam was to increase the utility and potential of the Mill Brook's waterpower to sites located along the brook by providing a storage reservoir which would regulate the flow of water in the brook and thereby eliminate seasonal irregularities. The Ascutney Mill Dam Company's principal interest in building the dam was to accelerate the industrial growth of the village of Windsor by guaranteeing continuous waterpower. The dam was designated a National Historic Civic Engineering Landmark in 1970. The Town has developed an Emergency Action Plan for the Ascutney Mill Dam. The priority need is to address structural improvements to the Mill Dam. Recent work has been done to the Mill Dam (about $1.5 million), but more improvements are needed, as are currently being identified in an ongoing engineering review. The results of the final dam safety inspection report and integration of those results will be incorporated into the next plan update.

- Address public safety concerns associated with deteriorated condition of Ascutney Mill (Pond) dam (a.k.a. Kennedy Pond dam). Repair and restore dam in such a way as to re-establish its structural integrity while at the same time preserve the aesthetic and recreational value of the pond. Seek outside funding assistance for this project—one that is expected to be very costly[2].

Land use patterns in Windsor have developed in the classical New England village pattern with a densely developed downtown surrounded by more sparsely developed rural lands. There is a downtown commercial center near the Connecticut River with industrial uses nearby. The downtown is home to many beautiful historic buildings. Immediately outside of the downtown and to the west of Route 5 are high- and medium-density residential neighborhoods, sprinkled heavily with historic structures. Beyond these neighborhoods are rural residential areas, as well as areas of farmland and forest. All of the high-density residential areas are served by Town water and sewer, as are most of the medium-density residential areas, and portions of the rural residential areas along County Road and Route 44. The density of development and population peaks in and around downtown, and tapers off to the north, south, and west.

Windsor has two sections of town located in the Industrial zoning district, one to the far North of town and the other to the far South. The industrial lands are all located between Route 5 and the Connecticut

[1] 2014 Windsor Town Plan
[2] 2014 Windsor Town Plan Utilities and Facilities Policy

River. The Windsor Industrial Park (i.e. Artisans Park) consists of a total of 23.6 acres. Currently, Simon Pearce Glassblowing and Pottery, Harpoon Brewery, Lebanon Screw Products, Vermont Farmstead Cheese Company, American Crafted Spirits Distillery and Land Air Express occupy the developed lots. The second industrial area is a tract of land immediately north of the Weathersfield town line which is currently occupied by Biebel Builders and Miller Construction. The former Goodyear campus, although not in the Industrial District, is located in the downtown area east of the railroad tracks. Buildings are occupied by Park Corp. (a machine tool manufacturer), several small manufacturers, woodworkers, offices, retail and residential buildings. This area is comprised of approximately 60 acres.

4. PLANNING PROCESS

The local planning process used to develop this hazard mitigation plan follows guidance by the Federal Emergency Management Agency (FEMA) and the Vermont Division of Emergency Management and Homeland Security (DEMHS). Beginning in the spring of 2014, Southern Windsor County Regional Planning Commission (SWCRPC) staff reviewed the 2012 Windsor All Hazard Mitigation Plan, which at the time was an annex to the Southern Windsor County Regional Planning Commission Multi-Jurisdictional All Hazard Mitigation Plan to identify key areas for updates. The State of Vermont also recently adopted an updated Hazard Mitigation Plan in November of 2013 (Vermont HMP 2013), which was consulted during this update.

4.1 Public Process

The Town of Windsor in partnership with the Southern Windsor County Regional Planning Commission established a plan of completion for the Windsor All Hazard Mitigation Plan which included several meetings:

- Complete hazard analysis and hazard extent
- Review hazard history and identify additional data to be included
- Discuss identification and protection of historic resources
- Review plan and identify mitigation strategies to address each high hazard
- Review past completed or on-going mitigation projects and actions
- Identify new mitigation projects and actions

4.2 Plan Update Process

In March of 2014, SWCRPC staff met with the Windsor Hazard Mitigation Committee to complete the hazard analysis. Participants also discussed the purpose and timeline for updating the plan and groups/individuals that should be invited to meetings and made aware of the plan update. In addition, The Town of Windsor has appointed a design review/historic preservation commission to review exterior changes at the Ascutney Mill Dam Historic District (documenting early Windsor industrial and engineering heritage) site. The commission will review the annual inspection report for the dam and will review the needs of the dam and adjacent structures annually as well.

The current plan is an extensive update to the previous annex plan. A partial list of revisions that have been made include:

- General updates
- Reorganization/restructuring of the plan
- Revaluation of hazards and edits as necessary

- Update of data and statistics
- Status of mitigation strategies
- Identification of current mitigation strategies
- Maps
- Discuss the addition of an appendix or section that lists historic properties of significance in Windsor
- The expansion of the existing "Hazard Vulnerability Assessment" section to include specific historic properties listed in an appendix or section
- Discuss the proposed funding for repairs to the Ascutney Mill buttress wall stipulations

In the winter of 2014-2015, SWCRPC staff reviewed and edited the previous version of the Hazard Mitigation Plan to continue the rewriting process. This revision includes updating population statistics in the town profile section, incorporating hazard events that occurred since the last plan revision into the hazard analysis, updating and adding data, and reviewing the progress of past mitigation actions. Following the draft edits completed by SWCRPC, publicly noticed meetings were held at Windsor Town Hall on February 23, 2015 to meet with the Hazard Mitigation Committee and on March 9, 2015 to meet with First Responders at Town Hall. The revised draft plan was submitted to the Planning Commission for review and comment on February 27, 2015. Planning Commission members comments were reviewed, discussed and incorporated into the draft or highlighted for future hazard mitigation planning discussions. SWCRPC submitted the revised draft plan to the Windsor Selectboard for review and comment at their March meeting. Simultaneously, the revised draft plan was put out for public comment. This was done by posting an electronic copy on the town and SWCRPC website and having a hard copy of the plan advertised and made available at the town office for public review and comment. No comments were received from the public. On March 11, 2015 the Windsor AHMP was distributed to adjacent towns (West Windsor, Weathersfield, and Hartland) for comment via email. Emails were sent directly to the applicable Town Clerk and Town Manager for each community.

Attendees of these meetings consisted of members of the Windsor Planning Commission, Selectboard, Town Manager, town personnel, members of the public and SWCRPC staff.

- Tom Marsh – Windsor Town Manager
- Mark Kirko – Windsor Fire Chief
- Judy Hayward – 'Historic Windsor, Inc.
- Allison Hopkins – SWCRPC Regional Planner
- Jason Rasmussen – SWCRPC Senior Planner
- Windsor Planning Commission
- Windsor Selectboard

Meeting attendees discussed areas of town most likely to be affected by these hazards as well as future goals and mitigation strategies that may be undertaken to reduce the risk of future harm and cost to the town. These mitigation strategies were incorporated into the implementation schedule at the end of this document. Changes in priorities, development, and local mitigation efforts were also considered both at these meetings and during the entire revision process. Mitigation Strategies included developing goals,

objectives and strategies aimed at mitigating future disaster losses that are cost-effective, technically feasible, and environmentally sound. The final adopted Windsor All Hazard Mitigation Plan will also be posted on the SWCRPC website and available at the Windsor Town Offices.

This plan has also been updated to reflect progress in local mitigation planning efforts. The table below (Table 1.1) incorporates status updates for mitigation actions from the previous plan. Some not-completed actions have been revaluated and incorporated into the new Projects and Actions table near the end of this document. In addition, several of the not-completed actions were not chosen to be on the updated list. The Town of Windsor and Mitigation Committee decided that other actions had higher priority and feasibility of completion.

There has been very little development (commercial, residential, or otherwise) in the last five years, and no major development is anticipated in the next five years. According to town permits the following new structures were constructed between 2010 and 2014 - 3 mobile homes, 2 houses, no commercial and no industrial. This small amount of development has not impacted the Town's vulnerability.

Table 1.1. Status on Past Mitigation and Preparedness Actions and Projects

MITIGATION ACTION	TYPE OF ACTION	HAZARD(S) ADDRESSED	RESPONSIBLE PARTY	TIMEFRAME	FUNDING SOURCE	STATUS
Basic/ Local Emergency Operations Plan	Preparedness	All Hazards	Town Manager, Fire and Police Chief	Annual update process to begin every March following town meeting	Town funds and SWCRPC EMPG grant	Done, Annually
ICS/NIMS Training	Preparedness	All Hazards	Selectboard and Fire and Police Chief	Annually or as required	No cost	On-going
Bridge enlargement on Bridge Street	Mitigation Preparedness	Fire (greater access for current equipment)	Selectboard, Highway Department, and New England Central Railroad	2014-2019	Capital Budget program and possible HMGP project	Town contact railroad so they are aware of the issue when they do a project
Plan for improved traffic flow on evacuation routes	Preparedness	Severe Weather, Flooding, Fire, Earthquake, Transportation Disruption	Selectboard and Town Manager	2013-2014	Possible funding through SWCRPC TPI grants	Action item scope changed
Upgrades to Mill Pond dam to meet standards	Mitigation	Flooding	Town Manager	2016-2020	HMGP	Early detection system and awareness completed. Construction not yet started.
Address Pine St. erosion. (Town's drainage system is eroding homeowner's yard.)	Mitigation	Flooding, Severe Weather	Highway Department	2016-2017	Better Backroads program. Possible HMGP	Done

MITIGATION ACTION	TYPE OF ACTION	HAZARD(S) ADDRESSED	RESPONSIBLE PARTY	TIMEFRAME	FUNDIN G SOURCE	STATUS
Initiate an annual review of HM plan	Mitigation Preparedness	All Hazards	Emergency Management Director, Hazard Mitigation Committee	Annually	No cost	Done, Annually
Collect additional hazard vulnerability data for inclusion in next plan update	Mitigation	All Hazards	SWCRPC	Before the next plan update	EMPG funds	Done, On-going
Enhance fire suppression capabilities	Mitigation	Fire	Fire Chief, Emergency Management Director	2014-2019	Town Capitol Budget, Federal Grants	Portion completed
Make NFIP pamphlets available in town	Mitigation	Flooding	Zoning administrator	2012-2014	Town capital budget funds	Done, On-going
Conduct Phase II of the Hubbard Brook Stream Geomorphic Assessment	Mitigation	Flooding	SWCRPC	2014-2015	PDM-C, HMPG, and Ecosyste m Restorati on grants.	Not yet completed
Review mitigation suggestions from Stream Geomorphic Assessment	Mitigation	Flooding	Paradise Park Commission, Town Manager, Road Foreman, Hazard Mitigation Committee	2013-2014	No cost	Ongoing
Conduct an engineering study of critical	Mitigation	Severe Winter Weather	Town Manager, Selectboard Chair	2014-2019	HMGP, Town Capitol Budget	Not yet completed

MITIGATION ACTION	TYPE OF ACTION	HAZARD(S) ADDRESSED	RESPONSIBLE PARTY	TIMEFRAME	FUNDIN G SOURCE	STATUS
facilities to identify snow load capacity						
Identify alternative location for emergency operations center	Mitigation Preparedness	All Hazards	Emergency Management Director, Town Manager, Police/Fire Chiefs	2012-2014	SWCRPC EMPG funds, town funds though coordinat ion	On-going
Conduct studies to assess vulnerability of critical facilities to earthquake events	Mitigation	Earthquake	Town Manager, Selectboard Chair, Zoning Adminstrator	2014-2019	HMGP, Town Capitol Budget	Not assessed. Action item should be removed from list.
Conduct an engineering study of critical facilities to identify vulnerabilities to high wind	Mitigation	High Wind Events	Town Manager, Selectboard Chair, Zoning Administrator	2014-2019	HMGP, Town Capitol Budget	Not yet completed.
Review 2011 Commodity Flow Study to assess hazardous materials transportatio n routes	Mitigation	Hazardous Materials	Emergency Management Director, Road Foreman, Town Manager	2012-2014	No cost	Completed

The following plans, studies, reports, and technical information was consulted during the preparation of this plan:

- Southern Windsor County Regional Planning Commission Multi-Jurisdictional All-Hazard Mitigation Plan with Windsor, VT Annex. Adopted July 24, 2012.
- Windsor Town Plan. Adopted September 30, 2014
- Zoning Regulations for the Town of Windsor, VT. Adopted June 12, 2001. Last amended September 25, 2007

    - Includes Flood Regulations which regulated the Special Flood Hazard Area (SFHA)
- Windsor Local Emergency Operations Plan (LEOP). Adopted 6/24/2014
- Flood Insurance Study for Windsor County, Vermont (dated 09/28/2007)
- Southern Windsor County Regional Planning Commission. 2014 Regional Plan. Volumes 1 and 2. Adopted November 18, 2014
- TransCanada Hydro Northeast Emergency Actions Plan for Dam Failure [Wilder Dam]. May 2014
- Community Flood Study: Town of Windsor, Vermont .(May 9, 2014)
- Memo concerning water services freezing in winter 2014-2015. Written 4/7/2015 and updated 4/28/2015
- Peer Review Evaluation and Engineering Report for the Main Wastewater Treatment Facility in Windsor. Written 11/15/2012
- Windsor Upper Dam (WUD) Document Portfolio. Compilation of Historic Documents related to the Mill Pond Dam. Completed September 2014.

At the time this plan was being prepared there was no Phase 1 or Phase 2 Stream Geomorphic Assessments completed within Windsor – studies which help to delineate fluvial erosion hazard areas. An assessment of the Mill Brook watershed is due to be completed in June 2015. The town does not have any studies of landslides or earthquakes.

4.3 Plan Maintenance Process

The future method for monitoring and evaluating the Windsor All Hazard Mitigation Plan includes annual meetings of the identified Hazard Mitigation Review Committee in partnership with the SWCRPC. The purpose of these meetings will be to continue to identify hazards which may threaten structures and property within the town and to review the mitigation strategies included within this plan. The mitigation strategies will be reviewed annually to ensure that appropriate actions are being followed and budgeted for as necessary. These efforts will be coordinated by the Emergency Management Director. The Hazard Mitigation Review Committee includes the Fire Chief (Emergency Management Director), Town Manager, Town Road Foreman and Town Zoning Administrator. An effort will be made to involve representatives from the Windsor Selectboard, Planning Commission, Fire Department, Police Department and other town officials along with local volunteer boards and interested members of the public, including business owners. In addition, neighboring communities will be pointed to where draft versions can be found for review and comment.

Additional outreach will continue to garner input from community members and businesses which have not been included in previous hazard mitigation planning efforts. The Town of Windsor and SWCRPC recognize the importance of public participation in hazard mitigation planning and will continue to provide opportunities for public comment and review during future plan revisions and updates. In addition, the town realizes the importance of improving communication and integration among diverse committees, plans and regulations while meeting state requirements for hazard mitigation and flood resilience. This plan encourages hazard mitigation planning to be incorporated into other community planning projects, such as the Town Plan, budget planning, and Town Local Emergency Operation Plan.

The Hazard Mitigation Committee will be responsible for monitoring this plan to ensure that specific mitigation actions are implemented as resources or opportunities become available. This includes the identification and application for additional funding opportunities. The hazard mitigation committee will also be responsible for reviewing the plan to ensure proposed mitigation actions remain in line with current town goals, strategies, and policies. Four years into the five year plan revision process, the SWCRPC and Local Emergency Planning Committee (LEPC) 3 will assist the Windsor Hazard Mitigation Committee in revising and updating this plan to incorporate issues which have been identified during the ongoing mitigation meetings. The Windsor All Hazard Mitigation Plan update process will begin in April 2019 assuming an April 2015 plan adoption, with the first public meetings of the Hazard Mitigation Committee. All public meetings will be warned following town protocols including the publication notice in the paper of record.

Following the meeting, a draft plan will be made available for public comment. The plan will be available on the SWCRPC website (www.swcrpc.org), Windsor town website (http://www.windsorvt.org), and paper copies will be available at the town office. A second publicly warned meeting will be held no later than July 2019 in which any substantial revisions gathered during the public input period will be discussed. The SWCRPC will make all necessary edits to the plan and provide the Hazard Mitigation Committee with a revised version for final review. Subsequently, the plan will be sent to the Vermont State Hazard Mitigation Officer for referral to FEMA for Approval Pending Adoption (APA). Following APA, the town may then adopt the Windsor All Hazard Mitigation Plan and forward a copy of the adoption resolution for FEMA to complete the plan approval and adoption process.

5. *RISK AND VULNERABILITY ASSESSMENT*

The following assessment addresses the Town of Windsor's vulnerability to all of the hazard identified by the Hazard Mitigation Committee during the hazard analysis. The likelihood of occurrence and impact to the town were used to assess the town's vulnerability to each hazard.

5.1 Hazard Identification and Analysis

A hazard vulnerability assessment for the town began with an inventory of all possible hazards, both natural and man-made, the anticipated amount of warning time and an assessment of the risk each poses. The ranking methodology used for the analysis ranked the frequency of occurrence, warning time, and potential impact and provided an overall hazard score. For this plan, the hazards which ranked about a seven were considered for inclusion and additional information.

- Frequency of Occurrence
  - 1 = Unlikely. <1% probability of occurrence in the next 100 years (less than 1 occurrence in 100 years)
  - 2 = Occasionally. 1-10% probability of occurrence per year, or at least 1 chance in the next 100 years (1 to 10 occurrences in 100 years)
  - 3 = Likely. >10% but <100% probability per year (at least 1 chance in the next 10 years)
  - 4 = Highly Likely. 100% probable in a year (annual occurrence)
- Warning Time
  - 1 = More than 12 hours
  - 2 = 6 – 12 hours
  - 3 = 3 – 6 hours

- 4 = None / Minimal
- Potential Impact
  - 1 = Negligible. Isolated occurrences of minor property damage, minor disruption of critical facilities and infrastructure, and potential for minor injuries
  - 2 = Minor. Isolated occurrences of moderate to severe property damage, brief disruption of critical facilities and infrastructure, and potential for injuries
  - 3 = Moderate. Severe property damage on a neighborhood scale, temporary shutdown of critical facilities, and/or injuries or fatalities
  - 4 = Severe. Severe property damage on a town-wide or regional scale, shutdown of critical facilities, and/or multiple injuries or fatalities

Table 3 – Hazard Analysis

Hazard	Frequency of Occurrence	Warning Time	Potential Impact	Hazard Score
Flash Flood/Flood/Fluvial Erosion	3	2	4	9
Severe Weather (Thunderstorm, Lightning, High Wind, Hail, and Flooding)	4	2	3	9
Hail Storms	2	2	2	6
Hurricanes/Tropical Storms	3	1	4	8
Wildfire / Brushfire	4	4	2	10
Extreme Cold/Snow/Ice Storm	4	1	2	7
Extreme Heat	1	3	1	5
Structural Fire	4	4	3	11
Dam Failure	1	2	3	6
Ice Jams	3	1	2	6
Earthquake	1	4	1	6
Hazardous Material Spill	4	4	2	10

5.2 Detailed Hazard Analysis

While the town may be affected by many hazards, the detailed hazard analysis and potential loss estimates listed in this plan have been identified as having a 'high' likelihood of occurrence within Windsor.

Less significant hazards did not have occurrence frequencies or levels of impact that would necessitate a more detailed level of analysis. Human losses are also not calculated in this plan, but may be expected to occur depending on the type and severity of the hazard. Potential impact estimates are based on vulnerability and risk discussions held during the Hazard Mitigation Committee meetings.

The following hazards have been identified as having a 'high' total impact score based on the methodology above:

- Flash Flood / Inundation Flood / Fluvial Erosion
- Severe Weather
- Hurricanes/Tropical Storms
- Fire
- Extreme Cold/Snow/Ice Storm

- Hazardous Material Spill

When possible, previous occurrence data specific to Windsor has been provided, however, for all high hazards that was not possible and the best available information has been provided. Throughout the life span of this Windsor All Hazard Mitigation Plan, both the town and the SWCRPC will strive to continually gather local hazard information.

A discussion of the 'high' likelihood hazards is detailed in the proceeding subsections along with a County-wide FEMA Disaster Declarations table, local records and a narrative description of the hazard. While all hazards were considered by the Hazard Mitigation Committee for inclusion in this plan, it is not feasible to detail each in depth. For hazards that did not rank "7" or higher, and are not profiled in this plan, the reader is directed to the Vermont State Hazard Mitigation Plan. This plan will only focus on the hazards that Windsor has chosen to mitigate for and has resources for, which are Flash Flood/Flood/Fluvial Erosion, Hurricanes/Tropical Storms/Tornado/Microbursts, Brushfire and Wildfires, Water Supply Contamination, Dam Failure, Ice Jams, Earthquake, Hazardous Materials Spill and Transportation Incidents. Hazards that ranked low in the above table are not detailed as they are not likely to occur in Windsor or are a way of life in Vermont and handled well by the Town. That is why this plan will not cover those hazards.

Federal Disaster Declarations: Windsor County 1990 – 2015 (2/13)		
FEMA Disaster Number	**Date of Declaration**	**Description**
4207	February 3, 2015	Severe Winter Storm
4140	August 2, 2013	Severe Storms and Flooding
4120	June 13, 2013	Severe Storms and Flooding
4066	June 22, 2012	Severe Storm, Tornado, and Flooding
4043	November 8, 2011	Severe Storms And Flooding
4022	September 1, 2011	Tropical Storm Irene
4001	July 8, 2011	Severe Storms And Flooding
1995	June 15, 2011	Severe Storms And Flooding
1951	December 22, 2010	Severe Storm
1790	September 12, 2008	Severe Storms and Flooding
1784	August 15, 2008	Severe Storms, Tornado, and Flooding
1778	July 15, 2008	Severe Storms and Flooding
1715	August 3, 2007	Severe Storms and Flooding
1698	May 4, 2007	Severe Storms and Flooding
1559	September 23, 2004	Severe Storms and Flooding
1488	September 12, 2003	Severe Storms and Flooding
1428	July 12, 2002	Severe Storms and Flooding
1358	January 18, 2001	Severe Winter Storm
1336	July 27, 2000	Severe Storms And Flooding
1307	November 10, 1999	Tropical Storm Floyd
1228	June 30, 1998	Severe Storms and Flooding
1184	July 25, 1997	Excessive Rainfall, High Winds, Flooding
1124	June 27, 1996	Flooding
1101	February 13, 1996	Storms and Flooding

1063	August 16, 1995	Heavy Rain, Flooding
990	May 12, 1993	Flooding, Heavy Rain, Snowmelt
938	March 18, 1992	Flooding, Heavy Rain, Ice Jams
875	July 25, 1990	Flooding, Severe Storm

A. FIRE

Structure Fires were specifically identified in the hazard vulnerability as a risk to the town due to their high probability of occurrence and little warning time provided. Structure fires are common throughout Vermont during year, specifically during the winter months and fires may result in the loss of property and / or life. Fires may affect a single residential structure or spread to other homes and businesses. In Vermont heating is still the number one cause of structure fires though it is followed closely by cooking related fires.

In Vermont, during 2013, there were 45,689 emergency incidents to which fire departments responded. National Fire Protection Association (NFPA) estimates show, while residential structure fires account for only 25 percent of fires nationwide, they account for a disproportionate share of losses: 83 percent of fire deaths, 77 percent of fire injuries, and 64 percent of direct dollar losses.[3]

2010 VERMONT FOREST RESOURCES PLAN

The 2010 Vermont Forest Resources Plan (VTFPR, June 2010) provides a greater analysis of the statewide wildfire vulnerability. The plan states that *wildland fires does not pose a serious threat to Vermont forests, but the state does have fire seasons in the spring and fall. The majority of wildland fires occur in April and May, and usually involve small grass fires that escape the homeowner's control.'*

For additional information and associated wildland fire maps:
http://www.vtfpr.org/htm/for_resourcesplan.cfm

The Windsor Fire Department provides fire service within the town and mutual aid to surrounding towns and records the number and type of fires to which they respond.

- 2010 – 12 structure fires
- 2011 – 6 structure fires
- 2012 – 10 structure fires
- 2013 – 10 structure fires
- 2014 – 11 structure fires

In addition to structure fire calls the Windsor Fire Department responded to the following during 2010-2014:

- 3 explosion
- 2 other fire
- 5 vehicle
- 2 outside
- 8 other
- 21 cancelled calls

[3] 2013 Vermont Fire Marshal Report

- 12 hazardous conditions
- 31 false alarms
- 66 service good intentions

Wildfires are relatively rare within Vermont though smaller, brushfires occur every year. The 2013 Vermont Hazard Mitigation Plan identifies wildfires as a hazard but states "wildfire conditions in Vermont are typically at their worst either in spring when dead grass and fallen leaves from the previous year are dry and new leaves and grass have not come out yet, or in late summer and early fall when that year's growth is dry."[4] Though wildfires may not be a high hazard, the Hazard Mitigation Committee identified smaller, brush fires as a high hazard due to their frequency of occurrence and lack of warning time. Responses to brushfire calls by the Windsor Fire Department are listed below:

- 2010 – 2 wildland fire responses
- 2011 – 7 wildland fire responses
- 2012 – 5 wildland fire responses
- 2013 – 11 wildland fire responses
- 2014 – 5 wildland fire responses

It can be anticipated that small brushfires will continue to occur at a steady rate throughout Windsor on a yearly basis given the topography, climate, and land uses within the town. However, given the appropriate seasonal conditions, the threat of a large scale wildfire remains present. While the number of responses is known by year, the size, in acres, of the events was not captured.

B. FLASH FLOOD/INUNDATION FLOOD/FLUVIAL EROSION

The Town of Windsor is susceptible to flash flooding, inundation flooding and fluvial erosion hazard flooding. FEMA has designated floodplains or areas where there is a 1% chance of annual flooding in a given year, in the town for areas including the Mill Brook and other shorter tributaries of the Connecticut River. Particularly at risk are the following areas:

- Area around VT Route 44 in low lying area out past the armory (particularly Spring floods)
- East of US Route 5/ Main Street from the Golf Course to the Weathersfield town line
- Area below the Mill Pond Dam shown as being in Floodway Fringe.

The Water Resources and Downtown /Historic District Maps show the areas in town that are part of the currently mapped FEMA Floodways and Floodplains, as well as River Corridor Protection areas which are connected with fluvial erosion hazards.

Notable and recent flood events that have occurred in Windsor are:

- Flash flooding and inundation flooding following Tropical Storm Irene (8/2011)
- Flash flooding (7/2013)

Flood Hazards. All development located within the FEMA special flood hazard areas is subject to flood hazard review in accordance with the Windsor Zoning Ordinance. These special flood hazard areas are primarily subject to inundation flooding. Conservation of the broad floodplains along the Connecticut

[4] State of Vermont Hazard Mitigation Plan 2013

River, including extensive farmland north and south of downtown, will maintain flood storage capacity, which will help mitigate flooding in the lower elevations of the downtown area.

During Tropical Storm Irene, significant erosion damages were sustained in other areas along the Mill Brook. The SWCRPC is currently beginning a stream geomorphic assessment which will help to determine where the river erosion hazard areas are located. Until that process is complete, residents are advised not to build new structures in flood or erosion prone areas of the Mill Brook in particular. Storms of 2013 caused flooding damage in a number of locations, including but not limited to County Road and Hunt Road.

Floods are the most probable natural hazard event in Windsor and may include inundation flooding events, flash floods, ice jams, and erosion hazard flooding. FEMA has designated floodplains along the Mill Brook and major tributaries. Currently there are 245 buildings within the special flood hazard area in Town, 73 of those buildings are located within the regulatory floodway. Seventeen percent (17%) of all structures in Windsor are located within the special flood hazard area – this is the highest proportion of all Vermont towns. Furthermore, Windsor has the second highest number of structures within the floodway – second only to Barre City[5]. Given the location of the thickly settled area along the Mill Brook, flooding events have the potential to cause significant damage to infrastructure and structures within Windsor and Brownsville.

Within the Town of Windsor, 78 properties have NFIP insurance of which 4 have experienced repeat losses[6]. All 4 properties identified in the report have been identified as residential structures. 30% of buildings in the SFHA have flood insurance[7].

Damage from flooding can be influenced by the following factors: Residential structures within the FEMA identified Special Flood Hazard Area; Commercial structures within the FEMA identified Special Flood Hazard Area; Bridges and Culverts within Windsor; and dams.

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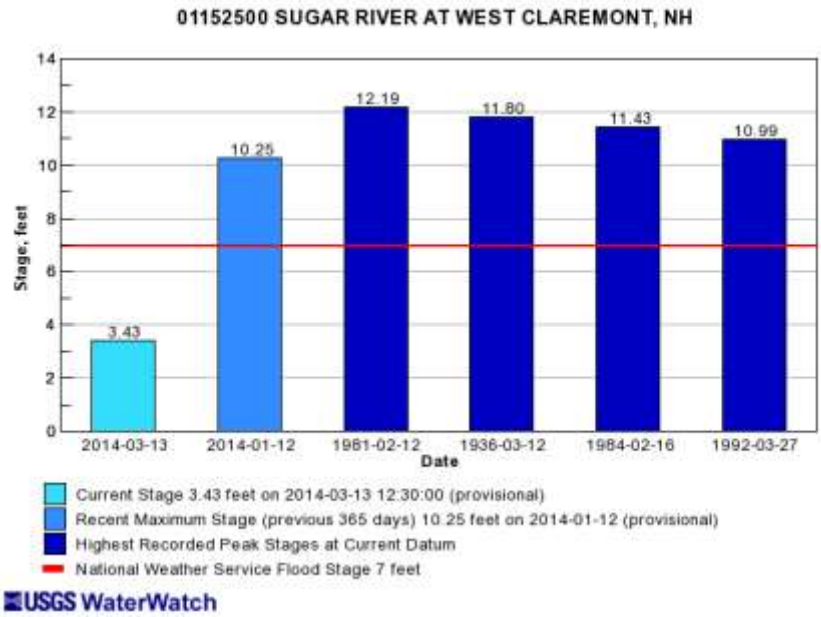
[5] 2014 Community Flood Study

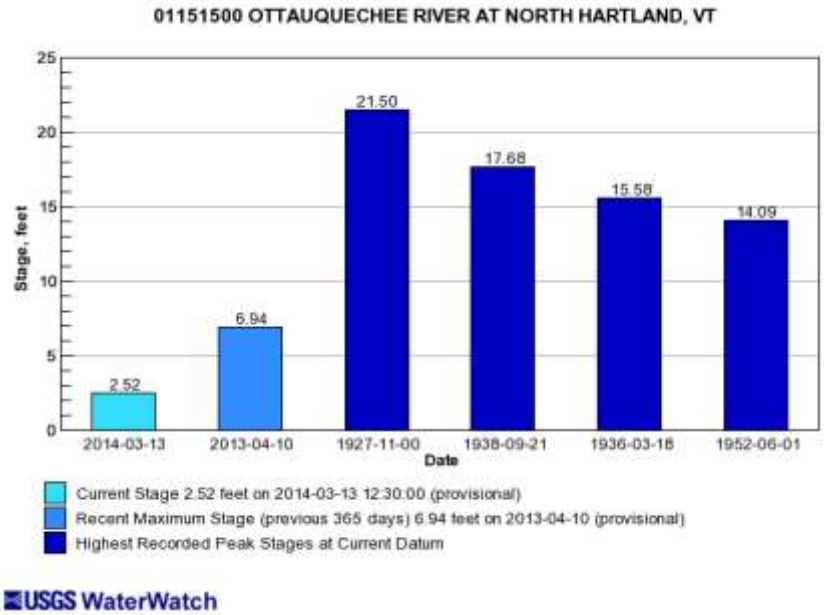
[6] Vermont Flood Ready – Federal Emergency Management Agency Repetitive Losses/ BCX Claims in Vermont. Last updated 01/26/2015
http://floodready.vermont.gov/sites/floodready/files/documents/VT%20RL%20Report%201.26.15.pdf

[7] Vermont Flood Ready – Expanded Community Report for Windsor. Accessed 4/13/2015.
http://floodready.vermont.gov/assessment/community_reports#Expanded_Community_Report

The hydrographs display historical data of river depth for the Ottauquechee River in the Town of Hartland, VT and the Sugar River in the Town of Claremont, NH. Hartland is located directly north of Windsor while Claremont is southeast of the town. Damage from inundation flood events can vary greatly depending on the amount of precipitation, snow cover, spring melt, soil saturation levels, and topography.



Flash flooding, identified by the Hazard Mitigation Committee as a high risk, typically occurs in higher elevation drainage areas as a result of summer thunderstorm activity. The National Weather Service describes a flash flood as:



"A flood caused by heavy or excessive rainfall in a short period of time, generally less than 6 hours. Flash floods are usually characterized by raging torrents after heavy rains that rip through river beds, urban streets, or mountain canyons sweeping everything before them. They can occur within minutes or a few hours after excessive rainfall. They can also occur even if no rain has fallen, for instance after a levee or dam has failed, or after a sudden release of water by a debris or ice jam."

Damage from flash floods is difficult to predict as flash flood zones are not mapped. Although the damage area may be difficult to predict, the hazards posed can present significant challenges as seen in the Tropical Storm Irene event in August 2011.

The National Oceanic and Atmospheric Administration (NOAA) has the best available data for localized flash flooding and reports there have been twenty-six flash flood events in Windsor County since 1996 totaling over $100,000,000 in damages countywide.

Fluvial erosion is often associated with flash flooding and may result in additional damage to property and town infrastructure when a rapid adjustment of a stream channel occurs. Fluvial erosion is caused by rivers and streams, and can range from gradual bank erosion to catastrophic changes in river channel location and dimension during high flow conditions. While flood losses due occur from inundation, most flood losses in Vermont are caused by fluvial erosion. Reasons are Vermont's geography, extreme climate, deep snows, ice jams and intense rainstorms. The SWCRPC received funding in 2013 to complete a study to identify erosion hazards along the Mill Brook. Until that process is complete, residents are advised not to build new structures in flood or erosion prone areas of the Mill Brook. Additionally, the SWCRPC continues to provide information on fluvial erosion hazard and river corridor bylaws, to local zoning officials and municipalities.

Flood Zone Definitions	
Floodway	The channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height; also known as the regulatory floodway. As designated and determined by FEMA.
Floodway Fringe (i.e. Floodplain)	The remaining portion of special flood hazard areas after exclusion of the floodway; also known as floodplain.
Fluvial Erosion	The erosion or scouring of riverbeds and banks during high flow conditions of a river. Fluvial erosion can be catastrophic when a flood event causes a rapid adjustment of the stream channel size and/or location.
Fluvial Erosion Hazard Zone	Includes the stream and adjacent lands necessary to accommodate the slope and plan form requirements of a geomorphically stable channel, and is subject to fluvial erosion as defined by the Vermont Agency of Natural Resources and delineated on the current Fluvial Erosion Hazard Zone Map. At this time only the Black River has a map showing fluvial erosion hazard zones.
Special Flood Hazard Area	The land in the flood plain within a community subject to a 1 percent or greater chance of flooding in any given year; also known as floodplain. As designated and determined by FEMA.
River Corridor	The land area adjacent to a river that is required to accommodate the dimensions, slope, planform, and buffer of the naturally stable channel and that is necessary for the natural maintenance or natural restoration of a dynamic equilibrium condition and for minimization of fluvial erosion hazards, as delineated by the Agency of Natural Resources in accordance with river corridor protection procedures. As of late 2014, the river corridor maps are available for this Region.

Though not identified as a high hazard, ice jams may be a secondary event of flooding and threaten many of the same properties located within the FEMA Special Flood Hazard Area. When broken river ice begins to flow downstream, ice can build up against bridge abutments, undersized structures, and other obstructions to create a temporary dam impounding water which has the potential to flood surrounding areas. Ice jams threaten many of the same properties as inundation flooding and the damage can be expected to be similar.

There are several ice jam events in Windsor on record in the U.S. Army Corps of Engineers Cold Regions Research and Engineering Laboratory (CRREL) database.

City	State	River	Jam Date	Water Year
Windsor	VT	Connecticut River	1/10/2001	2001
Windsor	VT	Connecticut River	12/17/2000	2001
Windsor	VT	Connecticut River	3/11/1992	1992
Windsor	VT	Mill River	3/11/1992	1992
Windsor	VT	Connecticut River	3/1/1979	1979
Windsor	VT	Connecticut River	2/1/1973	1973
Windsor	VT	Connecticut River	3/21/1968	1968
Windsor	VT	Connecticut River	3/6/1964	1964
Windsor	VT	Connecticut River	3/9/1946	1946
Windsor	VT	Connecticut River	3/27/1928	1928
Windsor	VT	Connecticut River	3/27/1928	1928

[8]

Historic Structures

NFIP rules allow two options to modify flood standards in order to maintain the historic integrity of designated historic structures. Windsor's Zoning Regulations include both options for historic structures.

- Seven buildings, the Cornish-Windsor Covered Bridge and the Mt. Ascutney State Park are individually listed on the National Register;
- There are currently two historic districts listed on the National Register: Ascutney Mill Dam Historic District and Windsor Village Historic District.
- Twenty-one buildings and one bridge are individually listed on the Vermont State Register;
- Four historic districts are also listed on the Vermont State Register: Ascutney Mill Dam Historic District, Court Square Historic District, Main Street Historic District, and Upper Main Street Historic District.

Non-contributing structures and vacant lands within Historic Districts do not meet the "historic structure" definition. Therefore, they must meet all applicable flood hazard provisions. FEMA publication "Integrating Historic Property & Cultural Resource Consideration into Hazard Mitigation Planning" provides guidance and concepts on identifying and integrating historic structures located in flood hazard areas.

C. SEVERE WEATHER

For the purposes of the Windsor All Hazard Mitigation Plan, severe weather is defined as being two or more of the following hazards occurring together: thunderstorms, power failure, high wind, lightning, hail, and flooding. Flooding is described in greater detail above, this section of the hazard analysis will focus on non-flood events.

Power failure is a common secondary hazard caused by severe weather and has an annual frequency within Windsor. Power outages can occur on a town wide scale and are typically the result of power lines damaged by high winds or heavy snow / ice storms but may also result from disruptions in the New England or national power grid as indicated by the widespread outages in 2003. Dead or dying trees in proximity to power lines pose a particular threat for power failure as these trees are often brought down by triggering events such as winter storms.

[8] http://rsgisias.crrel.usace.army.mil/apex/f?p=273:1:

Potential loss estimates are difficult to predict for power failures as they are typically isolated in geographic area and short in duration. Therefore, power failures often have only minimal impact to people and property. Power failures usually result in minor inconveniences to residents however, longer duration events may result in the loss of perishable items and business losses. Power outages in winter months may result in the loss of home heating, ruptured water pipes and the resulting structural damage. The loss of home heating may be a contributing factor to the increase in structure fires during the winter months.

High winds can result from hurricanes, tropical storms, summer *thunderstorms*, and tornadoes. The 2013 Vermont Hazard Mitigation Plan does not delineate high winds as a separate hazard, the plan states *'high winds pose a threat to the safety of Vermont's citizens and property.'* The National Weather Service issues wind advisories when sustained winds of 31-39 miles per hour are reached for at least one hour or gust between 46-57 miles per hour. Damage from summer thunderstorms in Windsor has been historically limited in both scope and cost. The Beaufort Wind Scale shown below can be used to predict damage based upon wind speeds.

Lightning is a giant spark of electricity in the atmosphere between clouds, the air, or the ground[9]. In the early stages of development, air acts as an insulator between the positive and negative charges in the cloud and between the cloud and the ground. As lightning can strike up to 50 miles away from a thunderstorm, can carry up to 100 million volts of electricity, and can reach temperatures upward of 50,000 degrees Fahrenheit it proves extremely hazardous to human life. Lightning can also damage infrastructure, plants, and property, and can start forest fires. Lightning is the most unpredictable weather-related event. According to the National Weather Service, lightning is the first thunderstorm hazard to arrive and the last to leave.

Tornadoes have the potential to cause *high wind* damage, but occur rarely in Windsor or Windsor County and their effects, although severe, are localized in extent. The largest tornado to occur within 50 miles of Windsor occurred in 1968 and registered as an F3 tornado, (see Enhanced Fujita Scale) with wind speeds over 158 miles per hour. There have been no reported deaths from tornadoes within the town and no high hazard wind areas have been mapped at this time. Damage cost estimates are difficult to predict due to the large range of impacts high winds can have within the town.

Table 2.1 - Beaufort Wind Scale

Classification Number	Wind Speed	Land Conditions
6	25 to 31 mph	Large branches in motion; whistling in telephone wires
7	32 to 38 mph	Whole trees in motion; inconvenience felt walking against wind
8 to 9	39 to 54 mph	Twigs break off trees; wind generally impedes progress
10 to 11	55 to 73 mph	Damage to chimneys and TV antennas; pushes over shallow rooted trees
12 to 13	74 to 112 mph	Peels surfaces off roofs; windows broken; mobile homes overturned; moving cars pushed off road
14 to 15	113 to 157 mph	Roofs torn off homes; cars lifted off ground

For the purposes of the Hazard Mitigation Plan, the scale is only shown above wind force 5; Data from NOAA

Hail is a form of precipitation that falls as pellets of ice. The pellets can range

[9] NOAA.gov

in size from balls typically 5–50 mm in diameter on average, though can be much larger during severe occurrences. Hail can be especially damaging to crops, homes and cars, and large hailstones can be deadly to livestock and people caught outside during an event.

D. HAZARDOUS MATERIALS

There are multiple sources of data available on hazardous materials spills both in Vermont and in the Town of Windsor, each provides a different picture of the frequency of hazardous materials spills. However, the Vermont Agency of Natural Resources Spills Database includes a more comprehensive listing of hazardous materials spills within the Town of Windsor since the year 2005.

Perhaps the greatest risk that hazardous materials pose to the town is their release into the surrounding environment in a traffic incident. Traffic accidents have historically been the culprit for some of the largest hazardous material releases in the area. The Windsor Fire Department regularly trains on hazardous awareness and is qualified to isolate a scene after an occurrence.

Vermont Agency of Natural Resources - Spills Database; Since 2005

Year	Facility Name	Address	Town	Date Reported
2005	N/A	14 Bayview	Windsor	2/9/2005
2005	N/A	Taylor Drive, Rt 5 N	Windsor	10/12/2005
2005	Wilma Parenteau Residence	106 Rt 5 North	Windsor	12/30/2005
2006	Cumberland Farms	181 Main St	Windsor	12/2/2006
2006	McClelland Farm	Rt 5	Windsor	5/22/2006
2006	Windsor Sub-Station	Maple St	Windsor	5/5/2006
2006	Windsor Wastewater Treatment Plant	Pasco Way	Windsor	3/7/2006
2007	George Residence	161 Johnson Rd	Windsor	12/6/2007
2007	N/A	133 A Main St	Windsor	12/11/2007
2007	Sarah Wolfe Residence/ Paronto Property	720 U S Rte 5 South	Windsor	11/27/2007
2007	Seldon Laboratories	18 Everette Lane	Windsor	5/17/2007
2008	"Old High School"	Union St	Windsor	12/24/2008
2008	MM 63/50	I-91 North	Windsor	5/5/2008
2008	N/A	968 Bible Hill Rd	Windsor	12/15/2008
2008	Namco Building	1-17 Union Street	Windsor	3/27/2008
2008	Neil Blake Estate	265 Colchin Lane Ext	Windsor	6/3/2008
2009	Carolyn Bushor Residence	250 Juniper Hill RD	Windsor	9/15/2009
2009	Chittenden Bank	50 Main St.	Windsor	12/14/2009
2009	Coleman Residence	58 Cubb Court	Windsor	4/3/2009
2009	DeutcheBank Property	167 County Road	Windsor	5/8/2009
2009	N/A	153 Pembroke Rd	Windsor	6/26/2009
2009	Stanley Mayo Residence	319 Back Mountain Rd.	Windsor	9/25/2009
2009	Young Residence	41 Jarvis St	Windsor	7/13/2009
2010	Crofter Cummings	58 Morningside Drive	Windsor	10/13/2010
2010	CVPS substation	999 Bridge St	Windsor	7/7/2010
2010	Dane Mesh	6 Pine St.	Windsor	1/13/2010
2010	Land Air Trucking	272 Ruth Carney Drive	Windsor	9/24/2010
2010	Newell Staple Residence	194 US RT 5	Windsor	1/27/2010
2010	roadside	7 Deway Ave	Windsor	4/8/2010
2010	roadside	7 Deway Ave	Windsor	4/8/2010
2010	Windsor SubStation	99 Maple St	Windsor	6/8/2010
2011	Cumberland Farms	169 Main Street	Windsor	2/8/2011
2011	Cumberland Farms	169 Main	Windsor	5/30/2011
2011	Hawsler Residence	132 Ascutney St	Windsor	7/19/2011
2011	John Lori residence	Unit 80, Bunker Hill Trailer Court, 80 Rte 5 North	Windsor	3/4/2011
2011	Karen Townsend Property	9 -11 Dewey St	Windsor	4/25/2011
2011	Line 434, Pole 106	Meadow Rush Road	Windsor	5/27/2011
2011	MM 57 Northbound	I-91 Northbound	Windsor	6/26/2011
2011	Webber Residence	210 Weston Heights	Windsor	1/7/2011
2011	Windsor sewer line break	unreported to VEM	Windsor	5/13/2011
2012	Merle Bushkin Residence	92 Prince Road	Windsor	10/12/2012
2012	Miller Construction	3105 USRoute 5	Windsor	2/22/2012
2012	roadway	1 mile stretch of RT 44 from Churchill Rd	Windsor	10/10/2012
2013	Ascutney Mountain Resort	899 Rte 44	Windsor	4/27/2013
2013	Hubbard Brook	Intersection of State Farm Prison Road and County Road	Windsor	10/17/2013
2013	Interstate 91, Southbound lane	Between exits 8 and 9	Windsor	10/9/2013
2013	Roadside	I-91 mile marker 58	Windsor	12/10/2013
2013	Roadside	Rte 44	Windsor	4/4/2013
2013	Roadside	Rte. 5	Windsor	8/9/2013
2014	Bunker Hill Community Cooperative MHP	72 Bunker Hill CT	Windsor	4/23/2014
2014	GMP Substation	65 Maple St	Windsor	9/3/2014
2014	Hardy Residence		Windsor	4/7/2014
2014	Land Air Express	272 Ruth Carney Drive	Windsor	8/28/2014
2014	Roadside	Route 5	Windsor	4/22/2014
2014	roadway/roadside	I-91 NB	Windsor	6/19/2014
2015	Windsor VTrans Garage	1640 US Route 5	Windsor	1/13/2015

Several areas of town are vulnerable to traffic related hazardous material releases: Interstate 91, the major hazardous material transportation corridor in town, runs adjacent to Mt. Ascutney Hospital. Hazardous materials incidents could also be likely along the New England Central Railroad, US Route 5 and VT Route 44. The railroad and Route 5 run through downtown Windsor and are in close proximity to

numerous critical facilities. VT Route 44 runs through numerous residential areas, passes recreational facilities and the National Guard Armory.

E. HURRICANES/TROPICAL STORMS

As a hurricane moves toward the coast, it loses wind speed and may be downgraded to a tropical storm. This is the case in many of the tropical storms that have reached Vermont. Tropical Storm Irene, in late August, 2011 brought damage to the Town of Windsor. Additionally, flooding and fluvial erosion caused by Tropical Storm Irene was catastrophic, destroying property and taking lives, and eliciting a disaster declaration (DR-4022). Irene caused significant damage to infrastructure along the Mill Brook, including the pedestrian bridge connecting Union Street to the school athletic fields, Bridge 10 on VT Route 44, Bridge 22 on Brook Road, and large sections of Brook Road. Map 1 shows the areas of Roadway Damage. Much of the areas damaged in 2011 by Tropical Storm Irene are not located within the flood hazard area. However for Windsor, most of this damage was caused by erosion, not flood inundation. Damage from Tropical Storm Irene has widened river beds and stripped river banks of natural vegetation making them more susceptible to additional erosion and landslides.

The total damage sustained by the Town of Windsor is estimated at $3.5 million. Many of the Towns roads were impacted by the storm and required repairs. In addition, numerous culverts required either replacement or repair.

The Saffir-Simpson Hurricane Wind Scale is a 1 to 5 rating based on a hurricane's sustained wind speed. The scale estimates potential property damage. Hurricanes reaching Category 3 and higher are considered major hurricanes because of their potential for significant loss of life and damage. Category 1 and 2 storms are still dangerous, however, and require mitigation.

Saffir-Simpson Hurricane Scale		
Category	Wind Speed	
	mph	knots
5	≥156	≥135
4	131-155	114-134
3	111-130	96-113
2	96-110	84-95
1	74-95	65-83
Non-Hurricane Classifications		
Tropical Storm	39-73	34-64
Tropical Depression	0-38	0-33

F. EXTREME COLD/SNOW/ICE STORMS

Winter storms and blizzards, with snow, ice, and freezing temperatures in varying combinations, are fairly commonplace in Windsor and occur town wide. Heavy wet snows of early fall and late spring, as well as ice storms, can result in property damage and in loss of electric power, leaving people without adequate heating capability. Power loss is often the result of downed trees, which can also disrupt traffic and emergency response by making roads and driveways impassable.

A winter storm is considered severe when there is a possibility of:

- Six or more inches of snow fall at a given location within 48 hours,
- There is property damage, injuries or deaths, or
- An ice/glaze storm which causes property damage, injuries or death.

A nor'easter is a large weather system traveling from South to North, passing along, or near the Atlantic seacoast. As the storm approaches New England and its intensity becomes increasingly apparent, the resulting counterclockwise cyclonic winds impact the coast and inland areas form a northeasterly

direction. The sustained winds may meet or exceed hurricane force. The Dolan-Davis Nor'easter Classification Scale is utilized to determine the severity of Nor'easters:

CLASS	% OF STORMS	AVERAGE RETURN INTERVAL	AVERAGE PEAK WAVE IN FEET	AVERAGE DURATION IN HOURS
1 WEAK	49.7	3 DAYS	6.6	8
2 MODERATE	25.2	1 MONTH	8.2	18
3 SIGNIFICANT	22.1	9 MONTHS	10.8	34
4 SEVERE	2.4	11 YEARS	16.4	63
5 EXTREME	0.1	100 YEARS	23.0	96

[10]

Blizzards are defined by the National Weather Service as "the following conditions are expected to prevail for a period of 3 hours or longer:

- Sustained wind or frequent gusts to 35 miles an hour or greater; and
- Considerable falling and/or blowing snow (i.e., reducing visibility frequently to less than ¼ mile)"[11]

Damage from blizzards can vary depending upon wind speeds, snow accumulation, storm duration, and structural conditions (such as heavy snow and ice accumulation on large, flat roofed structures). The assessed value of all residential and commercial property in Windsor is $249,419,411[12]. Assuming a range of town-wide damage of 1% to 5%, a heavy snow or ice storm could result in $2.49 million to $12.47 million of total damage.

Ice Storms are defined by the National Weather Service as "occasions when damaging accumulations of ice are expected during freezing rain situations. Significant accumulations of ice pull down trees and utility lines resulting in loss of power and communication. These accumulations of ice make walking and driving extremely dangerous. Significant ice accumulations are usually accumulations of ¼" or greater."[13]

Ice storms have a significant impact on Northern New England, with high elevation locations being the most severely impacted. Multiple sources state that a ¼ inch of ice accumulation from an ice storm can add 500 pounds of weight on the lines between two power lines.

G. WILDER DAM INUNDATION AREA

Though not identified as a highest hazard, by the Hazard Mitigation Committee, the Town has very recently begun to review and discuss implications of potential Wilder Dam failure. Dams are manmade structures built to impound water. Dams are built for many purposes including water storage for potable water supply, livestock water supply, irrigation, or fire suppression. Dams can also be built for recreation, flood control and hydroelectric power. Dams may also be multifunction, serving two or more of these purposes. Dam failure occurs when the structure is breeched and potentially can cause inundation of downstream areas and property. Dam failures can occur at any time in a dam's life; however, failures are most common when water storage for the dam is at or near design capacity. At high water levels, the water force on the dam is higher and several of the most common failure modes are more likely to occur.

[10] The Dolan-Davis Nor'easter Classification Scale
[11] National Weather Service Glossary
[12] Windsor Grand List as of 10/23/2014
[13] National Weather Service Glossary

Correspondingly, for any dam, the probability of failure is much lower when water levels are substantially below the design capacity for the reservoir.

The Wilder Dam in Hartford, owned by TransCanada, Inundation Area is shown on the Water Resources Map from 2008 data provided by Vermont Emergency Management and downloaded from the VT Center for Geographic Information, a major data warehouse for mapping data. The Wilder Dam is on the Vermont Agency of Natural Resources Dam Safety Program's list of high hazard dams[14]. The dams on this list are inspected by a state representative on a rotating basis and are not considered to be "in significant danger of failure." The State Hazard Mitigation Plan states that "DEMHS is coordinating efforts with towns to complete incident action plans (IAP) for all high hazard dams". As of writing this update, no coordination efforts have taken place with Hartford or Windsor to complete and IAP for Wilder Dam. Though in the preliminary discussion stages at the Town level, the following ideas/needs have been noted to discuss in future dam failure planning efforts:

- Alternate EOC location for inundation event
- Audible System
- Siren Policy Changes
- Due to size of area, tackle audibles for identified areas to hear
- Drills & education – movement to higher ground
- Signage Package
- Early Warning System/Tone received from Hartland

6. MITIGATION PROGRAM

6.1 Goals and Strategies

The following sections detail the mitigation goals, strategies, and potential mitigation actions which the town has identified to aid in the reduction of threats posed by the hazards detailed in this plan. The implementation schedule that follows is a table of actions that the town has targeted for implementation during the five year cycle of this plan.

The 2014 Windsor Town Plan identifies the following goals, policies, and recommendations which support hazard mitigation:

- Increase disaster preparedness of critical town services to enhance public safety, avoid economic destruction, and reduce human suffering from flood losses.
- Prevent flood damage through land use policies and regulations that control development in flood hazard areas and recognize the natural flood storage capabilities of wetlands.
- Prevent flood damage through proper ongoing maintenance of dams, dikes, berms or other flood control structures.
- When property is subdivided in flood prone areas, require subdivision plats to clearly show elevations and borders of flood prone areas.
- Development within FEMA floodway and floodplain areas are subject to the flood hazard provisions within Windsor's zoning bylaws.

[14] State of Vermont Hazard Mitigation Plan 2013

- The lands along the Connecticut River that are within the Conservation future land use category are intended to only allow land uses that preserve floodplain areas for conveyance and storage of floodwaters, such as farming or outdoor recreation.
- Regulate new development outside the floodplain to minimize adverse effects of increased stormwater runoff on the floodplain.
- Maintain the capacities of drainage channels and detention facilities, and avoid substantial reductions in flood storage through wetland destruction.
- Advise residents about flood hazard, flood insurance, and flood protection measures.
- Ensure that potential purchasers of flood prone property are aware of the hazard.
- Maintain a library of references on flood insurance sources and flood protection in the Municipal Building.
- Provide flood warning to the public and develop a response plan.
- Investigate the possibility of earning an improved CRS classification for the Town in order to decrease the adverse effects of flooding on the community and reduce flood insurance rates.
- Work with partners to evaluate erosion hazards along the Mill Brook.

The Hazard Mitigation Committee affirmed the goals of the 2014 Windsor Town to reduce or avoid long term vulnerabilities to identified hazards, particularly with the following general goals:

- Formation of Hazard Mitigation Review Committee
- Increase disaster preparedness of critical town services to enhance public safety, avoid economic destruction, and reduce human suffering from flood losses.
- Prevent flood damage through land use policies and regulations that control development in flood hazard areas and recognize the natural flood storage capabilities of wetlands.
- Prevent flood damage through proper ongoing maintenance of dams, dikes, berms or other flood control structures.

There have been no changes or additions to policies in response to Tropical Storm Irene and other high hazard events which have occurred since 2014 (last plan adoption). This AHMP will be referenced during the next update to the Windsor Town Plan.

6.2 Existing Programs

The following policies, programs, and activities supporting hazard mitigation are currently in place and/or being implemented in the Town of Windsor. Many of the current regulatory tools and maps can be found on the Windsor town website: http://www.windsorvt.org/zoning/

Windsor is currently a non-sanctioned, participating member of the National Flood Insurance Program (NFIP) and continues to regulate development in the Special Flood Hazard Area through the Windsor Flood Hazard Regulations adopted in 2007 and will continue to enforce these regulations to ensure continued NFIP compliance.

Windsor currently has adopted and enforced flood hazard regulations, subdivision regulations, zoning regulations, along with the additional resources noted in Table 3.1 below.

These programs reduce the effects of hazards to new and future development including buildings, infrastructure, and critical facilities by preventing their location in known hazard areas and ensuring that

infrastructure and buildings are designed to minimize damage from hazard events. The Hazard Mitigation Committee analyzed these programs for their effectiveness and noted area for improvement.

Table 3.1. Existing Resources for Mitigating Hazards: Authorities, Policies, and Programs

Resource	Description	Effectiveness in Implementing HM Goals	Opportunities for Improving Effectiveness
Town Plan	Plan for coordinated town-wide planning for land use, municipal facilities, etc.	Effective in addressing development in hazard areas, including floodplains	Plan is updated on a five year cycle and can be strengthened to be more effective
Basic/Local Emergency Operations Plan	Basic municipal procedures for emergency response	Effectively outlines procedures for call-outs, evacuation, etc.	Plan is updated yearly following town meeting. Statewide template restricts additional functionality
School Emergency Response Protocol	School procedures for emergency response	Effective in providing checklists for schools and Police Department for use in emergency situations	Coordination with the BEOP may improve effectiveness
LEPC 3 All Hazards Resource Guide	Outlines resources available to town in the event of an emergency.	Effective in providing resource information to the town	Should be revised to incorporate resources specific to the town of Windsor
Road Standards	Design and construction standards for roads and drainage systems	Effective through their continued implementation	Continued implementation of Road standards is critical to effectiveness
Subdivision Regulations	Regulates the division of land, standards for site access and utilities	Effective through their continued implementation	Continued updates and enforcement are important for continued effectiveness
Zoning Bylaw	Regulates development	Effective through their continued implementation	Continued updates and enforcement are important for continued effectiveness
National Flood Insurance Program (NFIP)	Provides ability for residents to acquire flood insurance	Effective; Windsor is compliant with NFIP program	Flood maps should be updated; pursue CRS rating
Maintenance Programs	Bridge & Culvert Inventory	Effective at tracking and planning infrastructure upgrades	Inventories should be updated whenever possible
Access Permits	Regulates driveway access along town-maintained roads	Effective in limiting the number of road cuts, thereby reducing the potential for traffic accidents	Continued enforcement of access permit regulations are critical in maintaining effectiveness

Resource	Description	Effectiveness in Implementing HM Goals	Opportunities for Improving Effectiveness
Zoning Administrator	Can carry out and enforce zoning codes and floodplain regulations	Effective in implementing zoning bylaws	Outreach to public to create awareness of regulations and their role in hazard mitigation
Local Emergency Planning Committee 3	Volunteer organization involved in regional hazard mitigation efforts	Effective and important contributor in the Hazard Mitigation planning process	Greater town participation at the regional planning level would be beneficial
Southern Windsor County RPC	Regional organization working to further Emergency Management and Hazard Mitigation Goals	Effective in assisting towns in the adoption of new ordinances and the revision of planning documents	The RPC should focus on improving the planning process and investigate additional sources of historical and statistical data for identified hazards
Stream Geomorphic Assessment	Investigation of stressors to the watershed system	Effective at assessing potential mitigation projects in the town	Can be used to inform future mitigation activities

6.3 Mitigation Strategies, Actions and Projects

The Windsor hazard mitigation committee discussed each mitigation strategy and found that many projects are still ongoing and/or are still relevant. In most cases, the past identified strategies have been left in place because of their ongoing and cyclic nature, for example, the incorporation of strategies into the town capital budget and planning documents. The instructions were to choose which should be included in the five year plan, based on cost (including considering the feasibility to complete or initiate in that time) versus benefit (or need).

The following identified programs, projects and activities are future mitigation strategies for the Town of Windsor. These mitigation strategies have been chosen by the town as the most appropriate policies and programs to lessen the impacts of potential hazards.

Potential mitigation projects are prioritized on an ad-hoc basis by:

- Severity of need – including life safety
- Projects with the greatest potential impact
- Available funding

Prior to pursuing potential mitigation projects, the Town considers the costs and benefits of the project.

Table 4.1. Mitigation and Preparedness Actions and Projects

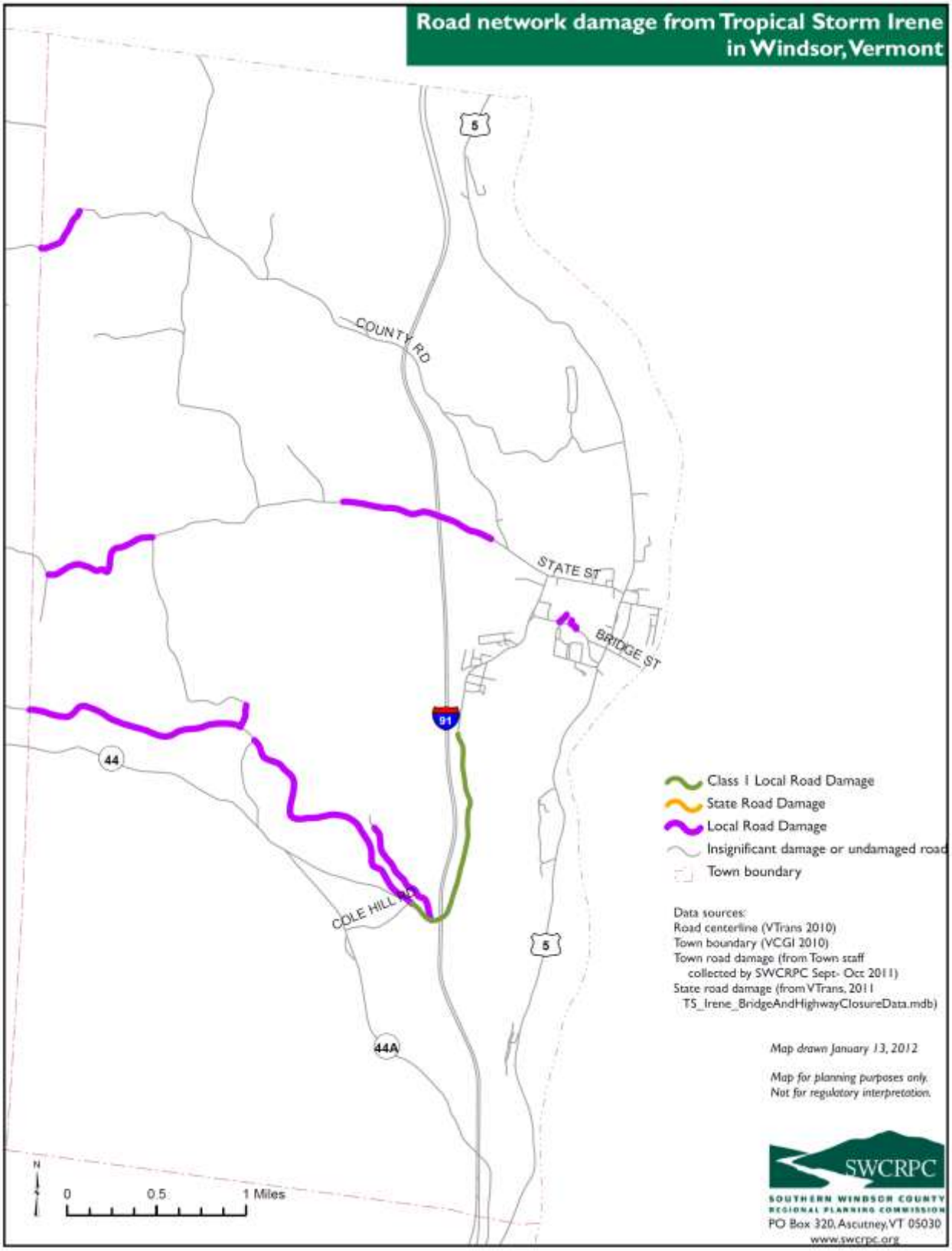
MITIGATION ACTION	TYPE OF ACTION	HAZARD(S) ADDRESSED	RESPONSIBLE PARTY	TIMEFRAME	FUNDING SOURCE
Basic Emergency Operations Plan	Preparedness	All Hazards	Town Manager, Fire and Police Chief	Annual update process to begin every March following town meeting	Town funds and SWCRPC EMPG grant
ICS/NIMS Training	Preparedness	All Hazards	Selectboard and Fire and Police Chief	Annually or as required	No cost
Discuss Requirements/ Encourage the installation of adequate fire suppression into new construction	Mitigation	Fire	Planning Commission, Zoning, Fire Chief	Annual Selectboard Meeting	No cost to town
Discussion & Upgrades to Mill Pond dam to meet standards	Mitigation	Flooding	Town Manager, Design Review/Preservation Commission	Annual dam inspection report review, 2016-2021	HMGP
Collect additional hazard vulnerability data for inclusion in next plan update	Mitigation	All Hazards	SWCRPC	Before the next plan update	EMPG funds
Discuss/Identify Options for Bridge enlargement on Bridge Street	Mitigation Preparedness	Fire (greater access for current equipment)	Selectboard, Highway Department, and New England Central Railroad	2016-2017	Capital Budget program and possible HMGP project
Enhance fire suppression capabilities	Mitigation	Fire	Fire Chief, Emergency Management Director	2017-2019	Town Capitol Budget, Federal Grants
Make NFIP pamphlets available in town	Mitigation	Flooding	Zoning administrator	2017	Town capital budget funds

MITIGATION ACTION	TYPE OF ACTION	HAZARD(S) ADDRESSED	RESPONSIBLE PARTY	TIMEFRAME	FUNDING SOURCE
Review Regional Resources List (shared equipment inventory)	Preparedness	All Hazards	Town Manager, Road Foreman, EMD	Annually	No cost to town
Public Outreach: distribute state brochures on fire prevention	Mitigation, Preparedness	Structure Fire, Wildfires	Fire Department, Town Clerk, EMD	2017-2018	No cost to town
Conduct studies to assess vulnerability of critical facilities to earthquake events	Mitigation	Earthquake	Town Manager, Selectboard Chair, Zoning Adminstrator	2018-2019	HMGP, Town Capitol Budget
Conduct an engineering study of critical facilities to identify vulnerabilities to high wind	Mitigation	High Wind Events	Town Manager, Selectboard Chair, Zoning Administrator	2019-2021	HMGP, Town Capitol Budget
Public Outreach: distribute FEMA guides and brochures	Mitigation, Preparedness	Flooding, Severe Winter Weather, Fire	Town Clerk, Zoning	2017-2018	No cost to town

The Town does not currently have any projects that could be eligible for potential applications for Hazard Mitigation Grant Program (HMGP) and 406 funding under new disaster declarations in the next few years.

6.4 Integration

Windsor uses all of the tools listed throughout the plan for current and future activities with the town. For example: the Local Emergency Operation Plan has a contact list that is used for response purposes in the case of a hazard event, and is updated every year after Town Meeting The list includes updates to vulnerable geographic locations, as well as locations of vulnerable populations. Town Road and Bridge Standards are followed by the town and Windsor just competed updating their culvert inventory in 2015. The mitigation action and goals identified in this plan will be reviewed annually by the Selectboard at a meeting prior to Town Meeting Day. Additionally, the SWCRPC will work with the Windsor Planning Commission to incorporate ideas into the next Town Plan rewrite. The goals of this hazard mitigation plan will be incorporated in the rewrite to ensure that emergency preparedness and mitigation planning efforts are included in the Town Plan, with particular attention to include the projects in the Mitigation Actions Table. As each referenced plans and regulations are updated, they will better incorporate hazard mitigation. This will assist with ensuring that this plan is utilized and project follow-through occurs.


Road network damage from Tropical Storm Irene in Windsor, Vermont
5
COUNTY RD
STATE ST
BRIDGE ST
91
44
COLE HILL RD
5
44A
Class 1 Local Road Damage
State Road Damage
Local Road Damage
Insignificant damage or undamaged road
Town boundary
Data sources:
Road centerline (VTrans 2010)
Town boundary (VCGI 2010)
Town road damage (from Town staff collected by SWCRPC Sept- Oct 2011)
State road damage (from VTrans, 2011 TS_Irene_BridgeAndHighwayClosureData.mdb)
Map drawn January 13, 2012
Map for planning purposes only. Not for regulatory interpretation.
N
0
0.5
1 Miles
SWCRPC
SOUTHERN WINDSOR COUNTY REGIONAL PLANNING COMMISSION
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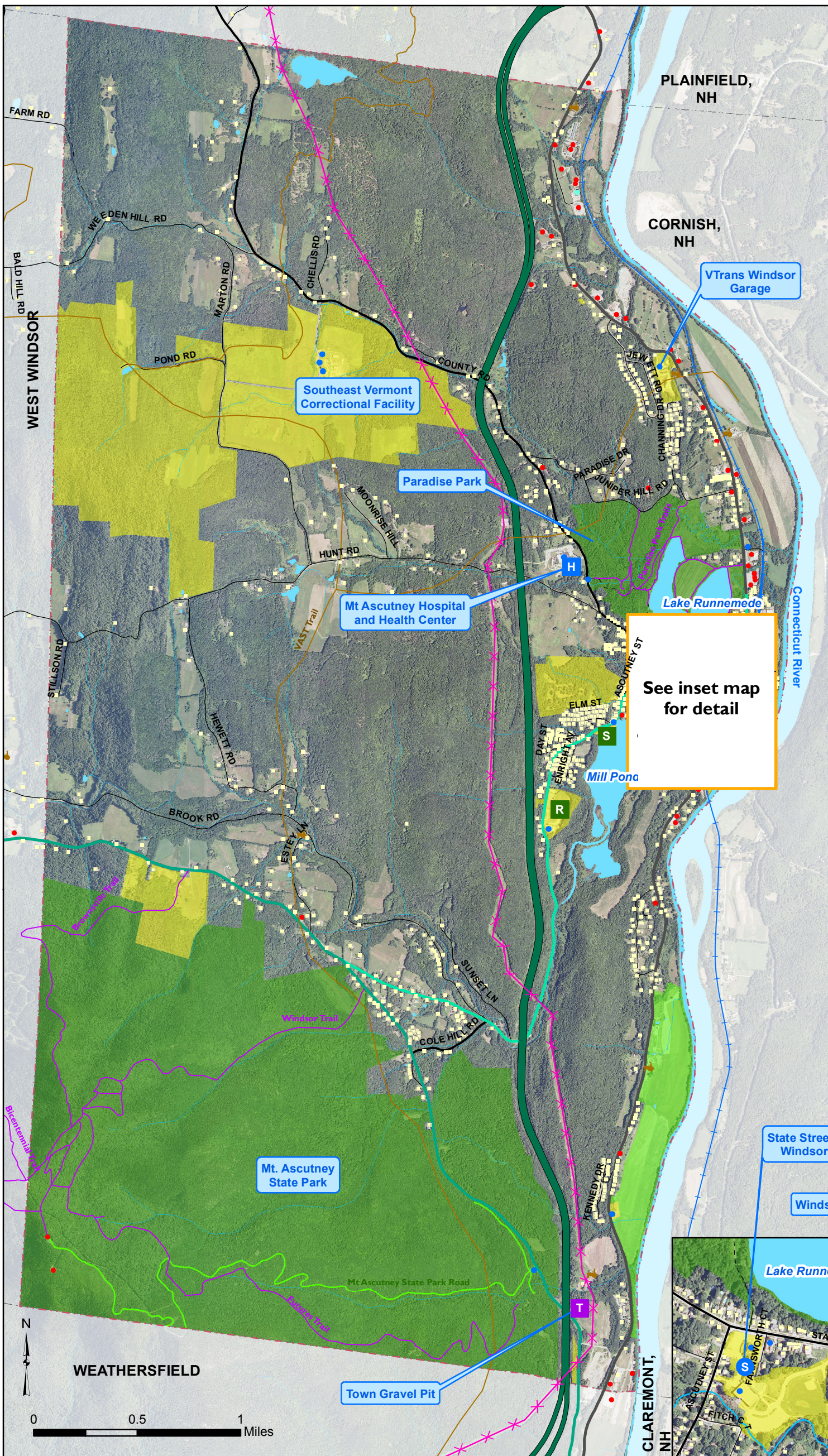
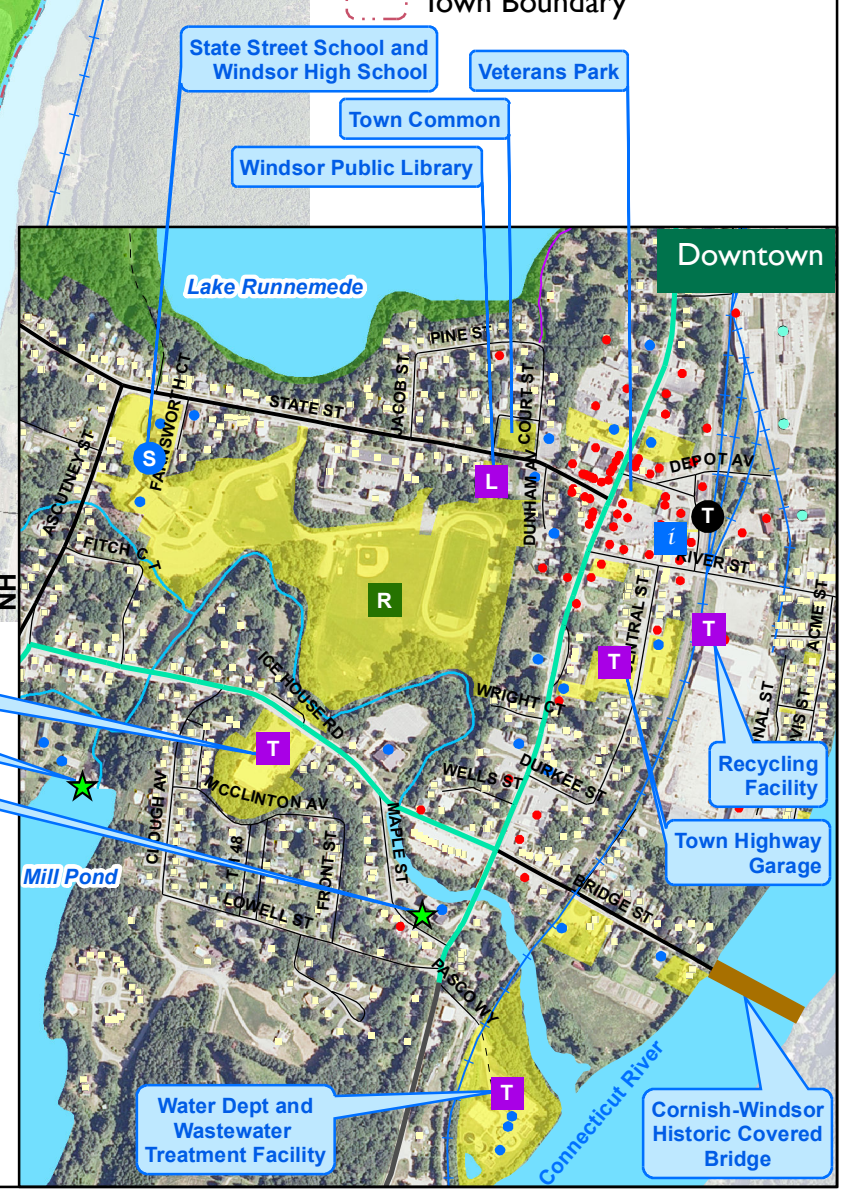
Current Land Use and Facilities Map
Town of Windsor, VT
All Hazard Mitigation Plan 2016
Adopted April 12, 2016



Land Use and Points of Interest

- Residential
- Commercial
- Farm
- Industrial
- Government and community
- Town Facility
- Windsor Welcome Center
- Windsor Public Library
- School
- Hospital
- Recreation Fields
- Town Swimming Area
- Train Station
- Other major site
- River or Stream
- Lake or Pond
- Conserved Public Land
- Conserved Private Land
- Public Land/ Facilities
- Interstate Highway
- US Highway
- VT State Highway
- Class 1 Town Highway
- Class 2 Town Highway
- Class 3 Town Highway
- Class 4 Town Highway
- Forest Road (Windsor only)
- Legal Trail (Windsor only)
- Private Road (Windsor only)
- Hiking Trails
- VAST Snowmobile Trails
- Transmission Line
- Town Boundary



Data Sources:
Facilities in town (Southern Windsor County Regional Planning Commission (SWCRPC) 2013 & 2015, and Buildings VT E911 April 2011), Public Lands (SWCRPC 2013), Conserved Lands (Upper Valley Land Trust 2012, University of Vermont 2010 and others), Waterbodies (VT Hydrographic Dataset 2008), Road centerline (VT Agency of Transportation (VTrans) 2014), Hiking and VAST Snowmobile Trails (VT E911 2013), Railroad (VTrans 2014 and NHDOT 1993), Transmission Line (VT Agency of Natural Resources 2003 and SWCRPC 2013), Town Boundary (VT Center for Geographic Information 2012 and New Hampshire Granit 2009), Aerial (National Agricultural Imagery Program 2009)

VT State Plane, Meters, NAD 83
Data depicted on this map are for planning purposes only and are based on best available information. Some of the data do not line up.

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Map drawn March 10, 2015
Adopted April 12, 2016

Emergency Management Map
Town of Windsor, VT
All Hazard Mitigation Plan 2016
Adopted April 12, 2016

HARTLAND
PLAINFIELD, NH
CORNISH, NH
WEST WINDSOR
WEATHERSFIELD
CLAREMONT, NH
Mount Ascutney
Bashan Brook
Lulls Brook
Kimball Brook
Hubbard Brook
Mill Brook
Connecticut River
5
91
44
44A

- Dry Hydrant
- Municipal Hydrant
- Police, Fire & Rescue (& Town Hall)
- School
- Town Hall and other govt
- Hospital/ Health Center
- Telecommunications Facility
- Transmission Line
- Interstate Highway
- US Highway
- VT State Highway
- Class 1 Town Highway
- Class 2 and 3 Town Highway
- Class 4 Town Highway
- Legal Trail, Private or Forest Rd
- Railroad
- River or Stream
- Lake or Pond
- Town Boundary

0 0.5 1 Miles

N

VT State Plane, Meters, NAD 83
Data depicted on this map are for planning purposes only and are based on best available information. Some of the data do not line up.

Downtown

Data Sources: Telecommunications Tower (Natural Resources Board 2007 and refined by SWCRPC 2013), Electric Transmission Line Corridor (VT Center for Geographic Information 2003 and refined by SWCRPC 2013), Hydrants (Vermont E-911 December 2014 and Town/ SWCRPC 2015), Roads (VT Agency of Transportation 2014), Railroad (VT Agency of Transportation 2014), Rivers and waterbodies (VT Hydrographic Dataset 2008), Town and Village Boundaries (VT Center for Geographic Information 2012), Buildings (Vermont E-911, November 2014),

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Map Drawn March 10, 2015
Adopted April 12, 2016

Hazardous Waste Sites Map
Town of Windsor, VT
All Hazard Mitigation Plan 2016
Adopted April 12, 2016

HARTLAND

PLAINFIELD, NH

CORNISH, NH

WEST WINDSOR

WEATHERSFIELD

CLAREMONT, NH

Mount Ascutney

5

91

44

44A

Hazardous Waste Site

Hazardous Waste Facility Status

- Fully Regulated Generator
- Conditionally Exempt Generator
- Out of Business
- Unknown Status

Major Brownfield Site

- Interstate Highway
- US Highway
- VT State Highway
- Class 1 Town Highway
- Class 2 and 3 Town Highway
- Class 4 Town Highway
- Legal Trail, Private or Forest Rd
- Railroad
- River or Stream
- Lake or Pond
- Town Boundary

0 0.5 1 Miles

N

VT State Plane, Meters, NAD 83
Data depicted on this map are for planning purposes only and are based on best available information. Some of the data do not line up.

Downtown

EVERETT LN
PINE ST
JACOB ST
STATE ST
COURT ST
DUNHAM AV
DEPOT AV
RAILROAD AV
RIVER ST
MAIN ST
FOSTER AV
ETTA FRAISER DR
CENTRAL ST
WRIGHT CT
CROSS ST
NATIONAL ST
JARVIS ST
WELLS ST
DURKEE ST
UNION ST
MCCARTY AV
BRIDGE ST
MAPLE ST
LOWELL ST
PASCO WY
Cone Blanchard
Goodyear

Data Sources: Hazardous Waste Facilities (VT Dept of Environmental Conservation 2006), Hazardous Waste Sites (VT Dept of Environmental Conservation 2012), Major Brownfield Site (Southern Windsor County Regional Planning Commission 2015), Roads (VT Agency of Transportation 2014), Railroad (VT Agency of Transportation 2014), Rivers and waterbodies (VT Hydrographic Dataset 2008), Town and Village Boundaries (VT Center for Geographic Information 2012).

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Map Drawn March 10, 2015
Adopted April 12, 2016

Transportation Map
Town of Windsor, VT
All Hazard Mitigation Plan 2016
Adopted April 12, 2016

HARTLAND
PLAINFIELD, NH
CORNISH, NH
WEST WINDSOR
WEATHERSFIELD
CLAREMONT, NH
Mount Ascutney

FARM RD
WEEDEN HILL RD
BALD HILL RD
CHELLIS RD
POND RD
COUNTY RD
HUNT RD
MARTON RD
MOONRISE HILL
STILLSON RD
HEWETT RD
BROOK RD
ESTEY LN
SUNSET LN
ROUTE 44
COLE HILL RD
BISHOPS LP
WESTON HILL
ORCHARD LN
PARADISE DR
JUNIPER HILL RD
CHANNING DR
PINE ST
STATE ST
RIVER ST
MAIN ST
JARVIS ST
ASCUTNEY ST
UNION ST
MCCLINTON
LOWELL ST
BRIDGE ST
ELM ST
DAY ST
FAIRVIEW
5
91
44
44A

Bridge or Very Large Culvert
Culvert
Interstate Highway
US Highway
VT State Highway
Class 1 Town Highway
Class 2 and 3 Town Highway
Class 4 Town Highway
Legal Trail, Private or Forest Rd
Railroad
River or Stream
Lake or Pond
Town Boundary

0 0.5 1 Miles

N

VT State Plane, Meters, NAD 83
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Downtown

CHANNING DR
PARADISE DR
JUNIPER HILL RD
COUNTY RD
PARADISE PARK RD
HUNT RD
PUMP STATION RD
EVERETT LN
PINE ST
DEWEY AV
STATE ST
COURT ST
MAIN ST
DEPOT AV
RIVER ST
ASCUTNEY ST
UNION ST
CENTRAL ST
NATIONAL ST
JARVIS ST
ELM ST
HALL ST
CHERRY ST
CLOUGH AV
WELLS ST
MAPLE ST
BRIDGE ST
DAY ST
DORRANCE ST
LOWELL ST
BAVIER AV
FAIRVIEW
PASCO WY
5

There are no airports in Town.

Data Sources: Airports (VT Agency of Transportation 2014), State Bridges and Large Culverts (VT Agency of Transportation 2014), Local Bridges and Culverts (SWCRPC and Town 2013), Roads (VT Agency of Transportation 2014), Railroad (VT Agency of Transportation 2014), Rivers and waterbodies (VT Hydrographic Dataset 2008), Town and Village Boundaries (VT Center for Geographic Information 2012)

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Map Drawn March 10, 2015
Adopted April 12, 2016

Water Resources Map
Town of Windsor, VT
All Hazard Mitigation Plan 2016
Adopted April 12, 2016

HARTLAND
PLAINFIELD, NH
CORNISH, NH
WEST WINDSOR
WEATHERSFIELD
CLAREMONT, NH
Bashan Brook
Lulls Brook
Kimball Brook
Hubbard Brook
Lake Runnemede
Mill Brook
Mill Pond
Connecticut River
Mount Ascutney
5
91
44
44A

River Corridor Protection Area
Groundwater Protection Area
VT Significant Wetlands

Floodway (Zone AE)
Floodplain (Zone A)
Floodplain (Zone AE)
Dam Inundation Area (also covers entire area under the Floodway and Floodplain)

Interstate
US
VT State
Class 1 Town Highway
Class 2 and 3 Town Highway
Class 4 Town Highway
Legal Trail, Private or Forest Rd

River or
Lake or
Town

Major Watersheds (in inset only)
Blow-me-down Brook
Cornish Tributaries
Lower Tributaries
Mill Brook
North Charlestown Tributaries
Plainfield Tributaries

0 0.5 1 Miles
N

VT State Plane, Meters, NAD 83
Data depicted on this map are for planning purposes only and are based on best available information. Some of the data do not line up.

The groundwater protection areas are for the Southeast Correction Vermont Facility well and the Town of Windsor Water Department.
There are no surface water protection areas or mapped Class 3 Vermont significant wetlands within Windsor.

Data Sources: Dams (VT Agency of Natural Resources 2008), Dam Inundation Area (Connecticut River) (VT Dept of Emergency Management 2008), Floodplain and Floodway (Special Flood Hazard Areas) (Federal Emergency Management Agency 2008), River Corridor Protection Area (VT Agency of Natural Resources, January 2, 2015), Wetlands (VT Significant Wetlands Inventory) (VT Agency of Natural Resources 2010), Groundwater Protection Area (also known as Wellhead Protection Areas) (VT Agency of Natural Resources 2011), Surface Water Protection Area (VT Agency of Natural Resources 2010), Roads (VT Agency of Transportation 2014), Railroad (VT Agency of Transportation 2014), Rivers and waterbodies (VT Hydrographic Dataset 2008), Town and Village Boundaries (VT Center for Geographic Information 2012)

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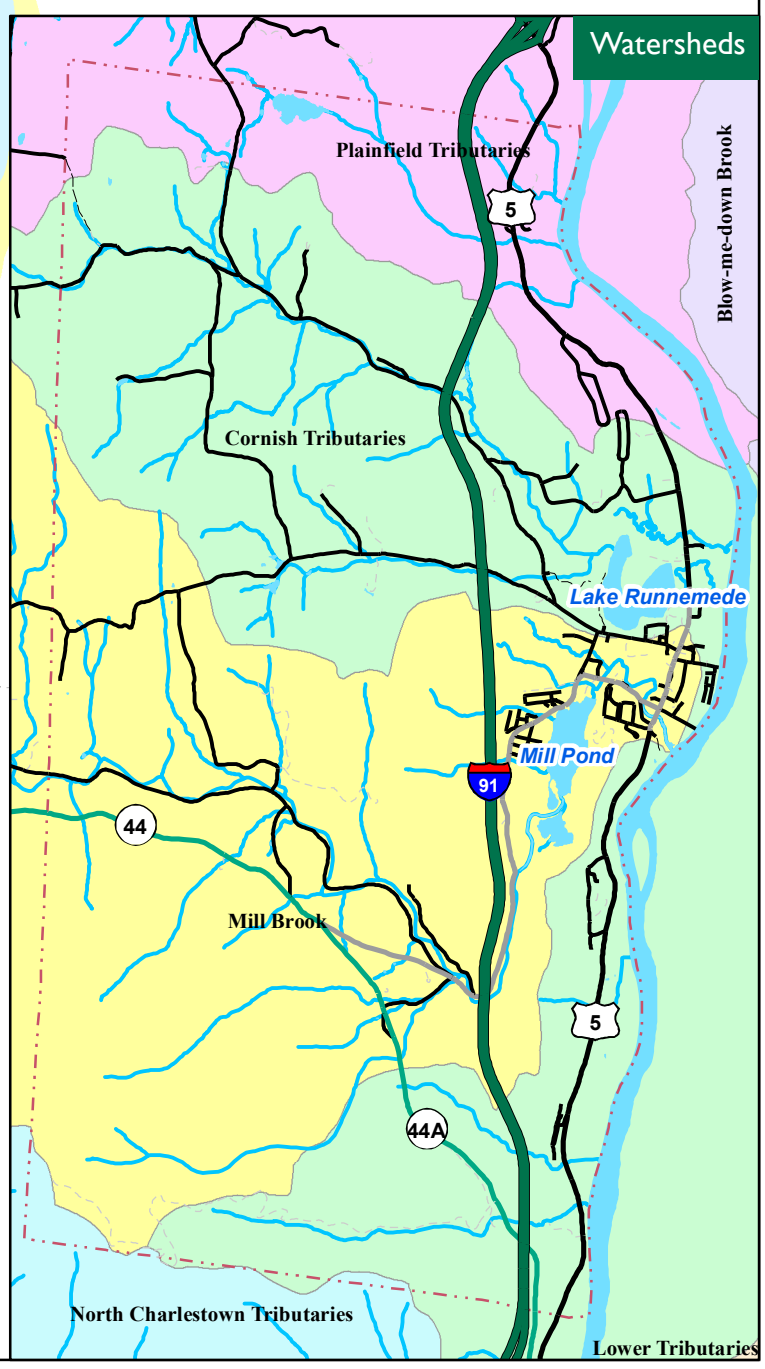
Map Drawn March 10, 2015
Adopted April 12, 2016

Watersheds



Elevation and Slopes Map
Town of Windsor, VT
All Hazard Mitigation Plan 2016
Adopted April 12, 2016

HARTLAND

PLAINFIELD, NH

CORNISH, NH

WEST WINDSOR

WEATHERSFIELD

CLAREMONT, NH

Weeden Hill

Mount Ascutney

- Summit
- 20ft contours
- 100ft contours
- Steep slopes
- Interstate Highway
- US Highway
- VT State Highway
- Class 1 Town Highway
- Class 2 Town Highway
- Class 3 Town Highway
- Class 4 Town Highway
- Forest Road (Windsor only)
- Legal Trail (Windsor only)
- Private Road (Windsor only)
- River or Stream
- Lake or Pond
- Town Boundary

Steep slopes shown are 24% and above.

0 0.5 1 Miles

N

Hillshade

VT State Plane, Meters, NAD 83
Data depicted on this map are for planning purposes only and are based on best available information. Some of the data do not line up.

Data Sources:
Summit (Unknown Source), Contours, steep slopes and hillshade (dervived from 10m Digital Elevation Model, US Geological Survey/ VT Center for Geographic Information 2012), Road centerline (VT Agency of Transportation 2014), Town boundary (VT Center for Geographic Information 2012 and NH Granit 2009),

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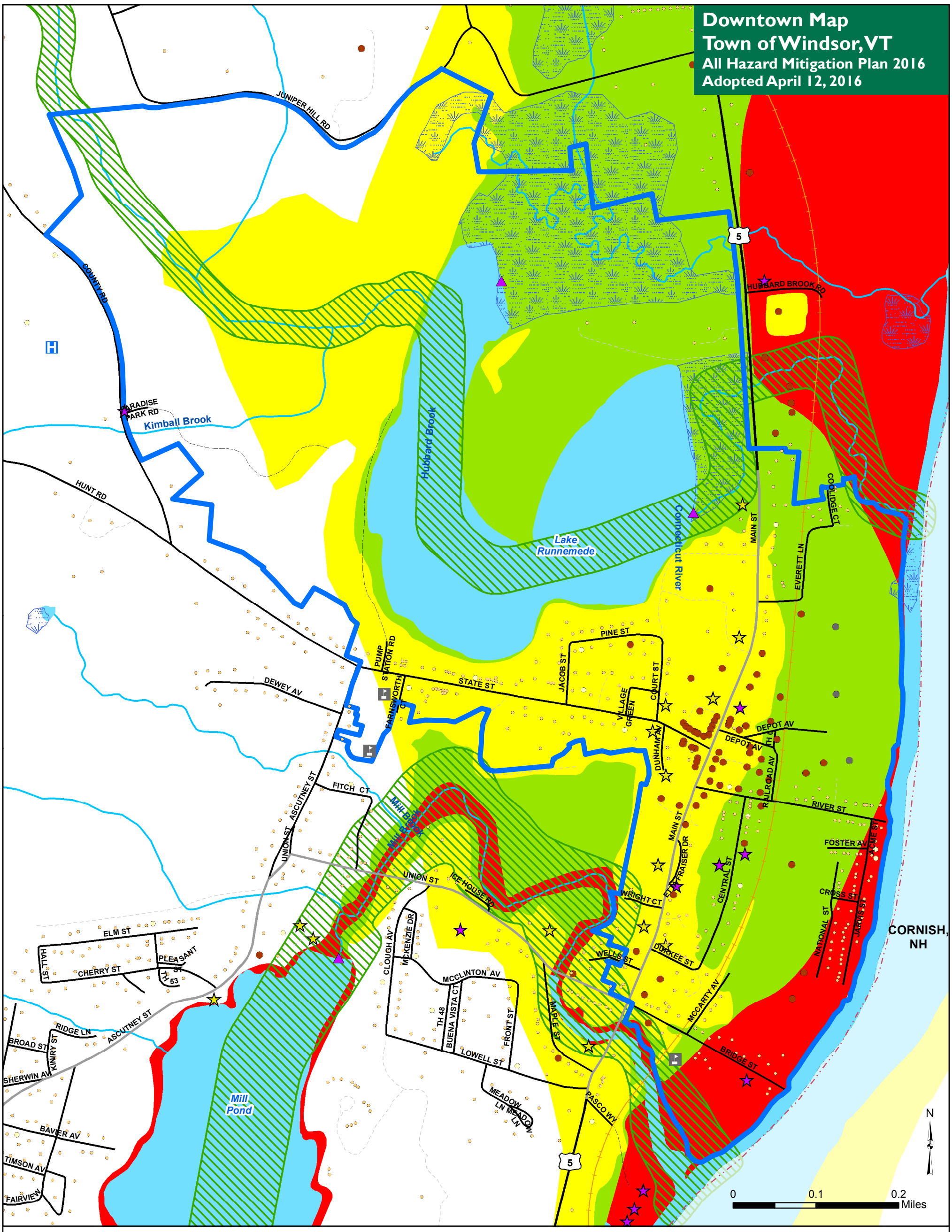
Map Drawn March 10, 2015
Adopted April 12, 2016

Downtown Map
Town of Windsor, VT
All Hazard Mitigation Plan 2016
Adopted April 12, 2016



- Goverment and Emergency Service
- School
- Other civic site (including churches)
- Commercial
- Manufacturing or Industrial
- Residential (including mobile homes)
- Other
- Hospital
- Dam
- 2014 Historic District (ROUGH)
- River Corridor Protection Area
- VT Significant Wetlands
- Floodway (Zone AE)
- Floodplain (Zone A)
- Floodplain (Zone AE)
- Dam Inundation Area
- Interstate Highway
- US Highway
- VT State Highway
- Class 1 Town Highway
- Class 2 and 3 Town Highway
- Class 4 Town Highway
- Legal Trail, Private or Forest Rd
- Railroad
- River or Stream
- Lake or Pond
- Town Boundary

VT State Plane, Meters, NAD 83
Data depicted on this map are for planning purposes only and are based on best available information. Some of the data do not line up.

Data Sources: For full list of sources see Water Resources Map
Buildings (VT E911 sites November 2014), Dams (ANR 2008), Dam Inundation Area (Connecticut River) (VEM 2008), Floodplain and Floodway (Special Flood Hazard Areas) (FEMA 2008), River Corridor Protection Area (ANR January 2, 2015), Wetlands (VSWI) (ANR 2010), Roads (VTrans 2014), Railroad (VTrans 2014), Rivers and waterbodies (VHD 2008), Town Boundaries (VCGI 2012), Historic District (SWCRPC 2015 ROUGH DRAFT)

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Map Drawn March 6, 2015
Adopted April 12, 2016