



33 Vernon

Community Overview

The Town of Vernon is a fully suburban community that encompasses 18.4 square miles of land and has a population of approximately 29,622. Elevation ranges from about 150 feet in the west to over 800 feet in the east. Vernon's lies primarily within the Hockanum River Watershed, however, the southeastern corner of town drains to the Willimantic River. Major watercourses include the Hockanum and Tankerhoosen Rivers, as well as Clarks and Railroad Brooks. Vernon is bisected by Interstate 84 which travels east-west. Other major thoroughfares include state routes 30, 31, 74 and 83. Strong business sectors include retail, professional, medical, commercial-industrial, and agricultural and horticultural enterprises.

Most recent development in Vernon has consisted of redevelopment and renovation projects; these include redevelopment at the Amerbelle Mill Complex and the Talcottville Mill, conversion of the former Roosevelt Mill to lofts, and reconstruction of a Connecticut Water Company (CWC) reservoir pumping station at Shenipsit Road.

Critical Facilities

Critical Facilities throughout the Capitol Region are listed in Appendix B. In Vernon these include the Bolton Road Senior Center, Town Hall Annex, Parks and Recreation Facility at Henry Park.

Table 33-1: Critical Facilities, Vernon

Facility	Shelter	Generator
Bolton Road Senior Center		
Town Hall Annex		X
Parks and Recreation Facility		X
Primary Shelter		Partial

The Bolton Road Senior Center is in the process of acquiring a backup generator. The Town Hall Annex and Parks and Recreation facility are each in the process of upgrading their generators.

The Vernon's primary emergency shelter has a generator capable of powering most of the building; this is a regional shelter that provides mass care and qualifies for American Red Cross approval.

A Yankee Gas pumping station, a facility previously identified as critical, has been removed.

Capabilities

Hazard mitigation is incorporated, to some degree, as a specific element in Vernon's Plan of Conservation and Development (POCD). POCD actions specifically address natural hazards. In 2013, the Town incorporated low impact development (LID) requirements into its Zoning

Regulations to aid in reducing its vulnerability to flooding. The Town has not permitted any new development in the flood plain since 2008.

Vernon has a tree warden and conducts tree maintenance annually, along with Eversource.

New Capabilities

Since adoption of the 2014-2019 Capitol Region Natural Hazards Mitigation Plan Update (“2014 HMP”), Vernon has built redundancy into its IT systems.

The redevelopment project at Amerbelle Mille Complex included removal of an onsite dam, which is believed to have alleviated flooding problems on the site. The Talcottville Mill redevelopment included a bank stabilization project.

Vernon has continued to expand its public water system, and the majority of the Town is now on public water with hydrants. The Connecticut Water Company (CWC) recently added hydrants on South Street, High Street, and Merline Road.

The Town has actively worked to address tree maintenance issues in recent years. The Town owns a bucket truck and a 72-foot four-by-four lift truck. Since the 2014 HMP, the Town purchased a grappling hook for debris cleanup.

A map modernization effort by FEMA is currently underway for Tolland County, but its full extent, and how much of Vernon it will cover, is unknown.

Challenges

Challenges Overview

Flooding, hurricane winds, and winter storms are the top hazards of concern for Vernon. Drought is the lowest hazard of concern. The Hockanum River and Tankerhoosen River are the primary sources of flood problems.

The Bolton Lake area does not have public water.

There are four to five dams in Town; none of which are a major concern.

Vernon is concerned about widespread crumbling foundation issues, and the potential they pose for amplification of natural hazard effects.

Hazard Losses

The economic losses faced by Vernon from natural hazards can be estimated by reviewing historic, and modeling future, loss figures. Loss estimates are summarized below.



Historic FEMA Payments

FEMA reimburses communities for hazard losses through programs including Public Assistance (PA) and the National Flood Insurance Program (NFIP). Combining PA and private flood insurance payments can give an estimate for total losses to a community.

The National Flood Insurance Program (NFIP) has paid 28 claims in Vernon totaling \$149,475 to-date. Vernon has eleven Repetitive Loss (RL) Property claims to-date on four properties with payments totaling \$92,732.

Total PA reimbursements to the community were as follows:

- Flood Events: \$45,653 (\$2,403 annually)
- Hurricane Events: \$215,495 (\$11,342 annually)
- Winter Storm Events: \$4,923,688 (\$259,141 annually)

These are summarized in the tables below.

Table 33-2: Flood Event PA Reimbursements, Vernon

Incident	Oct 2005
Declaration	12/16/2005
Disaster No.	1619
Entity	FEMA PA Reimbursement
State	\$4,243
Municipal	\$41,410
Nonprofit	\$0
Total	\$45,653
Annualized	\$2,403

Table 33-3: Hurricane Wind Event PA Reimbursements, Vernon

Incident	Aug - Sep 2011 (T.S. Irene)	Oct - Nov 2012 (Storm Sandy)
Declaration	9/2/2011	10/30/2012
Disaster #	4023	4087
Entity	FEMA PA Reimbursement	
State	\$9,818	\$17,333
Municipal	\$142,079	\$46,265
Nonprofit	\$0	\$0
Total	\$151,897	\$63,598
Annualized	\$7,995	\$3,347



Table 33-4: Winter Storm PA Reimbursements, Vernon

Incident	Mar 2003	Dec 2003	Jan 2005	Feb 2006	Jan 2011	Oct 2011	Feb 2013	Jan 2015
Declaration	3/11/03	1/15/04	2/17/05	5/2/06	3/3/11	11/17/11	3/21/13	4/8/15
Disaster #	3176	3192	3200	3266	1958	4046	4106	4213
Entity	FEMA PA Reimbursement							
State	\$29,627	\$30,645	\$43,799	\$39,871	\$66,486	\$52,819	\$49,627	\$97,103
Municipal	\$53,795	\$74,438	\$76,982	\$97,580	\$110,587	\$3,828,275	\$153,713	\$96,841
Nonprofit	\$0	\$0	\$0	\$0	\$2,007	\$19,493	\$0	\$0
Total	\$83,421	\$105,083	\$120,781	\$137,451	\$179,079	\$3,900,588	\$203,340	\$193,944
Annualized	\$4,391	\$5,531	\$6,357	\$7,234	\$9,425	\$205,294	\$10,702	\$10,208

National Centers for Environmental Information Losses

The table below summarizes events in the National Centers for Environmental Information (NCEI) severe storm database that were specifically noted as having impacted the community since 2012.

Table 33-5: NCEI Database Losses since 2012, Vernon

Date	Event	Property Damage
6/22/2012	Hail	\$0
7/1/2012	Thunderstorm Wind	\$10,000
8/10/2012	Thunderstorm Wind	\$15,000
8/10/2012	Thunderstorm Wind	\$1,000
9/18/2012	Thunderstorm Wind	\$5,000
7/27/2014	Hail	\$0
8/13/2016	Thunderstorm Wind	\$40,000
Total		\$71,000

NCEI losses under other event categories (such as drought, high wind, flooding, and winter storms) were not specifically noted as impacting this community, though they did impact Tolland County and nearby towns. NCEI losses are reported in Section II of this Plan.

HAZUS-MH Losses

CRCOG used FEMA’s Hazus-MH model to analyze the risks that the community might face from flooding, hurricanes, and earthquakes. The model estimates economic losses due to damage to buildings and building contents, as well as other economic disruptions. Both residential and commercial structures are addressed. Losses from different hazards are summarized below. Where available, estimates from the previous and current versions of the HMP are provided side-by-side; differences between the two may have been caused by a combination of the following:

- Changes in methodology: such as hazard zone mapping
- Changes in data: such as population and property values



- Changes in the model: this HMP utilized Hazus-MH version 4.0 rather than 2.1
- Other factors: inherent in a complex software like Hazus-MH

More details are available in the Multi-Jurisdictional HMP. Ultimately, changes in the loss estimates reflect the reality that small differences in hazard event features can have a significant impact on losses incurred.

Table 33-6: Estimated Damages to Vernon from a 1% Annual-Chance Flood

Loss Type	2014 Results	2018 Results
Households Displaced	336	392
People Needing Shelter	805	699
Buildings at Least Moderately Damaged	76	0
Economic Losses		
Residential Building & Content Losses	\$21,920,000	\$28,484,918
Other Building & Content Losses	\$28,230,000	\$86,429,604
Total Building & Content Loss	\$50,150,000	\$114,914,522
Total Business Interruption Losses	\$310,000	\$6,384,597
TOTAL	\$50,460,000	\$121,299,119

Table 33-7: Estimated Damages to Vernon from a 1% Annual-Chance Hurricane

Loss Type	2014 Results (1938 event)	2018 Results (1% track)
Buildings at Least Moderately Damaged	1,182	2
Buildings Completely Damaged	56	1
Total Debris Generated	40,650 tons	8585
Truckloads (at 25 tons/truck) of building debris	608	343
Economic Losses		
Residential Building & Content Losses	\$107,500,000	\$23,197,210
Other Building & Content Losses	\$16,700,000	\$823,566
Total Building & Content Loss	\$124,200,000	\$24,020,776
Total Business Interruption Losses	\$15,700,000	\$1,467,375
TOTAL LOSSES	\$139,900,000	\$25,488,151

Losses were calculated from a modeled probabilistic earthquake (1% annual-chance of occurrence), as well as for four specific scenarios with epicenters around Connecticut.



Table 33-8: Estimated Damages to Vernon from a Probabilistic Earthquake

Loss Type	2018 Results
Wage Loss	\$4,620
Rent Loss	\$4,047
Relocation Loss	\$5,861
Income Loss	\$3,269
Inventory Loss	\$286
Total Business Disruption	\$18,082
Structural Loss	\$11,147
Non-Structural Loss	\$38,412
Total Building Loss	\$49,559
Total Content Loss	\$13,903
TOTAL LOSSES	\$81,543

Table 33-9: Estimated Damages to Vernon from Modeled Earthquake Scenarios

Epicerter Location	Magnitude	Estimated Total Losses
East Haddam	6.4	\$489,448.19
Haddam	5.7	\$93,968.27
Portland	5.7	\$195,319.84
Stamford	5.7	\$7,427.23

Average Annualized Losses

Average Annualized Loss (AAL) figures are useful tools for comparison of the risks faced from different hazards with different likelihoods of occurring in a given time period. AAL estimates were prepared for each natural hazard that may impact the community based on the methodologies discussed in Section II of the Multi-Jurisdictional HMP. Dam failure, drought, tornado, and wildfire losses were sourced from the 2014 Connecticut Natural Hazard Mitigation Plan Update, with dam failure data supplemented by the National Performance of Dams Program and the Connecticut Department of Energy & Environmental Protection. Earthquake and hurricane losses were calculated in HAZUS-MH. Losses for flooding came from NFIP claims, for winter storms from Public Assistance Reimbursements, and for thunderstorms from the NCEI database. These are presented in the table below in dollars per year. Note that Hurricanes and Tropical Storms represent the largest share of total annualized losses.

Table 33-10: Average Annualized Losses, Vernon

Dam Failure	Drought	Earthquakes	Flooding	Hurricanes and Tropical Storms	Severe Winter Storms	Thunderstorms	Tornadoes	Wildfires	Total
\$1,793	\$0	\$81,543	\$6,336	\$1,977,355	\$259,141	\$10,621	\$8,479	\$2,323	\$2,347,593



Losses Summary

A review of the above loss estimates demonstrates that the community has experienced significant expenses as a result of natural hazards and is at risk for additional losses if some of the less-frequent events were to occur. These actual and potential losses justify hazard mitigation actions to reduce losses in the future.

Mitigation Strategies and Actions

Noted Hazard Mitigation Needs

Over the course of Plan development, specific hazard mitigation needs were noted.

- Crumbling building foundations are a significant and widespread problem in Vernon and exacerbate the effects of natural hazards.

Status of Previous Mitigation Strategies and Actions

The Town of Vernon reviewed the mitigation actions proposed in the 2014 HMP and determined the status of each. That information is included in the table below.

Table 33-11: Status of Previous Mitigation Strategies and Actions, Vernon

Action #	Action	Notes	Status
GOAL: PRESERVATION OF LIFE AND PROPERTY.			
Objective 1: Improve snow removal equipment at public works.			
1.1	Incorporate needs in Capital Improvement Plan and pursue opportunities to upgrade equipment.	This is an ongoing effort.	Capability
Objective 2: Provide police/fire/EMS with dedicated 4-wheel drive vehicles.			
2.1	Pursue opportunities to obtain vehicles - through grants, surplus military equipment, etc.	This is an ongoing effort.	Capability
Objective 3: Provide public works with mobile generator to power shelters.			
3.1	Work with CREPC to identify grant programs for purchasing portable generators and modifying buildings for hook-up.	Town continues to pursue funding to upgrade the generators of the Town Hall Annex and Parks & Recreation Facility. Have not yet been successful.	Carry Forward with Revisions
Objective 4: Ensure emergency preparedness of residents and businesses.			
4.1	Conduct periodic educational outreach to residents on storm readiness and property maintenance issues.	Ongoing effort. This is a capability.	Capability
4.2	Conduct periodic outreach to private medical-care facilities and apartment complexes to encourage installation of generators.	Established practice. This is a capability.	Capability
4.3	Complete the requirements to join FEMA's Community Rating System to reduce flood insurance premiums for residents.	The Town wishes first to evaluate the costs and benefits of joining CRS.	Carry Forward with Revisions
GOAL: IMPLEMENT PREVENTATIVE PROGRAMS TO MITIGATE STORM DAMAGE.			
Objective 1: Purchase and implement GIS mapping program.			



Action #	Action	Notes	Status
1.1	Continue planning to implement GIS for use by all town departments, including emergency services.	Ongoing effort. This is a capability.	Capability
Objective 2: Maintain adequate manpower and equipment for preventative tree program and assessment.			
2.1	Investigate CRCOG service sharing initiative for opportunities to share equipment used in tree maintenance.	Vernon shares equipment with neighboring Towns, and has also acquired its own equipment.	Completed
Objective 3: Make improvements to town Emergency Operations Center and communications facility.			
3.1	Acquire telephones, computer server and back-up, mobile hand-held radios and enable wireless connections.	This action has been completed.	Completed
Objective 4: Obtain weather and water level monitoring and alerting systems.			
4.1	Acquire weather monitoring system that provides real-time data and alerts to inform critical decision making for emergency preparedness and response operations.	This action is not necessary, as the Town utilizes National Weather Service alerts.	Drop
4.2	Acquire water level monitoring system that provides real-time data and alerts to inform critical decision making for emergency preparedness and response operations. Because this is expected to be a long term, multi-year project, for the 2014-2019 Plan period, the action to be taken is to review available systems and grant funding options.	This action has not yet been completed due to funding limitations.	Carry Forward
GOAL: IMPLEMENT DRAINAGE IN FLOOD ZONES.			
Objective 1: Conduct study of existing drainage problem areas for improvements.			
1.1	Study improvements to Franklin Road to alleviate road flooding issues. (The Town made claims for FEMA assistance in repair costs following the October 2005 flood). Because this is expected to be a long term, multi-year project, for the 2014-2019 Plan period, the action to be taken is to develop a scope of work and Request for Proposal (RFP) for the study.	This action has not yet been completed due to funding limitations.	Carry Forward
1.2	Study improvements to Manchester Flats area - Route 83, Welles and Main Streets. (During the October 2005 flood, a motel on Rt. 83 became inaccessible, isolating guests.) Because this is expected to be a long term, multi-year project, for the 2014-2019 Plan period, the action to be taken is to develop a scope of work and Request for Proposal (RFP) for the study.	This action has not yet been completed due to funding limitations.	Carry Forward
1.3	Study improvements along Frederick Road. (Residents in area currently carry flood insurance and have utilized town sandbags during high water events.) Because this is expected to be a long term, multi-year project, for the 2014-2019 Plan period, the action to be taken is to develop a scope of work and Request for Proposal (RFP) for the study.	This action has not yet been completed due to funding limitations.	Carry Forward
Objective 2: Upgrade or repair identified problem areas.			
2.1	Upon completion of above studies, prioritize and implement recommended improvements. Because this is expected to be a long term, multi-year project, for the 2014-2019 Plan period, the action to be taken is to develop a prioritized list of projects.	This action falls outside of the 5 year planning period for this plan. Drop until studies are complete.	Drop
Objective 3: Obtain public notification system.			



Action #	Action	Notes	Status
3.1	Improve public notification system.	Town uses CTAlerts.	Capability

Active Mitigation Strategies and Actions

The Town proposed to initiate several new mitigation actions for the upcoming five years. Additionally, a number of actions from the previous planning period are being carried forward or replaced with revised actions. These are listed below.

Each of the following actions has been prioritized based on FEMA guidelines, listed from highest to lowest priority, and numbered.

<i>Action #1</i>	
Enter the Sustainable CT program through Registration and review actions that can be undertaken to pursue Certification. Make progress with the actions related to hazard mitigation.	
Goal	4. Increase the use of natural, "green," or "soft" hazard mitigation measures, such as open space preservation and green infrastructure.
Category	Natural Resources Protection
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2019 - 12/2019
Priority	High

<i>Action #2</i>	
Develop a scope of work and a request for proposals to study improvements to the Manchester Flats area, around Route 83 and Welles and Main Streets, to alleviate flooding issues.	
Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Structural Projects
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2020
Priority	High



Action #3

Develop a scope of work and a request for proposals to study improvements to Frederick Road to alleviate flooding issues.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Structural Projects
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2020
Priority	High

Action #4

Complete upgrades to the generators at the Town Hall Annex and Parks & Recreation Facility

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$25,000 - \$50,000
Funding	Town Operating Budget / Grants
Timeframe	07/2020 - 06/2021
Priority	High

Action #5

Conduct outreach to local small businesses with the aim of preventing the accidental release and pollution from chemicals stored and used at their facilities during or following natural hazard events.

Goal	6. Improve public outreach, education, and warning systems
Category	Education & Awareness
Lead	Planning, in coordination with DEEP
Cost	\$0 - \$10,000
Funding	Materials & Resources Provided by CT DEEP
Timeframe	01/2019 - 12/2019
Priority	Medium



Action #6

Coordinate with NEMO and CRCOG to share resources and gain technical support for hazard mitigation actions involving stormwater management and public outreach, which have parallel benefits related to MS4 stormwater permit compliance.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Prevention
Lead	Public Works
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	01/2020 - 12/2020
Priority	Medium

Action #7

Participate in EMI courses or the seminars and annual conference held by the Connecticut Association of Flood Managers.

Goal	3. Improve institutional awareness and understanding of natural hazard impacts and mitigation within municipal governments and other decision-making bodies
Category	Education & Awareness
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2019 - 06/2024
Priority	Medium

Action #8

Review water level monitoring systems that can provide real-time data and alerts to inform critical decision making to identify those appropriate for the Town. Explore grant funding options.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2020 - 06/2021
Priority	Medium



Action #9

Contact the owners of Repetitive Loss Properties and nearby properties at risk to inquire about mitigation undertaken and suggest options for mitigating flooding in those areas. This should be accomplished with a letter directly mailed to each property owner.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Property Protection
Lead	Planning
Cost	\$0 - \$10,000
Funding	Town Operating Budget / DEMHS
Timeframe	07/2021 - 06/2022
Priority	Low

Action #10

Evaluate the costs and benefits of joining the FEMA Community Rating System.

Goal	9. Minimize the economic impact of hazard damages
Category	Property Protection
Lead	Emergency Management
Cost	\$0 - \$10,000
Funding	Town Operating Budget
Timeframe	07/2021 - 06/2022
Priority	Low

Action #11

Coordinate with CT SHPO to conduct historic resource surveys, focusing on areas within natural hazard risk zones (such as flood or wildfire hazard zones and areas near steep slopes), to support identification of vulnerable historic properties and preparation of resiliency plans across the state. This action leverages existing resources and best practices for protection of historic and cultural resources through an ongoing statewide initiative by CT SHPO.

Goal	8. Ensure community character and social equity are addressed in mitigation activities
Category	Property Protection
Lead	Planning, in coordination with SHPO
Cost	\$10,000 - \$25,000
Funding	SHPO
Timeframe	07/2021 - 06/2023
Priority	Low



Action #12

Work with CT DEEP to complete a formal validation of the Repetitive Loss Property list and update the mitigation status of each listed property.

Goal	1. Minimize the impact of natural hazards on physical buildings and infrastructure
Category	Property Protection
Lead	Planning
Cost	\$10,000 - \$25,000
Funding	Town Operating Budget / CT DEEP / DEMHS
Timeframe	07/2021 - 06/2023
Priority	Low

Action #13

Pursue grants to purchase portable generators and modify buildings for hook-up.

Goal	7. Improve the emergency response capabilities of the region and its communities
Category	Preparedness & Emergency Response
Lead	Emergency Management
Cost	\$50,000 - \$100,000
Funding	Grants
Timeframe	07/2023 - 06/2024
Priority	Low














Capitol Region Natural Hazards Mitigation Plan Update




Vernon, Connecticut

Flood Plains, Dams & Critical Facilities




Critical Facilities

-  Fire Station
-  Police Station
-  School
-  Healthcare Facility
-  State Facility
-  Town Facility
-  Waste Water Facility
-  Emergency Center
-  NRHP Buildings/Sites

Dam Hazard Class

-  BB, A, AA OR Unclassified
-  Class B - Significant Hazard
-  Class C - High Hazard

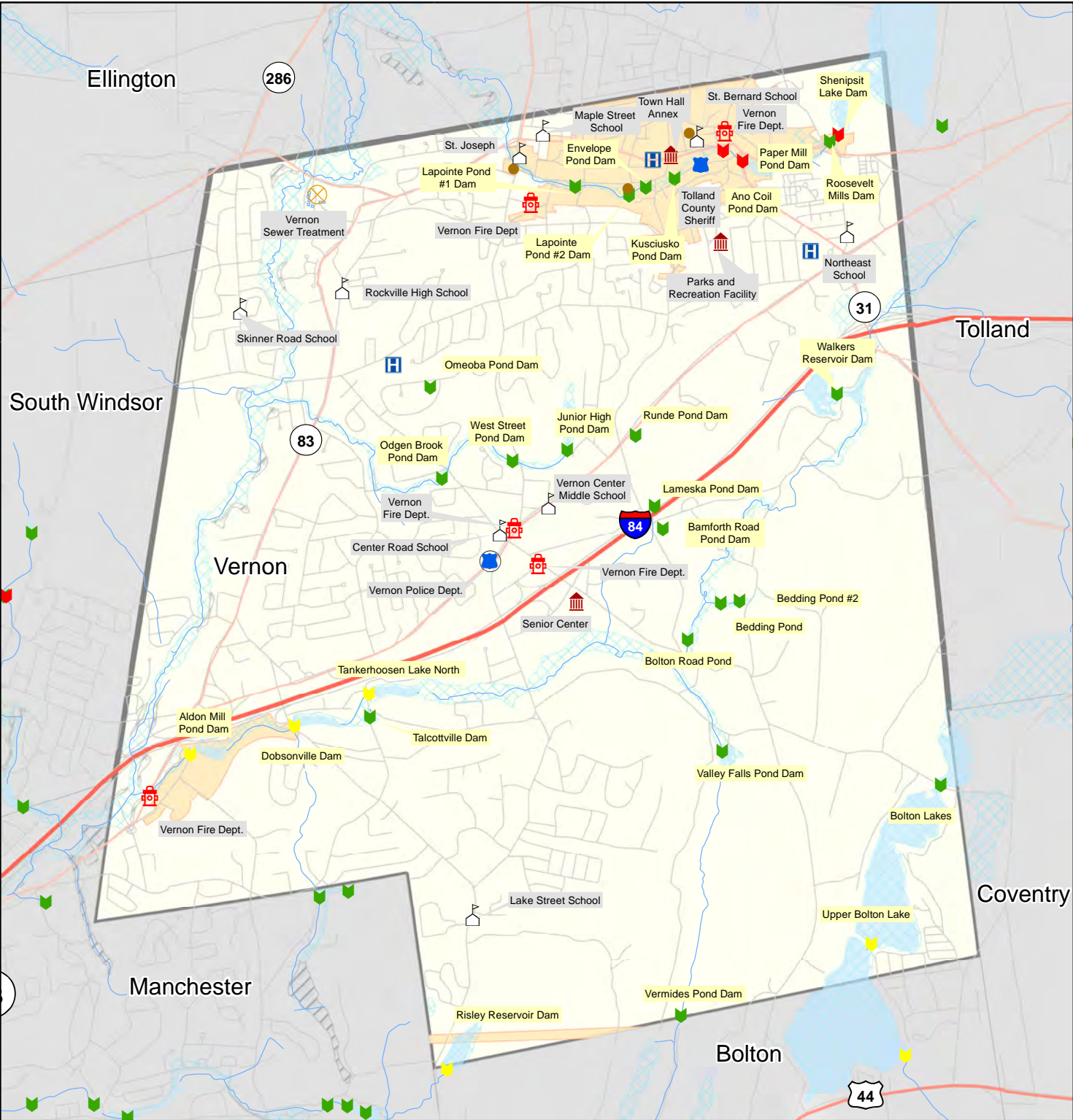
FEMA Flood Hazard Area

-  100 Year Flood Zone
-  500 Year Flood Zone
-  NRHP Districts/Areas

Data Sources: FEMA, National Register of Historic Places, CT DEEP, CRCOG, ESRI



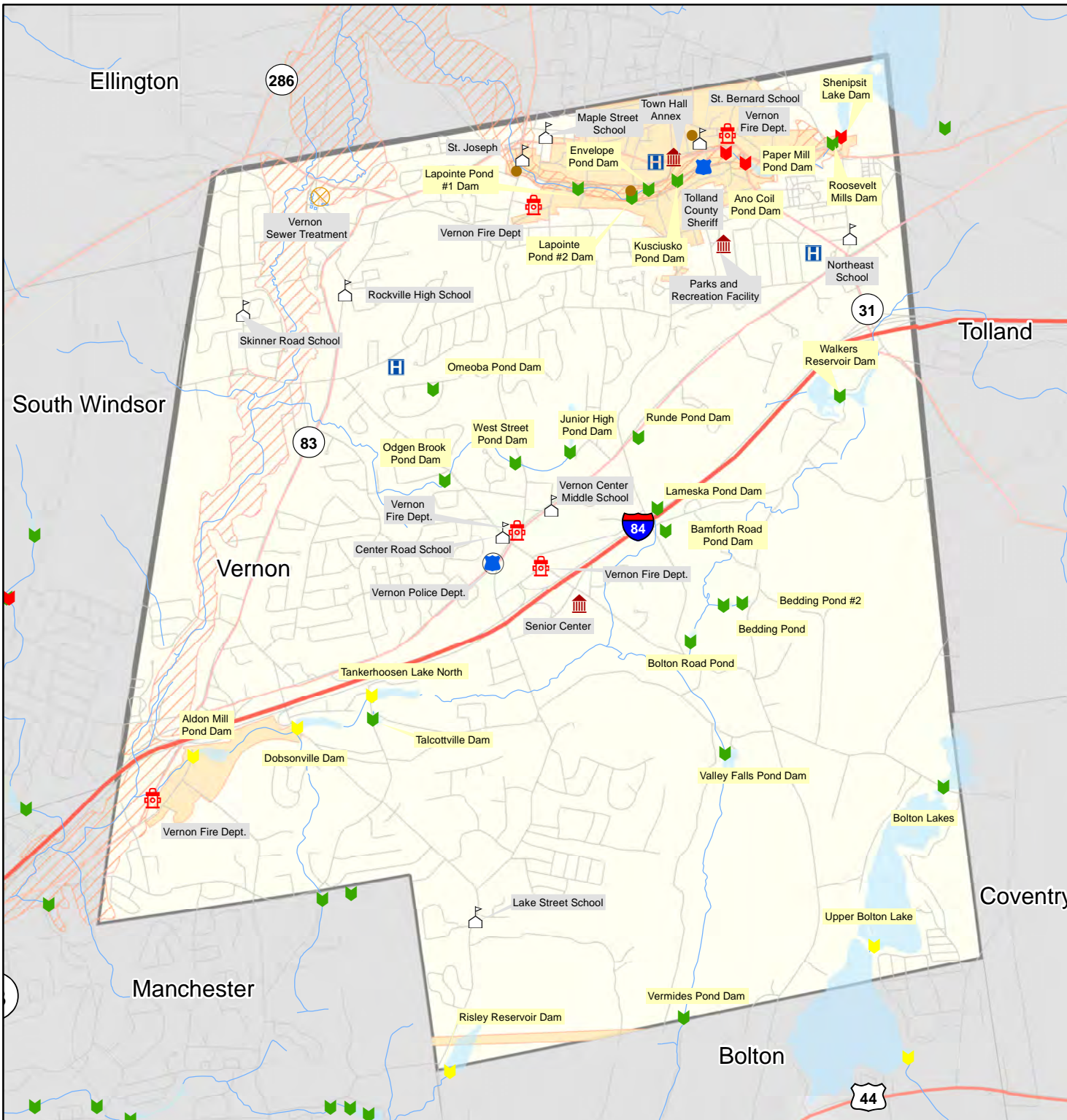
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






Capitol Region Natural Hazards Mitigation Plan Update

Vernon, Connecticut






Dam Breach Inundation Area & Critical Facilities



Critical Facilities

-  Fire Station
-  Police Station
-  School
-  Healthcare Facility
-  State Facility
-  Town Facility
-  Waste Water Facility
-  Emergency Center
-  NRHP Buildings/Sites

Dam Hazard Class

-  BB, A, AA OR Unclassified
-  Class B - Significant Hazard
-  Class C - High Hazard
-  Dam Breach Inundation Areas
-  NRHP Districts/Areas

Data Sources: FEMA, National Register of Historic Places, CT DEEP, CRCOG, ESRI



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