

Town of Braintree, Vermont
Local Hazard Mitigation Plan

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

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I. Introduction

Natural and human-caused hazards may affect a community at any time. They are not usually avoidable; however, their impact on human life and property can be reduced through community planning. Accordingly, this Local Hazard Mitigation Plan (hereafter referred to simply as the Plan) seeks to provide an all-hazards mitigation strategy that will make the community of Braintree more disaster resistant.

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

II. Purpose of the Plan

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

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

The 2013 Braintree Local Hazard Mitigation Plan is the first stand-alone mitigation plan drafted for the Town. Previously, the Town had a town-specific 2009 Annex in the Regional Pre-Disaster Mitigation Plan. This new plan has been reorganized and new sections have been added:

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

Old assumptions have been challenged throughout and new information has been added to make the plan stronger and more useful for the Braintree town officials and residents who will implement the hazard mitigation strategies in the future.

III. Community Profile

The Town of Braintree, Vermont is situated in the northwest corner of Orange County and comprises a total land area of approximately 22,700 acres or 35.5 square miles. Braintree is bounded by six towns (Randolph, Rochester, Granville, Roxbury, Brookfield, and Bethel), and is located in the northern part of the Two Rivers-Ottawaquechee Regional Commission's planning area. Although Braintree is predominantly a rural-residential town, it abuts the Town of Randolph, which serves as the commercial and political hub for the area.

Braintree's population is growing. In 2010, the population of Braintree was 1,246, an increase from just 1,194 residents in the year 2000 (U.S. Census). The increase in population is reflected in housing unit growth. According to the U.S. Census, there were 645 housing units in Braintree in 2010, compared to just 567 in 2000. This amounted to an increase of 78 units (or 13.7%) over the ten year period, at an average rate of almost eight units per year. The majority of Braintree's homes are owner-occupied with less than 25% either being rented or used for seasonal, recreational or occasional use (second homes). As is the case in most Vermont towns, the bulk of Braintree's housing units are comprised of single-family homes. Braintree also has a fairly high percentage of mobile homes (27.8%), most of which are located in the Mobile Acres mobile home park, which is located partially within and just outside of the floodplain. The increase in housing units is likely due in part to the neighboring commercial center, Randolph, which resides along Interstate 89 and is home to several large employers. Braintree will probably continue to experience pressure to grow in the future.

With regard to services, the Town of Braintree lies within the service area of Green Mountain Power (formerly the Central Vermont Public Service), which supplies electrical power to all sections of the town. Internet access can be obtained in one of five ways throughout the town, including landline/dial-up, cable, DSL, satellite or cellular internet. Despite the variety of ways to connect to the internet, a vast majority of users rely on dial-up or satellite, and those who have access to high-speed internet most likely live close to the Randolph town line. Braintree does not have a cellular tower within its town, and, as a result, cell reception is quite poor and in some areas, non-existent.

Braintree has sufficient fire protection services that are available to all residents thanks to a contractual agreement, paid annually, with the Town of Randolph. Randolph has three satellite fire stations that are staffed by volunteer firefighters, with the Randolph Village Fire Department being the closest to Braintree, and the first to respond to an emergency in that area. When necessary, the Randolph Village Fire Department can call up additional firefighters from its other satellite stations, and there are approximately 40 more volunteers available at other area departments.

With respect to law enforcement, a Constable is elected each year at the Braintree Town Meeting. The Constable and Town residents may call upon the Vermont State Police (Troop D) for assistance, which has its station in Royalton. Presently, the law enforcement procedures in Braintree are considered adequate.

Emergency medical services are provided by the White River Valley Ambulance, Inc., which is located in nearby Bethel. This non-profit ambulance/rescue service is jointly owned by Braintree and seven other

towns, and currently has a fleet of three ambulances. The Randolph Fire Department has a rescue truck with extrication equipment used for assisting injured people. The closest hospital is Gifford Medical Center, which is located in Randolph Village, and medivac services are available through the Dartmouth Hitchcock Advanced Response Team (DHART) helicopter, which is based at Dartmouth Hitchcock Medical Center in Lebanon, New Hampshire.

IV. The Planning Process

A. Plan Developers

Samantha Holcomb and Emma Zavez, both Land Use Planners at the Two Rivers-Ottawaquechee Regional Commission (TRORC), assisted the Town of Braintree with updating its Hazard Mitigation Plan.

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

The core planning team was comprised of Braintree’s “Irene Disaster Committee” (which was later renamed “Braintree Disaster Response Committee” and will henceforth be called the Committee). The Committee formed in the wake of devastating flooding caused by Tropical Storm (TS) Irene in August 2011. Their original mission was to learn about the best practices, as well as mistakes, that occurred at the local level in responding to TS Irene; however, the Committee eventually began reviewing and revising the town’s Hazard Mitigation Plan. Committee members who assisted with the revisions include:

Name	Role/Organization	How Participation Was Solicited
Nancy Davoll	Chair/Member - Braintree Emergency Response Committee; Resident.	On 2/7/2013, TRORC staff sent an introductory letter and e-mail to Selectboard members (David Atkinson, Tim Caulfield, Walt Palmer), and Emergency Director/Coordinator (Tuthill Doane). In this letter, TRORC’s staff requested names and contact information for potential committee members to revise Braintree’s HMP. Braintree’s Emergency Director/Coordinator responded by inviting TRORC’s staff to the next meeting of the Braintree Disaster Response Committee. TRORC’s staff attended that meeting, followed by many more meetings in which participants revised the HMP.
Richard Bowen	Member – Braintree Emergency Response Committee, Braintree Historical Society, Braintree Lister, Justice of the Peace; Resident.	
Terry Rose	Member - Braintree Emergency Response Committee; Resident.	
Sam Paddock	Member - Braintree Emergency Response Committee; Resident.	
Derek O’Toole	Member - Braintree Emergency Response Committee; Resident.	
Nathan Cleveland	Member - Braintree Emergency Response Committee; Resident.	
Tuthill	Member - Braintree Emergency Response Committee;	

Doane	Braintree Emergency Coordinator/Director; Resident.	
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Additional Participants in the Process:

- Selectboard Members: Paul Kendall, Linda Doane, David Atkinson, and Tim Caulfield
- Mike Gaidys, original member of the Braintree Emergency Response Committee
- Jeff Masterson, Town of Braintree Road Foreman
- Patrick Ross, Vermont Agency of Natural Resources, River Management Engineer

B. Plan Development Process

The 2009 Braintree Annex was originally part of the 2008 multi-jurisdictional Regional Hazard Mitigation Plan, drafted by Two Rivers-Ottawaquechee Regional Commission, and approved by FEMA on September 30, 2008 with its first local annex. The Braintree Annex received subsequent FEMA approval, but since it was part of a larger plan, FEMA treats its start date as September 30, 2008 and so the Braintree Annex expired on September 30, 2013.

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

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

The changes to this plan include:

- **General**
 - New sections: Plan Development Process, 2009 Mitigation Strategies Status Update chart, Existing Hazard Mitigation Programs, Projects & Activities, Plan Maintenance;
 - Data updates: New hazard incidents, emergency declarations, census data;
 - Hazards have been reevaluated with the hazard ranking system used by the Vermont Division of Emergency Management and Homeland Security.
- **Hazards Analysis**
 - Structure fire/wildfire are now differentiated and analyzed separately;
 - Severe Weather is now on the list of “top threats;”
 - Severe Weather events are now depicted in a chart that shows the multiple hazards involved during each event;
 - The Hurricane/Tropical Storm section has been added;
 - For each hazard, a location/vulnerability/extent/impact/likelihood table has been added to summarize the hazard description.
- **Maps**
 - A map of the Town of Braintree depicting critical facilities, town infrastructure, and the NFIP designated floodway and 100 year floodplain has been added.

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

- **Activities**

- 2/7/2013: Introductory letter and email indicating that the town's HMP would soon expire and explaining the process for revising and readopting the HMP. Requested names and contact information for potential committee members to revise HMP. Sent to Selectboard members (David Atkinson, Tim Caulfield, Walt Palmer), and Emergency Director/Coordinator (Tuthill Doane).
- 4/3/2013: Met with Emergency Director/Coordinator (Tuthill Doane) and the Braintree Disaster Response Committee. Introduced the revision process, reviewed Braintree's existing Hazard Mitigation Plan (adopted in April 2009), considered the status of various mitigation actions, potential hazards, and the data collection/research process. Set goals and scheduled next meeting.
- 5/1/2013: Met with Braintree's Disaster Response Committee and discussed and ranked hazards. Determined "Top Threats" in town. Set a goal to have a draft plan drafted within the next couple weeks, asked Committee to begin thinking about and brainstorming mitigation strategies for each "Top Threat" hazard identified, and introduced concept of how the plan will be maintained and the public will be included in the process.
- 6/5/2013: Met with Committee to discuss first draft sent a few weeks prior to meeting. The entire draft was reviewed in detail, with TRORC staff making note of any comments or errors. The Committee suggested the Selectboard be involved in the brainstorming of mitigation strategies and asked TRORC to coordinate a meeting with the Selectboard at a later date.
- 9/4/2013: Met with the Committee and members of the Selectboard to discuss and develop hazard mitigation actions for each hazard identified in the Plan.
- 11/19/2013: TRORC staff attended a Selectboard meeting to inform Braintree residents about the work that had been done to update the Town's Hazard Mitigation Plan. The Selectboard agenda is posted on the Town's website and also at the Town Office. TRORC staff also asked for comments at the meeting, but none were received. *The revised Braintree Hazard Mitigation Plan was posted on the Town of Braintree's website for review prior to the public information meeting.*

- **Public participation and involvement (44 CFR 201.6(b)(1))**

***Note: The meetings listed below were public sessions.*

- 4/3/2013: Introduction to Hazard Mitigation Plan development process. Reviewed Braintree's existing Hazard Mitigation Plan (adopted in April 2009), considered the status of various mitigation actions, potential hazards, and the data collection/research process.
- 5/1/2013: Discussed and ranked hazards.
- 6/5/2013: Discussed the first draft of the Braintree Hazard Mitigation Plan.
- 9/4/2013: Met with the Committee and members of the Selectboard to discuss and develop hazard mitigation actions for each hazard identified in the Plan.

- October 2013: A notice was placed in the Two Rivers-Ottauquechee Regional Planning Commission Newsletter alerting recipients that Braintree was engaging in hazard mitigation planning and updating their Hazard Mitigation Plan.
- 11/19/2013: TRORC staff attended a Selectboard meeting to inform Braintree residents about the work that had been done to update the Town’s Hazard Mitigation Plan. The Selectboard agenda is posted on the Town’s website and also at the Town Office. TRORC staff also asked for comments at the meeting, but none were received. *The revised Braintree Hazard Mitigation Plan was posted on the Town of Braintree’s website for review prior to the public information meeting.*
- **Governmental participation and involvement (44 CFR 201.6(b)(2))**
 - Sent revised draft to Planning Commission Chair, Bob Moyer (November 4, 2013).
 - Sent revised draft to Division of Emergency Management and Homeland Security (November 4, 2013).
- **Neighboring community participation and involvement (44 CFR 201.6(b)(2))**
 - October 2013: A notice was placed in the Two Rivers-Ottauquechee Regional Planning Commission Newsletter alerting recipients that Braintree was engaging in hazard mitigation planning and updating their Hazard Mitigation Plan.
 - Posted a notice in four local papers alerting the public to the Hazard Mitigation Planning process that was taking place.
 - Valley News—ran October 23, 2013
 - The Herald of Randolph—ran October 24, 2013
 - Journal Opinion—ran October 23, 2013
 - Vermont Standard—ran October 24, 2013
 - Sent revised draft to neighboring towns’ Selectboards for comment (November 4, 2013).
 - Towns of: Granville, Hancock, Rochester, Randolph, Brookfield, Roxbury
 - No comments were received.
- **Review of existing plans, studies, reports, and technical information (44 CFR 201.6(b)(3))**
 - Braintree Hazard Mitigation Plan (Adopted 4/21/2009)
 - This Plan was referenced extensively during the plan development process, especially in regard to the worst threats and mitigation action strategies identified in 2009.
 - Braintree Town Plan (Adopted 8/25/2012)
 - The Town Plan provided TRORC’s staff with background information on the community, as well as more detail on their emergency services.
 - Town of Braintree, VT – Annual Report (2012) – TS Irene Disaster Response Assessment (Compiled by the Braintree Emergency Response Committee)
 - This Assessment was incredibly useful for TRORC’s staff in understanding the response (and subsequent analysis of that response) following a major disaster

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

(Tropical Storm Irene in 2011). This Assessment was discussed during the update of Braintree’s Hazard Mitigation Plan.

- The Braintree Emergency Response Committee’s Existing “Possible Emergency Situations and/or Vulnerable Sites” List
 - This List was referenced while updating Braintree’s Hazard Mitigation Plan, especially in regard to matching vulnerable sites with identified hazards beyond flooding.

C. Status Update on Mitigation Actions Identified in 2009

The following table outlines the mitigation actions that were proposed in Braintree’s 2009 All-Hazard Pre-Disaster Mitigation Plan for the Town of Braintree (adopted on April 21, 2009 as an appendix to the Two Rivers-Ottauquechee Regional Commission’s multi-jurisdictional Pre-Disaster Mitigation Plan). Participants in the new Plan update process reviewed these actions and reported on the status of each:

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

2009 Mitigation Action	2013 – Status of Mitigation Actions
ALL HAZARDS 1. Ensure that RRP (Rapid Response Plan) is current.	<input checked="" type="checkbox"/> Complete. The new iteration of RRP is the Basic Emergency Operations Plan (BEOP). Braintree updates this document annually. Their most recent BEOP was updated and then adopted on 5/21/2013 by the Braintree Selectboard.
2. Use PDM Plan for Hazard Identification and Mapping.	<input checked="" type="checkbox"/> Currently being done/in process.
FLOOD 3. Stabilize riverbanks on Riford Brook Road and Route 12A along Riford Brook.	<input checked="" type="checkbox"/> Complete. Only focused on areas where town roads were or could be affected.
4. Continue the planned road maintenance program to survey culverts, and conduct upgrading and ditching.	<input checked="" type="checkbox"/> In process. The Town of Braintree has replaced many steel culverts with plastic ones.
5. Consider adopting Fluvial Erosion Hazard (FEH) regulations to incorporate lands in danger of flash flooding and erosion.	<input checked="" type="checkbox"/> Complete. FEH Regulations were adopted in Braintree's Unified Bylaw (adopted March 4, 2010). The Town is also considering extending the zone where limited development is allowed.
6. Revise flood hazard regulations, integrating FEH regulations.	<input checked="" type="checkbox"/> Complete. FEH Regulations were adopted in Braintree's Unified Bylaw (adopted March 4, 2010).

<p>HAZMAT 7. Establish an additional access route to the Mobile Acres 100 unit trailer park.</p>	<p>Over 2-3 years' time (approximately 2010-2012), several earnest and thorough attempts were made to establish an additional access route by Tuthill Doane, Braintree's Emergency Coordinator. While all consulted parties (Vermont Emergency Management, the Two Rivers-Ottawaquechee Regional Commission (TRORC), VTrans, etc.) agreed that an additional access is necessary, no progress was ever made in building one. TRORC staff believe this is due to the complicated nature of the site, which involves a railroad crossing. The effort reached an impasse and Braintree town officials are no longer pursuing this action.</p>
<p>8. Install guardrail or barriers between Town fuel tank and route 12A.</p>	<p>Not complete. However, this item was set as a priority for the FY 2015 budget.</p>
<p>FIRE 9. Develop additional dry hydrant sites in rural locations.</p>	<p><input checked="" type="checkbox"/> In process. The Town of Braintree recently increased their number of dry hydrants from 1 to 3, and now have about 10 areas considered to be potential sites for future dry hydrant development.</p>

Braintree's Emergency Response Committee also published a town-wide report entitled "Irene Disaster Response Assessment" in 2012 (a full copy is included as an Annex to this Plan). It's important to note that this report made some additional hazard mitigation recommendations; the top priority was for the town to purchase a repeater for Braintree Hill to enable radio communication throughout the Town (Braintree has several areas that lack cell phone service and prevent efficient emergency communications). The Town of Braintree has not yet budgeted for this repeater, but the town intends to move forward with the project and place it on privately-owned property. The repeater will be funded by grants and is estimated to cost \$20,000. Paperwork for the project should be finished by 12/31/2013. Finally, there are no current plans for new development in the Town of Braintree.

D. Existing Hazard Mitigation Programs, Projects & Activities

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

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

Community Preparedness Activities

- Annual update of Braintree's Basic Emergency Operations Plan (BEOP)
 - Current copy was updated and formally approved on 5/21/2013.
- Creation of an Irene Disaster Committee (now known as the "Braintree Emergency Response Committee" to review the local emergency response to Tropical Storm Irene (August 2011) and make recommendations for improvements. They worked on updating the town's Basic Emergency Operations Plan (BEOP) and its Hazard Mitigation Plan (which ultimately resulted in the creation of this document).
- Published "Irene Disaster Response Assessment" (2012/2013) to ensure better community preparedness next time.

- Citizens Emergency Response Team (CERT) Training-planner (hope to get going by fall 2013 or early 2014).
- Braintree Emergency Preparation Brochure (Prepared by Richard Bowen)

Insurance Programs

- Participation in National Flood Insurance Program (NFIP)
 - Unified Bylaw adopted on 3/4/2010 includes:
 - Floodplain Overlay District, and limitations/requirements for new development within the Special Flood Hazard Areas.
 - Fluvial Erosion Hazard Regulations were adopted in Braintree's latest Unified Bylaw (adopted 3/4/ 2010).
 - Most current FIRM maps dated 9/27/1985

<p>This section of the Plan satisfies the requirements of 44 CFR 201.6(c)(3)(ii).</p>

Land Use Planning

- Braintree Town Plan
 - Revised and adopted on 8/25/2012
 - Capital Budget & Program
 - The Town of Braintree received a 2013 Municipal Planning Grant from the State of Vermont to create a Capital Budget & Program with the assistance of the Two Rivers-Ottawaquechee Regional Commission. This project is in progress and will be complete by May 2014.
- Unified Bylaw
 - Adopted on 3/4/2010
 - Includes Floodplain Overlay District, and limitations/requirements for development within the Special Flood Hazard Areas
 - Fluvial Erosion Hazard Regulations were adopted in Braintree's Unified Bylaw (adopted March 4, 2010).

Hazard Control & Protection of Critical Infrastructure & Facilities

- Up-to-date culvert inventory
- Upsized multiple culverts (Thresher Road, Thayer Brook Road, Riford Brook Road , Rochester Hollow Road, Braintree Hill Road)
- Railroad Emergency Pre-Plan—Braintree, Vermont
 - Braintree’s Emergency Coordinator/Director developed a Railroad Emergency Pre-Plan that lists all crossings, mile markers, and other pertinent information in the event of an emergency. This list is kept up-to-date (last version dated 3/11/13). A copy of this Pre-Plan is also sent to the Randolph Fire Department Chief.

Education/Public Outreach

- Braintree Emergency Preparation Brochure (Prepared by Richard Bowen)

E. Plan Maintenance

This Plan (the Braintree Local Hazard Mitigation Plan) will be updated and evaluated annually at a May Selectboard meeting, along with the review of their Basic Emergency Operations Plan (BEOP). This meeting will constitute an opportunity for the public and other town officials to hear about the town's progress in implementing mitigation strategies and to give input on future activities and Plan revisions.

Updates and evaluation of this Plan by the Selectboard and the local Emergency Coordinator/Director will also occur within three months after every federal disaster declaration. The Town shall reference the Local Hazard Mitigation Plan when working on Town Plan amendments or changes to the Town's bylaws.

This section of the Plan satisfies 44 CFR and 201.6(c)(4)(i), 201.6(c)(4)(ii), and 201.6(c)(4)(iii).
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The Two Rivers-Ottawaquechee Regional Commission (TRORC) will help with Plan updates if assistance is requested by the Town of Braintree and if funding is available. If TRORC is unable to assist the Town, then Braintree's Town Clerk, Administrative Assistant, or Selectboard will update the Plan, or the Selectboard may appoint a committee of interested citizens (including the current local Emergency Coordinator/Director) to draft changes.

The process of evaluating and updating the plan will include continued public participation through public notices posted on the municipal website, notice within the municipal building, and notice in The Herald of Randolph and the TRORC newsletter and blog, inviting the public to the scheduled Selectboard (or specially scheduled) meeting. Additional stakeholders shall be invited to the meeting; these include: White River Valley Ambulance, Inc., Braintree Elementary School, and the Vermont Agency of Natural Resources (VT ANR). VT ANR will be invited because they can provide assistance with NFIP outreach activities in the community, models for stricter floodplain zoning regulations, delineation of fluvial erosion hazard areas, and other applicable initiatives. These efforts will be coordinated by the Town Clerk.

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

Braintree shall also incorporate mitigation planning into their long-term land use and development planning documents. The 2013 Vermont Legislature passed a law requiring all towns to incorporate flood resiliency elements into their town plans as of July 2014. To do so, flood hazard and fluvial erosion hazards will be identified, and strategies and recommendations will be provided to mitigate risks to

public safety, critical infrastructure, historic structures and public investments. This Local Hazard Mitigation Plan will help the town to comply with the new community flood resiliency requirement for town plans adopted after July 2014.

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

V. Community Vulnerability by Hazard

A. Hazard Identification

Mitigation efforts must be grounded in the rational evaluation of hazards to the area and the risks these hazards pose. This is done through a process, which in essence asks and answers three basic questions:

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

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

It is important that we learn from the past in order to avoid the same disasters and their outcomes. Disasters that have occurred within the Town of Braintree, the larger region, and the State of Vermont can give us good information about what types of disasters we can expect in the future and what kinds of damage they might cause. However, while this historical data can inform our perspective of what might happen in the future, it is by no means a prophecy. While Braintree might not have been impacted by a specific hazard in the past, this does not necessarily mean it will never be affected in the future. Indeed, the advance of climate change means that old weather patterns may not hold. For instance, in recent years, Vermonters have seen an increase in the number and severity of storms, especially rainfall events. Armed with historical data and a healthy respect for climate change and the unknown, we have tried our best to identify hazards and prepare for the future.

The following table reflects the hazards that we believe can be expected, or are at least possible, in the central Vermont area. We have considered factors such as frequency of occurrence, warning time and potential community impact to rank each and determine which hazards pose the greatest threats to life

and property in Braintree.¹ The worst threats (bolded in the table, below) are then followed-up with discussion and mitigation strategies throughout the rest of this Plan.² It should be noted that hazards assigned with the same “Hazard Score” are not in order and their placement in the table should not be assumed to reflect their potential to create hazards for the town.

¹ The ranking methodology used in this Plan (see Appendix A) is closely modeled on that which is used by the Vermont Division of Emergency Management & Homeland Security (VDEMHS). The only changes made were intended to reflect the more limited geographical scope of this analysis, which is focused on a small, rural town rather than the entire State of Vermont (which is the focus of VDEMHS).

² It’s important to note that those hazards which were not found to pose the greatest threats may still occur in Braintree’s future; however, they are not the focus of this Plan.

Hazard	Frequency of Occurrence	Warning Time	Potential Impact	Hazard Score
Flash Flood/Flood/Fluvial Erosion	Highly Likely	None-Minimal	Major	12
Wildfire	Highly Likely	None-Minimal	Major	12
Severe Weather (Thunderstorm, Lightning, High Winds, Hail, and Flooding) *Note: We have defined 'Severe Weather' to include two or more of the above listed hazards.	Highly Likely	3-6 Hours	Major	11
Structure Fire	Likely/Highly Likely	None-Minimal	Minor/Moderate	11
Hazardous Material Spill	Likely	None-Minimal	Major	11
Hurricanes/Tropical Storms	Highly Likely	12+ Hours	Major	9
Tornado	Unlikely	None-Minimal	Major	9
Lightning	Likely	None-Minimal	Minor	9
Hail Storm	Likely	None-Minimal	Minor	9
High Wind	Highly Likely	3-6 Hours	Minor	9
Extreme Cold/Snow/Ice Storm	Highly Likely	12+ hours	Moderate	8
Drought	Likely	12+ Hours	Major	8
Water Supply Contamination	Likely	3-6 Hours	Minor	8
Earthquake	Likely	None-Minimal	Negligible	8
Ice Jams	Occasionally	3-6 Hours	Moderate	8
Landslides/Mudslides	Occasionally	None-Minimal	Minor	8
Avalanche	Unlikely	None-Minimal	Moderate	8
Extreme Heat	Likely	12+ Hours	Negligible	5
Invasive Species/Infestation	Occasionally	12+ Hours	Negligible	4
Dam Failure (no dams in the Town of Braintree)	N/A	N/A	N/A	N/A
Tsunami (Vermont is landlocked.)	N/A	N/A	N/A	N/A
Volcano (Vermont has no active volcanoes.)	N/A	N/A	N/A	N/A

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

- Flash Flood/Flood/Fluvial Erosion
- Wildfire
- Severe Weather
- Structure Fire
- Hazardous Material Spill
- Hurricanes/Tropical Storms

Each of these “top hazards” will be discussed in the following sections. Within each section, previous occurrences of each hazard will be listed, including the County-wide FEMA Disaster Declarations (DR-#), where applicable. Hazards information was gathered from local sources (ex. town history book), the National Climatic Data Center’s (NCDC’s) Storm Events Database (1950-2012 and 2006-2012), the Spatial Hazard Events and Losses Database for the United States (SHELDUS) 1960-2012, and Special Reports produced by the National Weather Service in Burlington, Vermont. This section also includes a description of each “top hazard” and a hazard matrix that will also include the following information (please see each hazard profile for a hazard-specific matrix):

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

B. Hazard Profiles For “Top Hazards”

1. Flash Flood/Flood/Fluvial Erosion

Flooding is one of the worst threats to Braintree’s residents and infrastructure. Past instances of flooding in Braintree have included rain and/or snowmelt events that cause flooding in the major rivers’ floodplains and intense rainstorms over a small area that cause localized flash-flooding. Both kinds of events can be worsened by the build-up of ice or debris, which can contribute to the failure of important infrastructure (such as culverts, bridges, and

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

dams).

The worst flood disaster to hit the Town of Braintree, as well as the overarching region and the State of Vermont, occurred on November 3, 1927. This event was caused by nearly 10 inches of heavy rain from the remnants of a tropical storm that fell on frozen ground. Eighty-four Vermonters, including the Lieutenant Governor, were killed. The flooding in the White River valley was particularly violent, with an estimated 120,000 to 140,000 cubic feet/second (cfs) flowing out of the White River at West Hartford, Vermont. Like many towns in the region, the Town of Braintree received heavy precipitation; Riford Brook took out all eight bridges along its course and the small hamlet of Peth was essentially wiped out.

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

The Town of Braintree suffered major damage to property and infrastructure during Tropical Storm Irene, although no lives were lost. It is estimated that Tropical Storm Irene dropped 6-7 inches of rain over the Town of Braintree in a very short span of time, and 5-7 inches across the county. It is thought that the flooding that occurred as a result of the storm was close to being or was a full-fledged 500-year flood. Many of Braintree's roads and culverts were damaged by the storm, including parts of: VT Route 12A, Riford Brook Road, Thresher Road, Thayer Brook Road, Rochester Hollow Road, Bear Hill Road and West Street. The county-wide damage for Orange County totaled over \$5 million. Following the flood damage, the State of Vermont and FEMA have been coordinating on the home buy-out process across the state. There is one home buy-out in Braintree on Thayer Brook Road.

Unfortunately, flooding is very common across the region, with many events impacting the Town of Braintree specifically. Flooding is one of the worst threats to Braintree's residents and infrastructure. The following list indicates the history of occurrence with regard to this hazard in Orange County (given the small population of Braintree, town-specific data is limited); an asterisk "*" denotes the few instances in which town-specific data is available, and federal disaster numbers are listed where appropriate.

History of Occurrences:

Date	Event	Location	Extent
06/25/2013—07/11/2013 (DR 4140)	Flash flooding & flooding	County- wide	
08/28/2011* (DR 4022 VT for period of 8/26/2011 – 9/2/2011)	Severe Flash Flooding	Braintree, County- wide	5-7" of rain across region, significant damage to roads/culverts. \$2,228,085.22 in damage total for Braintree according to FEMA's Public Assistance database (captures at least 70% of total damage)
5/26/2011 – 5/27/2011	Flash &	County-	3-5+'' of rain county-wide

(DR 4001 VT)	riverine flooding	wide	
Date	Event	Location	Extent
7/21/2008 - 8/12/2008 (DR 1790 VT)	Flooding	County-wide	
7/9/2007 - 7/11/2007 (DR 1715 VT)	Flooding	County-wide	
4/15/2007 - 4/21/2007 (DR 1698 VT)	Flooding	County-wide	Snowfall in valleys 4-7" throughout the county; 13" fell in nearby Randolph
7/21/2003 - 8/18/2003 (DR 1488 VT)	Flooding	County-wide	
7/14/2000 - 7/18/2000 (DR 1336 VT)	Flooding	County-wide	
9/16/1999 - 9/21/1999 (DR 1307 VT)	Flooding	County-wide	
6/27/1998*	Flash flood	Braintree, County-wide	4-8" of rain; 75% of roads damaged in town
6/17/1998 - 7/13/1998 (DR 1228 VT)	Flooding	County-wide	
6/28/1973 - 6/30/1973	Flooding	Braintree, County-wide	8.53" reported in nearby Rochester, Vermont. Braintree-specific data could not be found.
11/2/1927 – 11/4/1927* ("The 1927 Flood")	Flash flooding	Braintree, County-wide	4-9" of rain, Riford Brook took out all 8 bridges along its course; roads severely damaged

Given its history, the Town of Braintree has become very proactive. The Floodplain Overlay District prohibits new structures in the floodplain and places restrictions on other types of activities within the floodplain. It also specifies land, area and structural requirements in the Floodplain Overlay District. The town bylaw has set a 50-foot stream buffer for structure development and a 35-foot buffer for ground disturbance, except for bridge or culvert construction or permitted bank stabilization. These buffers seek to protect the fragile riparian habitat, improve or maintain water quality and prevent soil erosion.

There are 8 residential and 2 commercial/industrial/public structures (of approximately 110 tax parcels in Braintree) in the 500-year floodplain, which would equal \$1,782,151 if all properties were damaged/destroyed in a severe flooding event. Two of these structures, including one residential, are located in the fluvial erosion hazard area. There are no critical facilities located in the floodplain. The 500-year floodplain was chosen as a basis for this analysis to demonstrate the number of Braintree properties that are or may be vulnerable to flooding. In addition, the flooding that occurred as a result of Tropical Storm Irene is considered to be greater than a 100-year flood. Therefore, in order to be more forward-looking, the damage to structures in the 500-year floodplain is documented in this plan.

Across Vermont, most child and elder care facilities are not registered with the State. Most child day care is private in-home care in Braintree, and there are no licensed facilities. There are no elder care facilities in the Town of Braintree. Finally, low income housing is not registered with the State, and

there is one mobile home park in Braintree that is registered with the state, Mobile Acres Mobile Home Park.

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

Braintree maintains an up-to-date list of culverts and culvert condition, and has engaged in culvert upgrading since the 2009 Braintree Annex was drafted. The process of upgrading culverts is currently in process. No development projects are planned in Braintree in areas that would be vulnerable to flooding. There are no repetitive loss properties in Braintree on FEMA’s NFIP list.

Hazard	Location	Vulnerability	Extent	Observed Impact	Likelihood/Probability
Flooding	VT Route 12A, Riford Brook Road, Thresher Road, Thayer Brook Road, Rochester Hollow Road, Bear Hill Road, West Street	Culverts, bridges, road infrastructure. Approximately 7 residences and 3 commercial buildings in 100 year floodplain.	Most recent, Tropical Storm Irene- 5-7” across county (6-7” in Braintree).	From TS Irene: \$2,228,085.22 for Braintree from FEMA’s Public Assistance database.	Highly likely

2. Wildfire

Wildfire may be sparked by natural or human activities. Lightning is one of two main natural causes of wildfire. However, across the United States, approximately 90 percent of wildfires are started by humans. According to FEMA, there are three types of wildfire that can consume natural landscapes and man-made structures and features: surface fire, ground fire and crown fire. Surface fires are slow moving across the forest floor, and, as a result, kill and damage trees. Ground fires are usually caused by lightning strikes, and burn on or below the forest floor. Crown fires, so called for their location in the crown of trees, effortlessly spread through tree tops, often aided by wind.

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

The Vermont landscape is especially vulnerable to wildfire during the period of time in early spring when all the snow has melted, vegetation has not begun to develop leaves, and the land and vegetation are very dry and/or dead. The Town of Braintree does not include any state or federally- owned forest land; all forested land is held privately. The majority of Braintree (84% of the Town’s land area) is covered by forest.

The following occurrences were reported by the Committee. Both wildfires that have occurred in the last few years are thought to have been caused by people who built bonfires during a time when the landscape is very vulnerable to wildfire. Their reports were supported with research of news stories, where possible (indicated with an asterisk*).

History of Occurrences:

Date	Event	Location	Extent
05/04/2013	Wildfire	Route 12A, West Braintree	2-3 acres scorched
04/28/2013	Wildfire	2.5 miles up Braintree Mountain Road (nearby Braintree/Granville town line)	Approximately 5 acres
07/28/2007*	Wildfire	Several miles up Braintree Mountain Road	Approximately 10-15 acres

Dry hydrant sites have increased, from 1 to 3 since the 2009 Hazard Mitigation Plan, and there are 10 additional sites being considered for future dry hydrant development. The two additional dry hydrants are located on Thresher Road and Allen Bent Road. However, forest areas exist where ground-based firefighting efforts would be very difficult, due to their remoteness. This creates the potential for wildfire to impact private land and property and any logging operations occurring at the time of the wildfire. A wildfire would likely impact or result in the damage of wildlife habitat and recreational lands used for hunting, hiking, mountain biking, and ATV and snowmobiling trails (maintained by VAST, Vermont Association of Snow Travelers).

The Town of Braintree is 84% forested. Generally, Braintree Hill and East Braintree are vulnerable to wildfire. Of special concern is the large amount of dead trees left over from the January 1998 ice storm that devastated and felled millions of trees over much of northern New England, northern New York and Canada. This unconsumed fuel could create “the perfect storm” for a very destructive wildfire in the Town.

Hazard	Location	Vulnerability	Extent	Observed Impact	Likelihood/Probability
Wildfire	Areas surrounding Braintree Mountain Road, Braintree Hill, and East Braintree.	Private property, town buildings, utility infrastructure	Up to this point, the extent of damage has been minimal but all that is needed are the right conditions to experience a more damaging wildfire, especially because 84% of the Town is forested.	Unknown— data gap.	Likely/Highly likely

3. Severe Weather (Thunderstorm, Lightning, High Winds, Hail, Flooding)

More common than hurricanes or tropical storms are severe thunderstorms (usually in the summer), which can cause flooding as noted above, and are associated with lightning, high winds, hail and tornadoes. Hailstorms have occurred in Vermont, usually during the summer months. While local in nature, these storms are especially significant to area farmers, who can lose entire fields of crops in a single hailstorm. Large hail is also capable of property damage. 382 hail events were recorded between 1950 and 2008 in the

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

state, making hail a regular annual occurrence in at least some part of the state. Most of these events had hail measuring .75 inches, but many had hail at least 1.5 inches in size. The largest hail during the period was 3-inch hail that fell in Chittenden County in 1968 (NCDC). Tennis ball-sized hail was reported in the town of Chittenden during a storm in the summer of 2001. Thunderstorms can generate high winds, such as hit the region on July 6, 1999, downing hundreds of large trees in a few minutes.

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

The following list indicates the history of occurrence with regard to this hazard in Orange County (given that small population of Braintree, town-specific data is limited); an asterisk “*” denotes the few instances in which town-specific data is available, and federal disaster numbers are listed when appropriate. In an attempt to capture the individual hazards that may arise, and the different circumstances caused by the hazards in concert, the separate hazards are documented in the table below.

History of Occurrences:

Severe Weather Date	Event					Location	Extent
	Thunderstorm/ severe storm	Flooding	Hail	High Winds	Lightning		
06/25/2013—07/11/2013 (DR 4140)	✓	✓				County-wide	
5/26/2011 - 5/27/2011 (DR 4001 VT)		✓				County-wide	

Severe Weather Date	Event					Location	Extent
	Thunderstorm/ severe storm	Flooding	Hail	High Winds	Lightning		
07/21/2010*			✓			Braintree Hill	Quarter-sized hail
7/10/2010*			✓			Braintree, County-wide	.5-1" hail
7/21/2008 - 8/12/2008 (DR 1790 VT)		✓				County-wide	
7/9/2007 - 7/11/2007* (DR 1715 VT)		✓	✓	✓		Braintree, County wide	Downed trees/wind damage
4/15/2007 – 4/21/2007 (DR 1698 VT)		✓				County-wide	
7/21/2003 – 8/18/2003 (DR 1488 VT)		✓				County-wide	
6/29/2003*					✓	Braintree, County-wide	Numerous lightning strikes, a few tree fires resulted
7/4/2002*	✓			✓		Braintree, County-wide	Downed trees, wind damage
7/10/2001*	✓			✓		Braintree, County-wide	Multiple downed trees
7/14/2000 – 7/18/2000 (DR 1336)	✓	✓				County-wide, especially west portion	Locally heavy rain
6/17/1998		✓				County-wide	Flash flooding
1/19/1996 – 2/2/1996 (DR 1101 VT)		✓				County wide	
6/27/1994*	✓		✓	✓		East Braintree, Braintree	Numerous downed, snapped, uprooted trees. Up to golf-ball sized hail in nearby Randolph.
8/6/1989	✓			✓		County-wide	
6/6/1984 – 6/8/1984 (DR 712 VT)		✓				County-wide	
8/5/1976 (DR 518 VT)		✓		✓		County-wide	
7/6/1973 (DR 397 VT)		✓				County-wide	Severe storms; landslides

The main hazard caused by severe weather throughout the Town is flooding. Prior to the flooding from Tropical Storm Irene, the spring of 2011 was particularly wet, and a pre-Memorial Day storm caused widespread flooding throughout Orange County. The road and infrastructure damaged during this flooding event was located on: VT Route 12A, Riford Brook Road, Thresher Road, Thayer Brook Road, Bear Hill Road and Rochester Hollow Road.

The Town maintains an up-to-date culvert inventory and its work to upgrade culverts remains in process. A number of the steel culverts have been replaced with plastic culverts.

Hazard	Location	Vulnerability	Extent	Observed Impact	Likelihood/Probability
Severe Weather	Town-wide for wind, hail, high winds, lightning and thunderstorm impacts; for flooding: VT Route 12A, Riford Brook Road, Thresher Road, Thayer Brook Road, Bear Hill Road and Rochester Hollow Road	Town and private buildings, and utilities; culverts, bridges, road infrastructure	Most recent, Tropical Storm Irene- 5-7" across county (6-7" in Braintree).	From TS Irene: \$2,228,085.22 for Braintree from FEMA's Public Assistance database.	Highly likely

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

4. Structural Fire

Vermont has one of the highest per capita death rates from fire in the nation. This is in fact the deadliest form of disaster throughout the state. In 2010, there were 1,956 reported structural fires in the state, which included 5 fatalities and over \$18 million dollars in damage. Although there have been requirements for smoke detectors in rental housing for over 20 years, and requirements for smoke detectors in new single-family dwellings since 1994, there was only one building involved in the fatal fires in 2000 that had evidence of working smoke alarms.

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

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

Braintree does not have a main village center like many of the towns in the region do so it cannot suffer a downtown fire, though it does have two small and localized village centers in West Braintree and East Braintree that are more densely developed than the rest of the town. A large mobile home park located in just off Vermont Route 12A in Braintree, Mobile Acres, houses more people than each of Braintree's small villages. A structural fire in either one of these small villages or Mobile Acres has the potential to spread to other structures located nearby in the right conditions, such as a strong wind. This is especially true of Mobile Acres, as there are approximately 100 mobile homes located on the site that they are located very close together, increasing the risk of a structural fire spreading to adjacent structures. A review of the fires listed in the "History of Occurrences" chart below demonstrates the

potential for structures located in the very rural Town of Braintree to be completely or severely destroyed by fire.

The following occurrences were reported by the Committee or obtained from local sources. Entries marked with an asterisk (*) in this section have been taken from a book written by Katharine F. DuClos in 1976, The History of Braintree, Vermont: Volume II 1883-1975. It is reasonable to assume that more structural fires have occurred in the period of time between the entries listed below.

History of Occurrences:

Date	Event	Location	Extent
11/22/2012	Small fire in mobile home	VT Route 12A	Small burn hole in back of structure, but significant smoke damage
Fall 2012	Historic House fire	VT Route 12, south of East Braintree	Completely destroyed
10/31/1971*	150-ton haystack fire, located near cable TV tower (could have set tower on fire)	Braintree Hill	Hay destroyed
1/1/1953*	Store and Post Office fire	West Braintree	Destroyed, then rebuilt
1/1951*	Peth Schoolhouse fire	Peth (an original village of Braintree)	Badly damaged
1947*	Two house fires	West Braintree Village	Completely destroyed
10/1930*	Store and store building fire	West Braintree	Destroyed

Poor access to fires, limited water supply for firefighting, and distances to homes from the Fire Stations in Randolph are some of the challenges that leave Braintree vulnerable to the impacts of structure fires. Braintree has installed 2 additional dry hydrants on Thresher Road and Allen Bent Road from their previous single dry hydrant, and is actively searching for and pursuing additional dry hydrants around the town. Ten additional sites are being considered for future dry hydrant development.

Hazard	Location	Vulnerability	Extent	Observed Impact	Likelihood/Probability
Structure Fire	Town-wide. Increased risk in Braintree’s small villages, and especially in Mobile Acres.	Town and privately owned structures	Depends on fire location and conditions.	Unknown/data gap--depends on structure and extent.	Likely

5. Hazardous Materials Spill

Based on available VT Tier II data, there are 2 sites in town that have sufficient types and/or quantities of hazardous materials that require reporting. However, the New England Central Railroad runs through Braintree, usually daily, right along Route 12. The railroad cuts through the middle part of the Braintree for roughly 7 miles,

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

entering the town from Granville in the northwest and exiting Braintree to Randolph in the southeast corner of the town. This leaves a large corridor in the town vulnerable to hazardous material spills. At any given time, there can be hazardous materials aboard a train. West Braintree village is located on Vermont Route 12A and sees a small amount of truck traffic, and East Braintree village is located on VT RT 12 and sees a moderate amount of truck traffic by Vermont standards. Vermont Route 12A closely follows the railroad tracks, which leaves a large corridor in the town vulnerable to hazardous material spills.

Within 1,000 feet of the railroad tracks and Routes 12 and 12A, there are 256 residences and 13 commercial, industrial or public buildings. In the event that 5% of these structures were involved in a HAZMAT incident, the estimated damage would be \$2,107,310. It should be noted that the State of Vermont currently has one fully trained HAZMAT response team, with vehicles located in Essex Junction, Brandon, and Windsor. The HAZMAT crew chief is available within minutes of a call for the team but on-scene response would be a matter of hours. In the event of a serious accident in town, there would be little time for evacuation and response would be difficult.

The following occurrences were reported by the Committee, to the best of their ability. Their reports were supported with research of new stories, where possible (indicated with an asterisk*). Information marked with a double asterisk “**” indicates that the data was retrieved from the Vermont Department of Environmental Conservation’s Spill List.

History of Occurrences:

Date	Event	Location	Extent
Late fall/early winter 2011	Fuel oil truck drove/lost control and went into a ditch	Bent Hill Road	Some fuel oil leaked into ditch
8/9/2008*	New England Central Railroad train derailment	South of VT 12A crossing	Last rail car dragged 4 miles, damaging rails (tore up a few miles of rail ties) and spilled limestone along rail bed. Train service suspended a few days for repairs.
6/1/1994**	Kerosene spill	Mobile Acres Park	250 gallons spilled, spill cleaned up and project closed.

The fuel storage tank at the Town Garage is unprotected and could be damaged in the event of a vehicular collision. A 100-unit trailer park in town has only one access route, over railroad tracks at a hard turn, with limited visibility. The major concern, then, is for a HAZMAT spill that would prevent evacuation of the trailer park. Tuthill Doane, Braintree’s Emergency Coordinator/Director has made several earnest attempts to build an additional access point to the trailer park. For a number of reasons, these attempts have been unsuccessful.

Braintree has drafted a Railroad Emergency Pre-Plan, which lists the road crossings and their mile mark. In the event of a hazardous material spill on the railroad tracks, this information could help responders and the Town of Braintree react more quickly.

Hazard	Location	Vulnerability	Extent	Estimated/Potential Impact	Likelihood/Probability
Hazardous Materials Spill	VT 12, VT 12A, areas adjacent to rail beds.	Road and rail infrastructure, nearby structures (ex. Town Garage if fuel tank struck), 100 unit trailer park/130 unit campground.	Initially, local impacts only; but depending on material spilled, extent of damage may spread (ex. into groundwater)	Within 1,000 feet of the railroad tracks and Routes 12 and 12A, there are 256 residences and 13 commercial, industrial or public buildings. In the event that 5% of these structures were involved in a HAZMAT incident, the estimated damage would be \$2,107,310.	Likely/Highly likely

6. Hurricane/Tropical Storm

Hurricanes (storms with sustained winds greater than 74 mph) rarely reach as far inland as Vermont; more often, they have weakened to tropical storms. In either case, the high winds, heavy rains, and large affected areas from hurricane or tropical storms can make these rare events major disasters. The most infamous example of an actual hurricane hitting the state was the disastrous “Long Island Express” Hurricane of 1938. On September 21, 1938 a very fast moving hurricane hit Vermont in the early evening, but was moving so fast that wind damage was more severe than damage from rain in places. However, there was severe flooding, as over 4 inches of rain accompanied the storm and followed upon the heels of preceding storms that had saturated the ground and raised river levels. Buildings were lost, power lines downed, and millions of trees were felled. Much more recently, Tropical Storm Floyd in September 1999 caused flooding and wind damage in parts of Vermont, as well as one fatality, and resulted in a federal disaster declaration.

Another flood that devastated Vermont, Orange County and Braintree was the result of Tropical Storm Irene, which occurred on August 28, 2011. Record flooding was reported across the state and was responsible for several deaths, and millions of dollars of home, road and infrastructure damage. Due to the strong winds, 50,000 were without power initially, and many did not have power restored for over a week. Despite the damage wrought, the flooding caused by Tropical Storm Irene is considered to be the second greatest natural disaster in 20th and 21st century Vermont, second only to the Flood of 1927.

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

History of Occurrences:

Date	Event	Location	Extent
08/28/2011* (DR 4022 VT for period of 8/26/2011 – 9/2/2011) (Tropical Storm Irene)	Severe Flash Flooding	Braintree, County-wide	5-7” of rain across region; significant damage to roads/bridges.
9/16/1999 – 9/21/1999 (DR 1307 VT) (Tropical Storm Floyd)	High winds, flooding	County and state-wide	3-6” statewide, with higher totals reported locally. Widespread downed trees/power outages due to wind.
9/21/1938 (“The Great New England Hurricane”)	High winds	State-wide	Hit Vermont as a Category 1 storm. High winds severely damaged trees, buildings, power lines.

There is an erosion hazard along Riford Brook that may wash out Riford Brook Road and/or Route 12A where it meets Riford Brook, and the conditions are not improving. There was a washout in 1998 in this area, but the repair work conducted only covered a portion of the damaged area. Also, a 100-unit mobile home park and 130-unit campground in town is built on a bank that may suffer serious erosion effects during a 500-year flood hazard event. Additional work to reinforce riverbanks is necessary, but the town believes bank stabilization on state roads is the responsibility of the state.

In the wake of Tropical Storm Irene, Braintree formed an Irene Disaster Committee, which created a report assessing the Town’s emergency response during and following the storm. It outlined the mechanisms that failed, considered actions to be taken to improve the Town’s emergency response, and proposed zones to be designated, with a point person to coordinate efforts in each zone. The emergency management zoning is still in the planning stages.

Hazard	Location	Vulnerability	Extent	Observed Impact	Likelihood/Probability
Hurricane/ Tropical Storm	Riford Brook Road, VT Route 12, VT Route 12A, Thayer Brook Road, Thresher Road, Bear Hill Road and Rochester Hollow Road	Culverts, bridges, road infrastructure, structures in floodplain	TS Irene: 5-7” of rain across region; significant damage to roads/bridges	TS Irene damage in Orange Co.: over \$5 million in property damage.	Likely

VI. Mitigation

A. Excerpted Town Plan Goals & Objectives Supporting Local Hazard Mitigation

- To protect the rural character of Braintree in order to maintain quality of life for its citizens. (General Planning Goals, p. 8)
- To ensure that the rate of growth does not exceed the ability of Braintree to provide the community with the necessary resources, facilities and services. (General Planning Goals, p. 8)
- To enhance and maintain use of flood hazard areas as open space, greenways, non-commercial recreation and/or agricultural land. (Floodplains, p. 62)
- To protect the citizens of Braintree by using good planning practices within designated Flood Hazard Areas and Fluvial Erosion Hazard Areas. (Future Land Use: Flood Hazard Area, p. 76)

The Braintree Town Plan was recently updated and adopted on 8/25/2012, and has a 5 year lifespan.

B. Hazard Mitigation Strategies: Programs, Projects & Activities

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

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

With each mitigation strategy, general details about the following are provided: local leadership, possible resources, implementation tools, and prioritization. The prioritization category is based upon the economic impact of the action, Braintree's need to address the issue, the cost of implementing the strategy, and the availability of potential funding. The cost of the strategy was evaluated in relation to its benefit as outlined in the STAPLEE guidelines.

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

The Town of Braintree understands that, in order to apply for FEMA funding for mitigation projects, a project must meet more formal FEMA benefit cost criteria. The Town must have a FEMA-approved Hazard Mitigation Plan as well.

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

Hazards Mitigated	Mitigation Action	Local Leadership	Prioritization	Possible Resources	Time Frame
All hazards	<i>Ensure that Basic Emergency Operations Plan (BEOP) is up-to-date.</i>	Selectboard	High	With TRORC assistance	Yearly
	<i>Determine location and seek funding to install (solar-powered?) repeater in the Town of Braintree.</i>	Selectboard	Medium-High	Grant funding from Homeland Security	1-3 years
	<i>Formally delineate radio zones and seek funding for radio equipment.</i>	Emergency Response Committee and Emergency Management Director	High	Grant funding, local resources	1-2 years
Hazardous Material Spill	<i>Maintain Railroad Emergency Pre-Plan and ensure that it is kept up-to-date.</i>	Emergency Management Director	Medium-High	Local resources	Yearly
Wildfire, Structure Fire	<i>Develop additional dry hydrant sites in rural locations, including in East and West Braintree.</i>	Braintree Rep to Randolph Fire Advisory Committee	Medium	Local resources, George Aiken Resource Conservation & Development grants	3-4 years
Wildfire	<i>Assess and map community’s overall vulnerability to wildfire. Determine means of accessing areas vulnerable to wildfire.</i>	Planning Commission	Medium	Local resources, Vermont Rural Fire Protection Task Force	2-4 years

Hazards Mitigated	Mitigation Action	Local Leadership	Prioritization	Possible Resources	Time Frame
Wildfire, Flooding	<i>Begin initiative to clean up debris along rivers left over from flooding.</i>	Selectboard, Road Foreman	High	Local resources	1-2 years
Flood; Severe Weather; Hurricane/ Tropical Storm	<i>Maintain with neighboring communities mutual aid agreements for road crews.</i>	Selectboard, Road Foreman	Low-Medium	Local resources	Yearly /on-going
Hazardous Material Spill	<i>Identify/develop additional access routes to Mobile Acres, a 100 unit mobile home park and campground.</i>	Selectboard, Emergency Management Director	High	Local resources	1-3 years
Flood; Severe Weather; Hurricane/ Tropical Storm <i>*Note: Please see Appendix C for additional flood mitigation projects.</i>	<i>Upgrade bridge on Bent Hill Road (undersized, narrow and has safety issues).</i>	Selectboard, Road Foreman	High	Local resources, Better Back Roads grant program, Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation (Competitive) grant program (PDM-C)	1-3 years
	<i>Upgrade culvert on Duclos Road.</i>	Selectboard, Road Foreman	High	Local resources, Better Back Roads grant program, Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation (Competitive) grant program (PDM-C)	1-3 years
	<i>Upgrade the four multiplate culverts on Riford Brook Road.</i>	Selectboard, Road Foreman	High	Local resources, Better Back Roads grant program, Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation (Competitive) grant program (PDM-C)	1-3 years
	<i>Upgrade Bridges 17 and 18 on Thayer Brook Road (close together and washed</i>	Selectboard, Road Foreman	High	Local resources, Better Back Roads grant program, Hazard Mitigation Grant	1-3 years

	<i>out during Tropical Storm Irene).</i>			Program (HMGP), Pre-Disaster Mitigation (Competitive) grant program (PDM-C)	
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Certificate of Adoption

The Town of Braintree
Select Board
A Resolution Adopting the Local Hazard Mitigation Plan
April 15, 201~~4~~

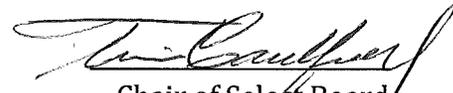
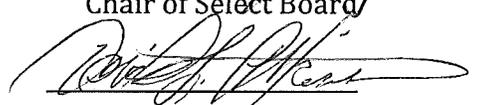
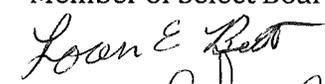
WHEREAS, the Town of Braintree has worked with the Two Rivers-Ottauquechee Regional Commission to identify hazards, analyze past and potential future losses due to natural and manmade-caused disasters, and identify strategies for mitigating future losses; and

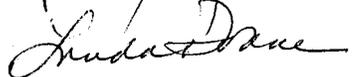
WHEREAS, the Braintree Local Hazard Mitigation Plan contains several potential projects to mitigate damage from disasters that could occur in the Town of Braintree; and

WHEREAS, a duly-noticed public meeting was held by the Town of Braintree Select Board on *April 15*, 201~~4~~ to formally adopt the Braintree Local Hazard Mitigation Plan;

NOW, THEREFORE BE IT RESOLVED that the Braintree Select Board adopts the Braintree Local Hazard Mitigation Plan Update.

ATTEST


Chair of Select Board

Member of Select Board




Appendices

Appendix A: Hazard Ranking Methodology

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

Appendix B: Critical Stream Crossings

Critical crossings group one includes stream crossing structures on town highways that cross third order streams or larger. Headwater streams generally include first through third order. Third order was included as these headwater streams will have larger drainage areas and may have larger structures that are more difficult to replace and have a larger impact on the road network. Most of these are bridges.

Critical crossings group one

STRUCT_NUM	STRUCTYPE	STRC_LBL	RDFLNAME
400902002009021	TS	B20	TANNENBURG RD
400902000509021	TS	B5	THRESHER RD
400902000709021	TS	B7	WEST ST
400902000909021	TS	B9	THRESHER RD
400902001509021	TS	B15	RIFORD BROOK RD

400902001709021	TS	B17	THAYER BROOK RD
400902001809021	TS	B18	THAYER BROOK RD
400902002309021	TS	B23	RIFORD BROOK RD
400902002709021	TS	B27	CONNECTICUT CORNERS RD
400902002909021	TS	B29	LABOUNTY RD
400902003009021	TS	B30	FARNSWORTH BROOK RD
400902003609021	TS	B36	BENT HILL RD
400902003809021	TS	B38	BEAR HILL RD
400902004009021	TS	B40	RIFORD BROOK RD
100902001309021	TL	B13	LEMERY RD
100902001609021	TL	B16	THRESHER RD
100902001209021	TL	B12	MENARD RD

Critical crossings group two includes significantly undersized structures, usually culverts, were identified from the ANR-DEC stream geomorphic assessment survey with openness ratios less than 50%. This measure refers to when structure’s width is less than half of the stream bankfull width. Several of these structures may have been damaged during TS Irene or other events and may have been replaced. The town, at some point, should look at these sites and assess their status and need for repair/upgrades.

Connecticut Corners Road, Thresher Road, Riford Brook Road and Thayer Brook Roads as well as B23 on Riford Brook Road were heavily damaged during TS Irene and all infrastructure along these roads should be assessed.

RDFLNAME	CATEGORY	X_COORD	Y_COORD	CUL_WIDTH	CUL_HEIGHT	CUL_LEN	OpennessR	ChannelWid
CONNECTICUT CORNERS RD	C	-72.7274	44.0239	4	4	34	0.470588	10
BRAINTREE HILL RD	C	-72.6874	43.9459	3	3	38	0.230263	7
DUCLOS RD	C	-72.7044	43.9584	3	3	35	0.257143	10
RIFORD BROOK RD	C	-72.7503	43.9435	4	4	57	0.280702	11
BOWEN HILL RD	C	-72.6863	43.9421	4	4	36	0.444444	8
BRAINTREE HILL RD	C	-72.6859	43.9421	4	4	37	0.45045	8
RIFORD BROOK RD	C	-72.7285	43.9443	4	4	35	0.462698	11
BRAINSTORM RD	C	-72.6643	43.9795	4	4	58	0.275383	10

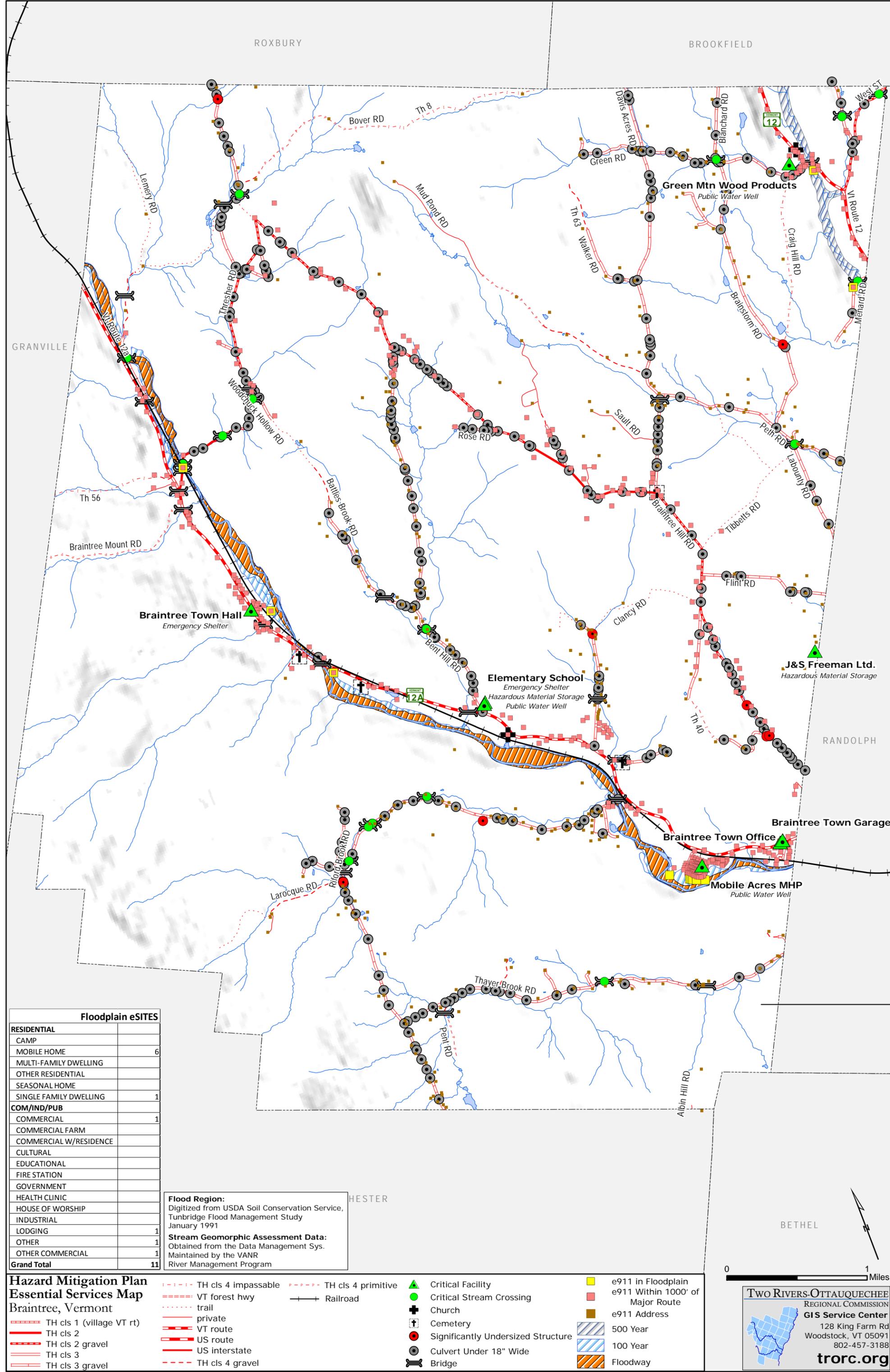
Appendix C: Large Structures List of Replacement in Order of Need

The following table represents the priority of structures in Braintree which need replacement, and the reasons why replacement is necessary. This information was obtained through the efforts of the Town of Braintree’s Road Foreman and a Vermont Agency of Natural Resources River Engineer to physically access the structures and determine their priority for replacement.

BRAINTREES LARGE STRUCTURES LIST OF REPLACEMENT IN ORDER OF NEED					
SUBJECT TO CHANGE AS NEEDED					
400902003609021	TS	B36	BENT HILL RD		WITHSTANDING HIGH WATER BUT IS UNDRSIZED AND IS NARROW /NEEDS SUBSTANTIAL RAILING INSTALLED SAFETY ISSUE
43.95191	-72.707		DUCLOS RD		OVERWASH IN HIGH WATER CRITICAL UNDERSIZED A 9 FOOT AND A 4 FOOT UPSTREAM OF THIS
400902004009021	TS	B40	RIFORD BROOK RD		THERE IS 4 NOT 3 MULTIPLATE CULVERTS IN A SHORT DISTANCE THAT ARE ALL UNDERSIZED AND KEEP WASHING OUT
400902002309021	TS	B23	RIFORD BROOK RD		
400902001509021	TS	B15	RIFORD BROOK RD		
43.9443	-72.7285		RIFORD BROOK RD		REPLACED 3 FOOT CULVERT WITH 5 FOOT IN 2012 MAY NEED HYD STUDY
43.94346	-72.7503		RIFORD BROOK RD		REPLACED 2012 WITH HYD STUDY
400902001709021	TS	B17	THAYER BROOK RD	THESE TWO SHOULD BE REPLACED AT SAME TIME	THESE TWO ARE CLOSE TOGETHER AND WASHED OUT DURING IRENE
400902001809021	TS	B18	THAYER BROOK RD		
43.94212	-72.6863		BOWEN HILL RD	ALL FOUR SHOULD BE REPLACED AT SAME TIME IF POSSIBLE	CULVERT UNDERSIZED SHOULD BE REPLACED SAME TIME AS BRAINTREE HILL ONES IN SAME AREA TWO CULVERTS AT THIS LOCATION THAT ARE UNDERSIZED AND SHOULD BE REPLACED SAME AS BOWEN CULVERT UNDERSIZED OVER WASHED JULY 2013 FLOOD
43.94208	-72.6859		BRAINTREE HILL RD		
43.94585	-72.6874		BRAINTREE HILL RD		
43.97945	-72.6643		BRAINSTORM RD		CULVERT HAS NOT BOTHERED IN HIGH WATER YET
400902002909021	TS	B29	LABOUNTY RD		THESE TWO ARE UNDERSIZED
400902003009021	TS	B30	FARNSWORTH BROOK RD		BUT HAVE NOT BOTHERED YET
400902002009021	TS	B20	TANNENBURG RD		BRIDGE STAYED DURING IRENE 160 FOOT ROAD TO ONE HOUSE
43.95839	-72.7044		DUCLOS RD		4 FOOT PLASTIC DID NOT WASH OUT OR OVER DURING IRENE
400902000709021	TS	B7	WEST ST		REPLACED IN 2013 WITH HYD STUDY
100902001309021	TL	B13	LEMERY RD		REDECKED IN 2013 WITHSTOOD IRENE AND JULY 2013 FLOODS BUT IS UNDERSIZED
44.02385	-72.7274		CONNECTICUT CORNERS RD		REPLACED 2011 AFTER IRENE WITH HYD STUDY
43.95977	-72.7056		DUCLOS RD		REPLACED AFTER IRENE WITH HYD STUDY

Attachments

Attachment A: Map of Braintree



Floodplain eSITES	
RESIDENTIAL	
CAMP	
MOBILE HOME	6
MULTI-FAMILY DWELLING	
OTHER RESIDENTIAL	
SEASONAL HOME	
SINGLE FAMILY DWELLING	1
COM/IND/PUB	
COMMERCIAL	1
COMMERCIAL FARM	
COMMERCIAL W/RESIDENCE	
CULTURAL	
EDUCATIONAL	
FIRE STATION	
GOVERNMENT	
HEALTH CLINIC	
HOUSE OF WORSHIP	
INDUSTRIAL	
LODGING	1
OTHER	1
OTHER COMMERCIAL	1
Grand Total	11

Flood Region:
Digitized from USDA Soil Conservation Service, Tunbridge Flood Management Study January 1991

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

**Hazard Mitigation Plan
Essential Services Map
Braintree, Vermont**

--- TH cls 1 (village VT rt)
--- TH cls 2
--- TH cls 2 gravel
--- TH cls 3
--- TH cls 3 gravel

--- TH cls 4 impassable
--- VT forest hwy
--- trail
--- private
--- VT route
--- US route
--- US interstate
--- TH cls 4 gravel

--- TH cls 4 primitive
--- Railroad

▲ Critical Facility
● Critical Stream Crossing
+ Church
† Cemetery
● Significantly Undersized Structure
● Culvert Under 18" Wide
= Bridge

■ e911 in Floodplain
■ e911 Within 1000' of Major Route
■ e911 Address
▨ 500 Year
▨ 100 Year
▨ Floodway

0 1 Miles

TWO RIVERS-OTTAUQUECHEE
REGIONAL COMMISSION
GIS Service Center
128 King Farm Rd
Woodstock, VT 05091
802-457-3188
trorc.org