According to the National Flood Insurance Program, Worcester has 5 structures and 99 properties located within the designated 100-year floodplain. The total loss value for floodplain properties is $18,324,900 based on the median property value of the grand list. There are no recurring loss properties in Worcester. As previous events have made clear, even areas beyond the NFIP designated 100-year floodplain may be vulnerable to flood related hazards. Channel adjustments with devastating consequences have frequently been documented wherein such adjustments are linked to historical channel management activities, floodplain encroachments, adjacent land use practices and/or changes in watershed hydrology associated with conversion of land cover and drainage activities, within and beyond the NFIP floodplain. There are no future residential or commercial developments planned within floodplain areas. Flood bylaws enacted in 2010 also limit development in flood prone areas.

The Hazard Analysis Map (attached) identifies the Worcester Methodist Church, Doty Memorial School, Fire House, and other government buildings to be outside the designated flood plain, but near the river. The attached Areas of Local Concern map highlights 11 stretches of road or bridges that have experienced either flood-induced washouts and/or significant fluvial erosion.

Within the past 5 years, there have been ongoing road maintenance and repair projects to help mitigate past and help prevent future flooding in Worcester. Route 12 by the North Hancock Brook was rebuilt in summer 2010. Crushed rock for improved drainage and erosion prevention has been placed in several areas – Collar Hill, Gould Hill, Hampshire Hill and Frazier Road off West Hill. In 2007, a flooding event occurred on Brown Road which caused $88,000 worth of damages that the town spent to repair the road.

Hazard	Location	Vulnerability	Extent	Impact	Likelihood
Flooding	Route 12, Downs Road, Minister Brook Road, Brown Rd	Municipal infrastructure – bridges, culverts transportation routes along North Branch, Minister Brook, and Worcester Brook.	327 acres in flood plain, 391 acres in FEH zone	$18, 324,900-possible floodplain damages; $88,000 from 2007 event; continuous funding from general maintenance activities	Medium

B. FLASH FLOODING

History of Occurrences (within Central Vermont, town specific data not available. See above Table):

According to FEMA, floods are one of the most common hazards in the United States; this is also the case in Worcester. Flooding occurs when rapidly rising water inundates an area beyond the body of water's normal or accepted channel or basin. Floods can affect a neighborhood, a community or an entire river basin and it should be noted not all floods are alike. Some floods develop slowly over a period of days due to rain fall or snowmelt; others can develop quickly due to a sudden rain burst and are commonly referred to as flash floods.

According to the State of Vermont Hazard Mitigation Plan, updated November 2013, "recent studies have shown most flooding in Vermont occurs in upland streams and road drainage systems that fail to handle the amount of water they receive. Due to steep gradients, flooding may inundate these areas severely, but only briefly." Flash flooding in Worcester most often occurs in areas where tree roots and branches block the path of the water. These areas are located along Downs Road and Minister Brook Road where tree growth is close to the edge of the waters. The town flooding bylaw follows the NFIP minimum guidelines to limit flooding of structures nearby. In 2007, a flooding event occurred on Brown Road which caused $88,000 worth of damages.

The North Branch Corridor Plan identifies several areas in Worcester where roads/field encroach the river's floodplain. Also identified in the Plan are structures which constrict the flow of the River and Minister Brook. Minister Brook has 2 private undersized structures over it which constricts the flow of the brook. These structures are located between Route 12 and Minister Brook Rd. Several berms along the Brook also limit access to the floodplain. Similar conditions are occurring on the Worcester Brook as well. Table 33 in the North Branch Corridor Plan outlines remediation actions for each stretch of the North Branch and its tributaries. It would be advisable for Worcester to implement high priority projects to reduce future impacts of flooding and restore the overall health of the North Branch. However, implementation is dependent upon identifying viable funding sources and grant awards as well as garnering cooperation and commitment from the private landowners.

Hazard	Location	Vulnerability	Extent	Impact	Likelihood
Flash Flood	Along North Branch, Upper Minister Brook, Worcester Brook, Downs Road	Municipal infrastructure, private property transportation routes, undersized culverts and bridges	327 acres in flood plain, 391 acres in FEH zone	$88,000 - 2007 event; continuous funding from general maintenance activities	Medium

C. WILDFIRE/FOREST FIRE

C.C. Putnam State Forest is approximately 13,000 acres and covers roughly 1/3 of the western portion of Worcester and is shown as conserved land on the attached Hazard Analysis Map. This forest is located in the Worcester Range and spans across 5 adjoining towns. The protection of C.C. Putnam State Forest is essential in protecting the water quality of the region as it is located in the headwaters of the Winooski watershed.

The State of Vermont does have a Forest Management plan in place which addresses forest fire concerns. The 2010 State Forest Management Plan includes several goals regarding forest fire prevention. The Plan states that although the risk of forest fire is low in the State of Vermont, that the State still performs controlled burns on a small scale during the spring season. To help prevent local forest fires, the State works with local planning commissions to develop Community Wildlife Protection Plans. These plans help towns to identify and mitigate wildfire risk. A common mitigation measure prescribed in the plan is through controlled burns with onsite State support.

The Forest Division also runs the Town Forest Fire Warden program. This program requires towns to have appointed fire wardens. In Worcester, the Fire Warden is Steven Lang. The forest fire program focuses on prevention, fire awareness and fire fighter safety.

Access to the State lands from the town is VERY limited. In the Forest are roughly 20 private camps. To date, there have been no occurrences of forest fire; however, given the limited access to the forest itself and water resources in the forest, the ability to put out a large fire quickly and efficiently is limited. The greatest threat of a forest fire comes from human error – such as smoking and improper campfire etiquette. However, lightning is also a threat as the forest is very dense and is said to contain dense undergrowth. Although Worcester has no large or small scale developments planned in the future, encroachment on forest lands presents greater threats of forest fire. A buffer between future residential development and forest land should be maintained to reduce the threat of forest fire and also protect important watershed areas. To date there have been no wild fires within Worcester.

Hazard	Location	Vulnerability	Extent	Impact	Likelihood
Wildfire/Forest Fire	State Forest lands	Private camps	13,000 acres of State Forest	$2 million ($100,000/house x 20)	Medium

D. SCHOOL SAFETY

Worcester's elementary school children attend Doty Memorial School, located on Calais Road near the center of the Village. Constructed in 1978, the school serves approximately 80 children from Kindergarten thru 6th grade.

The boiler for the School's furnace is located on the second floor. The Town mitigation meeting highlighted the location of the School's boiler as a potential hazard, given that a leak could cause a dangerous situation. The boiler has not had any history of defects.

The School suffered a bomb threat in 1999. The threat was deemed to be a prank, but the threat to the community is genuine as the School contains the Town's highest population density.

The Doty Memorial School Emergency Evacuation Plan addresses the following threats: bomb, fire, weather related closings, and general disaster emergencies. Doty Memorial School follows the Vermont School Crisis safety guidelines.

Hazard	Location	Vulnerability	Extent	Impact	Likelihood
School Safety	Doty Memorial School	Municipal infrastructure, transportation routes.	Boiler room and adjacent rooms	$500,000	Medium

E. LOCAL AREAS OF CONCERN

The Community Meeting provided input on Local Areas of Concern (Map Attached). Eleven roads or bridges within the Town have been highlighted for their susceptibility to flood hazards. Among them are two sections of Eagle Ledge Road, Bridge # 4 on the Calais Road, Bridge #13 on the Norton Road, two sections of Vermont Route 12, washouts at two points on Minister Brook Road, the intersection of Hancock Brook Road and Hampshire Hill Road and flooding at Downs Road.

5.3 Non "Worst" Threat Hazards

A. EXTREME COLD/WINTER STORM/ICE STORM

History of Occurrences (county wide)

Snow and/or ice events occur on a regular basis. Recent significant events have included:

Date	Event	Location	Extent
12/9/2014	Winter storm	County wide	6-24" of snow, widespread power outages
3/12/2014	Winter storm	County wide	12-24" of snow
3/19/2013	Winter storm	County wide	6-14" of snow
12/26/2012	Winter storm	County wide	9-18" of snow

2/24/2012	Winter storm	County wide	3-36” of snow
11/23/2011	Winter storm	County wide	5-12” of wet snow
3/6/2011	Winter storm	County wide	12-18” of snow, 10,000 customers lost power statewide
2/23/2010	Winter Storm	County wide	20” of snow and 50,000 customers lost power statewide
2/22/2009	Winter Storm	County Wide	16” of snow, 30 mph wind gusts
2/1/2008	Winter storm	County wide	3-7” of snow and ice ¼-1/2”thick, 50 mph wind gusts
2/14/2007	Winter storm	County wide	22” of snow
2/14/2006	Winter storm	County Wide	30” of snow
1/4/2003	Winter storm	County wide	19” of snow
3/5/2001	Winter storm	County wide	15-30” of snow
12/31/2000	Winter storm	County wide	10” of snow
1/15/1998	Winter storm	County wide	10-12” snow (not a DR in Washington County)
12/29/1997	Winter storm	County wide	21” of snow
12/7/1996	Winter Storm	County wide	12” of snow
3/21/1994	Winter storm	County Wide	5-11” of snow
11/1/1993	Winter storm	County wide	15” of snow
1/3/1993	Freezing Rain	Statewide	¼-1/2” freezing rain

A winter storm is defined as a storm that generates sufficient quantities of snow, ice or sleet to result in hazardous conditions and/or property damage. Ice storms are sometimes incorrectly referred to as sleet storms. Sleet is similar to hail only smaller and can be easily identified as frozen rain drops (ice pellets) that bounce when hitting the ground or other objects. Sleet does not stick to wires or trees, but in sufficient depth, can cause hazardous driving conditions. Ice storms are the result of cold rain that freezes on contact with the surfaces coating the ground,

tress, buildings, overhead wires and other exposed objects with ice, sometimes causing extensive damage. Periods of extreme cold tend to occur with these events.

One of the major problems associated with ice storms is the loss of electrical power. Major electric utility companies have active, ongoing programs to improve system reliability and protect facilities from damage by ice, severe winds and other hazards. Typically, these programs focus on trimming trees to prevent encroachment of overhead lines, strengthening vulnerable system components, protecting equipment from lightning strikes and placing new distribution lines underground.

Other major problems include closed roads and restricted transportation.

By observing winter storm watches and warnings, adequate preparations can usually be made to lessen the impact of snow, ice and sleet, and below freezing temperature conditions on the Town of Worcester. Providing for the mass care and sheltering of residents left without heat or electricity for an extended time and mobilizing sufficient resources to clear broken tree limbs from roads, are the primary challenges facing community officials. Worcester should plan and prepare for these emergencies. That planning and preparedness effort should include the identification of mass care facilities and necessary resources such as cots, blankets, food supplies and generators, as well as debris removal equipment and services. Doty Memorial School is the town shelter. The Barre Auditorium in Barre, Vermont serves as the Regional American Red Cross Shelter for Central Vermont when activated by the State of Vermont in a declared disaster and has the ability to shelter pets.

Hazard	Location	Vulnerability	Extent	Impact	Likelihood
Winter Storm/Ice Storm	Town Wide	Utilities, trees, roads, old/under insulated structures	18+" snow in March 2011 storm, depends on severity	5-10% damages –routine emergencies	Medium

B. STRUCTURE FIRE

Although many structures in Worcester are less than 100 years old, many residents heat their homes with wood or pellet burning stoves. The remoteness and distance from fire and emergency services of many homes also increases the likelihood of a home being completely, opposed to partially, destroyed by a fire. To date, there have been no large structure fires.

Hazard	Location	Vulnerability	Extent	Impact	Probability
Structure Fires	Town Wide	Wood structures, especially older than 100 yrs, homes that use wood burning stoves for heat	Less than 1 house/year	$150, 000 per home based on median grand list value	Med

6 Mitigation

6.1 Town Plan (proposed update 2016/2017) Goals that Support Local Hazard Mitigation

- To ensure that the nature and degree of land resource uses do not have negative impacts on the quality of the land and the resources or on adjoining property values
- To ensure swift and adequate emergency and health services
- To provide a transportation infrastructure that will enable the quick, efficient and safe movement of people, goods and services

Worcester's town plan will be updated in 2016/2017. The Town in interested in adding goals which related to mitigation planning such as:

- To take actions to reduce or eliminate the long-term risk to human life, property, and the environment from natural hazards.

Specific hazard mitigation strategies related to goals of the Plan include:

- Ensure existing and future drainage systems are adequate and functioning properly.
- Preserve and prevent development in areas where natural hazard potential is high.
- Ensure that all residents and business owners are aware of the hazards that exist within Worcester and ways they can protect themselves and adequately insure their property.
- Ensure that emergency response services and critical facilities functions are not interrupted by natural hazards.
-

6.2 Proposed Hazard Mitigation Programs, Projects and Activities

Hazard mitigation programs, projects and activities that were identified for implementation at the Town mitigation planning meetings:

<u>Flooding and Flash Flooding</u>

- Replacement and upgrade of bridges and culverts on Minister Brook Road, Jim Dawson's field, and Downs Road.
- Perform high priority corridor planning projects as outlined in the North Branch Corridor Plan after careful consideration of realistic priority, funding availability, and cooperation and commitment from private landowners when applicable.
- "Harden" utility services within the Village area and to Doty School through the replacement/burying of above-ground utility services.
- Extend Fluvial Erosion Hazard zone in the next review of flooding bylaw or river corridor ordinance.

Forest Fire

- Work with State Forest, Parks and Recreation, Vermont Association of Conservation Districts and the CVRPC to develop alternative water supplies in State Forest for wildfire suppression purposes.
- Remove taller and dead trees from land surrounding camps in State Forest.

School Safety

- Continue to perform routine inspections on the boiler.
- Retrofit and strengthen boiler room to better contain an explosion.
- Participate in the DEMHS School Crisis Planning and be familiar with and access the resources available of the DEMHS School Crisis Planning website. (DEMS is the Vermont Division of Emergency Management and Homeland Security)

NFIP

- Work with elected officials, CVRPC, the State and FEMA to assess the town's understanding of and needs under the NFIP and promote educational trainings and workshops for town officials and landowners to promote the program and ensure compliance under it.

The Hazard Mitigation Activities Matrix (Attached) lists mitigation activities in regards to local leadership, possible resources, implementation tools, and prioritization. Prioritization was based upon the economic impact of the action, the Community's need to address the issue, the action's cost, and the availability of potential funding. The action's cost was evaluated in relation to its benefit as outlined in the STAPLEE guidelines.

Worcester understands that in order to apply for FEMA funding for mitigation projects that a project must meet FEMA benefit cost criteria. The Town must also have a FEMA approved Hazard Mitigation Plan that is current.

A High prioritization denotes that the action is either critical or potential funding is readily available and should have a timeframe of implementation of less than two years. A Medium prioritization is warranted where the action 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.

Attachments

E. Hazard Mitigation Strategy Matrix
F. Hazard Analysis Map
G. Transportation Risk Analysis Map (aka Vulnerability Assessment Map)

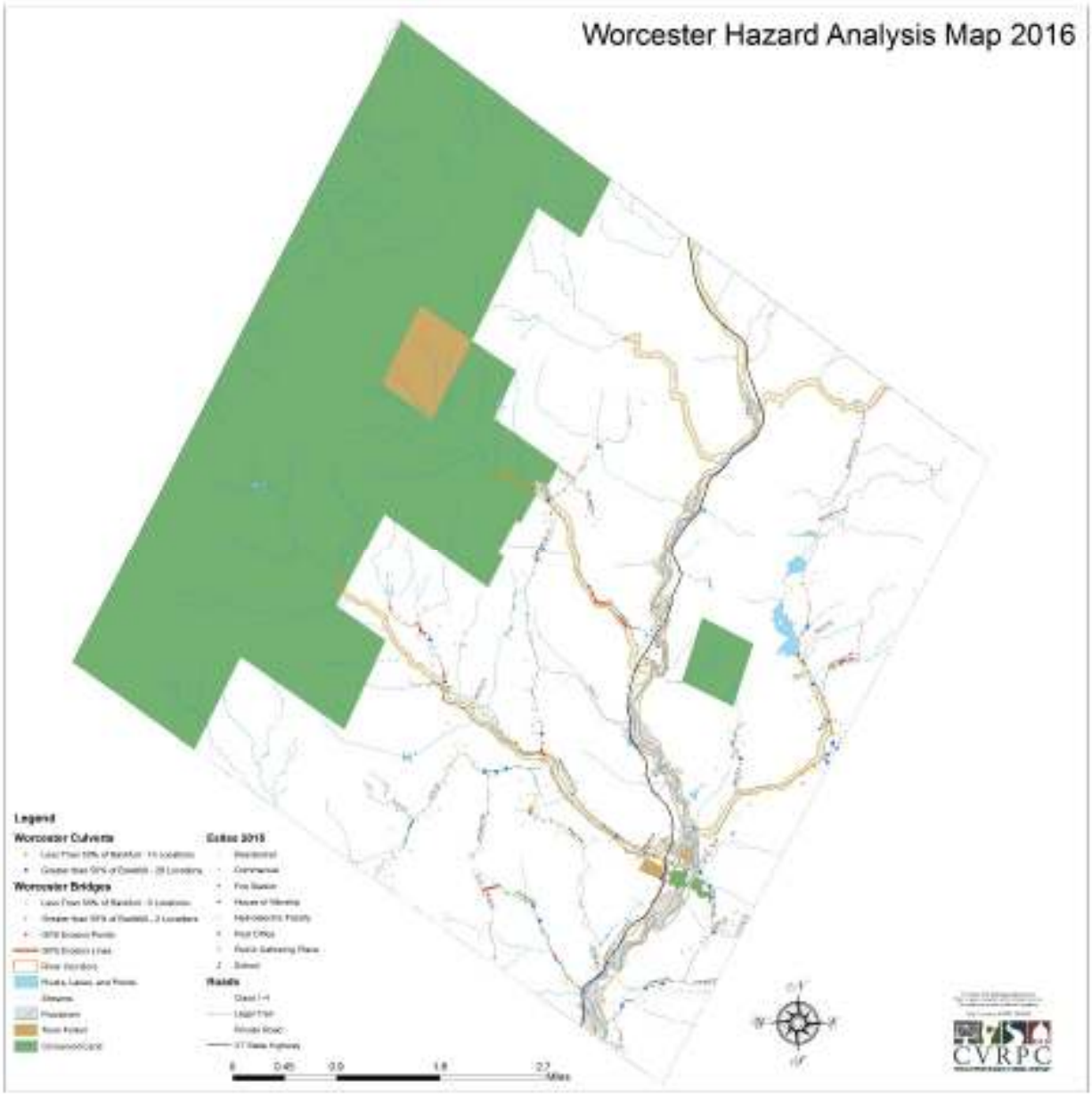
H. Certificate of Adoption

Appendix A. North Branch Corridor Projects – Table 33.

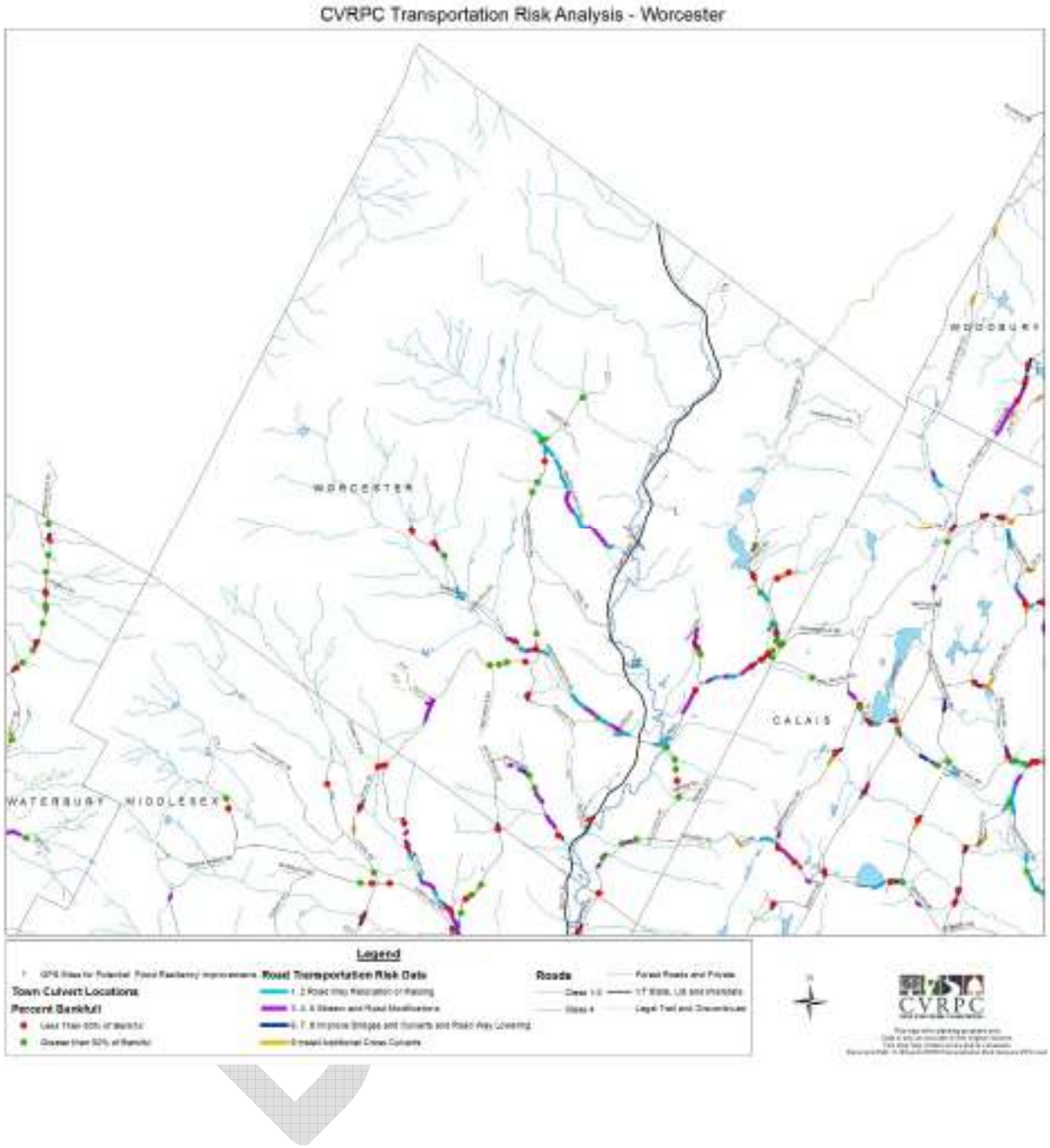
A. Hazard Mitigation Strategy Matrix

Mitigation Action	Local Leadership	Prioritization (High, Med)	Possible Resources	Time Frame
Replacement and upgrade of Minister Brook Rd, Jim Dawson's field, Downs Rd bridges and culverts	Select Board, Planning Commission, Fire Chief	High	HMPG DOD Flood Controls Projects	1-3 years
Perform high priority corridor planning projects as outlined in the North Branch Corridor Plan	Planning Commission, Conservation Commission, S B, VT RMP, NRCS, FWR, F&W	High	PDM-C HMGP	2-4 years
"Harden" utility services within the town through the replacement/burying of above-ground utility services.	Select Board	Low	EMGP	4-5 years
Extend Fluvial Erosion Hazard zone next review of flooding bylaw	Planning Commission Select Board	Med	EMGP	3-5 years
Work with State to develop alternative water supplies in State Forest for wildfire suppression purposes	Planning Commission VT ANR	Med	EMGP	2 years
Remove taller and dead trees from land surrounding camps in State Forest	VT ANR	Low	EMGP	3-5 years
Perform routine inspections on the boiler	School Board	High	Town Budget	Yearly
Retrofit and strengthen boiler room to better contain an explosion	School Board	Low	EMGP	5 years
Work with elected officials, the State and FEMA to provide education and training on the NFIP to ensure compliance and understanding of the program by the Worcester community.	Select board	Med	HMGP	1-3 years
Hampshire Hill Rd, Norton Rd, Hancock Brook Rd, Downs Rd, Ira B Rd, Eagle Ledge Rd, Harris Hill Rd, Gould Hill Rd, Ledge Rd, Minister Brook Rd, Culvert, Ditch, Stream Erosion	Select board	High	Town Budget	1-3 years

B. Hazard Analysis Map



C. Transportation Risk Analysis Map



CERTIFICATE OF ADOPTION

<<DATE>>

TOWN OF Worcester, Vermont Selectboard

A RESOLUTION ADOPTING THE Worcestser, Vermont 2017 Local Hazard Mitigation Plan

WHEREAS, the Town of Worcester has historically experienced severe damage from natural hazards and it continues to be vulnerable to the effects of the hazards profiled in the **2017 Worcester, Vermont Local Hazard Mitigation Plan,** which can result in loss of property and life, economic hardship, and threats to public health and safety; and

WHEREAS, the Town of Worcester has developed and received conditional approval from the Federal Emergency Management Agency (FEMA) for its **2017 Worcester, Vermont Local Hazard Mitigation Plan (Plan)** under the requirements of 44 CFR 201.6; and

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

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

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

RESOLVED by Town of Worcester Selectboard:

1. The **2017 Worcester, Vermont Local Hazard Mitigation Plan** is hereby adopted as an official plan of the Town of Worcester;

2. The respective officials identified in the mitigation action plan of the **Plan** are hereby directed to pursue implementation of the recommended actions assigned to them;

3. Future revisions and **Plan** maintenance required by 44 CFR 201.6 and FEMA are hereby adopted as part of this resolution for a period of five (5) years from the date of this resolution; and

4. An annual report on the process of the implementation elements of the Plan will be presented to the Selectboard by the Emergency Management Director or Coordinator.

IN WITNESS WHEREOF, the undersigned have affixed their signature and the corporate seal of the Town of Worcester this ____ day of _____ 2017.

_____
Selectboard Chair

_____
Selectboard Member

ATTEST_____Town Clerk

_____
Selectboard Member

Appendix A – North Branch Corridor Projects Table 33, Pages 1 – 19.