Town of Northfield, VT
Hazard Mitigation Plan Update - July, 2011

Prepared by The Town of Northfield and CVRPC

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1. Introduction

The impact of expected, but unpredictable natural and human-caused events can be reduced through community planning. The goal of this Local Hazard Mitigation Plan is to provide a local mitigation plan that makes the Town of Northfield more disaster resistant.

Hazard mitigation is any sustained action that reduces or eliminates long-term risk to people and property from natural and human-caused hazards and their effects. Based on the results of previous Project Impact efforts, FEMA and State agencies have come to recognize that it is less expensive to prevent disasters than to repeatedly repair damage after a disaster has struck. This Plan recognizes that communities have opportunities to identify mitigation strategies and measures during all of the other phases of emergency management – preparedness, response, and recovery. Hazards cannot be eliminated, but it is possible to determine what the hazards are, where the hazards are most severe, and identify local actions that can be taken to reduce the severity of the hazard.

Hazard mitigation strategies and measures alter the hazard by eliminating or reducing the frequency of occurrence, avert the hazard by redirecting the impact by means of a structure or land treatment, adapt to the hazard by modifying structures or standards, or avoid the hazard by preventing or limiting development.

2. Purpose

The purpose of this Local Hazard Mitigation Plan is to assist the Town of Northfield in recognizing hazards facing the region and their community and identify strategies to begin reducing risks from acknowledged hazards.

The 2011 Northfield Local Hazard Mitigation Plan is an update of the 2005 plan. The plan has been reorganized and new sections have been added regarding:

- Plan Update Process
- Plan Maintenance
- Earthquake Hazard
- Water Supply Contamination Hazard
- Updates of Local Areas of Concern and Hazard Analysis Map
- Status update of 2005 mitigation strategies
- Identification of new mitigation strategies
- Inclusion of maps from Dog River Corridor Plan

Refer to Section 4.2 for a complete list of updates.

3. Community Profile

The Town of Northfield is the third most populous community in Central Vermont. It is located in the Southwestern quadrant of Washington County, approximately 10 and 13 miles from the cities of Montpelier and Barre, respectively. Northfield contains three population centers, considerable industrial development, and Norwich University. Norwich University is the nation's oldest private military college and contains approximately 2,000 Corps of Cadets and civilian

students. The University is also home to the recently launched National Center for the Study of Counter-Terrorism and Cyber-Crime (NCatNU).

According to the 2008 US Census estimates, Northfield has a total population of 5,740 people living in 1,824 housing units. The population has decreased by 1% from the 2000 Census. Approximately 43% of Northfield's workforce is employed within the Town, while the remaining 57% work outside of the community.

The Town's major North-South thoroughfare is Vermont Route 12, which follows the course of the Dog River north of the Village. Vermont Route 12A intersects Vermont Route 12 below the Village and follows the Dog River south towards the Town of Roxbury. Further to the south Vermont Route 12 intersects Vermont Route 64, which provides connection to I-89 at Exit 5.

Housing is widely dispersed both throughout the Town and within the Village, with approximately one-third of the Town's population located within the Village. The Northfield Town Plan seeks to focus future development within the population centers of Northfield Village, Northfield Falls, and Northfield Center. New development has occurred on Fairway Drive, with the building of three new homes. The Town's commercial development is focused primarily within the Village. This pattern is reinforced by current zoning and flood hazard regulations. At the time of writing this plan, no new commercial or residential developments were planned. The Town is also currently rewriting its zoning regulations.

The Northfield Electric Department provides electricity to most of Northfield and portions of Roxbury, Berlin, and Moretown. The remaining portions of Northfield are served by the Central Vermont Public Service Corporation and the Washington Electric Cooperative. In the past 5 years, new transmission mains have been erected on the lines down to Northfield Falls, as well as on the west side of Town.

Northfield Village, Northfield Falls, and Northfield Center are served by a municipal water supply dependent upon wells adjacent to Vermont Route 12A and the Dog River and a recently completed 1,000,000 gallon reservoir on Garvey Hill. Community members outside of those three areas depend upon groundwater for their domestic water supply and industrial uses. The Municipality's wastewater treatment facility services the entire Village and Northfield Center, including Norwich University. Residents outside of the sewer service area are responsible for disposal of their wastewater through in-ground systems.

In the Town, fire coverage is provided by the volunteer Northfield Fire Department. Northfield is a member of the Capital Fire Mutual Aid System, which includes all of the Towns in Washington County. A new front line pumper was also purchased. According to the 2011 Town Report, the Department responded to 161 calls in 2010. Ambulance service is provided by the Northfield Ambulance Service. In addition to servicing the Town and Village, the Ambulance Service also responds to calls in Roxbury, Berlin and Moretown. According to the 2011 Town Report, the Northfield Ambulance Service responded to over 700 calls in 2010. Additional paid daytime staff has been added to better meet demand. The Ambulance Service is housed in the

Town Garage, which is located in the floodway of the Dog River. The Town would like to relocate this function to an area that is not in a flood hazard zone.

Police services are provided by the Northfield Police Department. The Department is staffed by a Chief of Police, 5 full-time officers, and 2 part-time officers. The Department responded to 2200 calls in 2010. In addition to the Police Department, Norwich University provides private, on-campus security services. Vermont State Police and the Washington County Sheriff's Department are relied upon to provide supplementary support. A new police department was built in 2008.

Northfield has an approved Rapid Response Plan that was adopted in 2004, and the municipal Emergency Operations Plan is presently under review for adoption. The municipality also adopted a Civil Defense Disaster Plan in 2001. The Municipality also has extensive emergency management vehicles and training. The Ambulance Service owns an all terrain vehicle with toboggan for use in off trail rescues. The Municipality also owns a mass casualty incident trailer and mobile command post, which is offered for mutual aid use. Staff in the Fire and Police Department is also trained to use the Jaws of Life.

The Municipal Plan was adopted in 2009 and includes goals, policies, and tasks in regards to environmentally sensitive areas, water resources, earth resources, future land use, wastewater treatment, transportation, and public services. The Zoning Regulations include a designation of prohibited uses in floodplain/fluvial erosion hazard zone areas and limit development on slopes greater than 25% and elevations greater than 1800 feet.

4. Planning Process and Maintenance

4.1 Planning Process

The Central Vermont Regional Planning Commission (CVRPC) coordinated the Northfield Local Hazard Mitigation Plan process. CVRPC contacted the Zoning Administrator, Michele Braun, and sent Town-Specific hazard mitigation material for review. After assessing the material, Michele and CVRPC staff held a meeting along with members of the community on April 14, 2011 at the Municipal Offices. The Northfield Hazard Mitigation Meeting focused on assessing past mitigation projects and compiling information on its current and future hazard mitigation programs, projects and activities.

Attendees included:

- Peter DeMasi, Highway Superintendent/Fire Chief
- Jim Baraw, EMS Director
- Patrick DeMasi, Utility Superintendant
- Michele Braun, Zoning Administrator
- Nancy Allard, Town Manager

- Jen Mojo, CVRPC Planner

The meeting indicated that the Town is most vulnerable to earthquakes, flash flood/flood/fluvial erosion, water supply contamination, and railroad accidents. Previously identified hazards include flooding, winter storm/ice storm, hazardous materials, and terrorism. Northfield feels winter storm/ice, hazardous materials and terrorism are no longer significant hazards because of Town wide changes that have been made over the course of the past 5 years (see appendix A for description of previous hazards.) The Town is now focusing on flooding and fluvial erosion hazards as these events are the most common.

Once the draft was updated, CVRPC placed a notice for public comments of the draft update on the CVRPC blog and newsletter. The draft update was also available was at Northfield Municipal offices and by request from CVRPC for public review and comments from May 3, 2011 to 6/29/2011 (see appendix). The announcement of the draft update in the CVRPC newsletter reached over 150 people and businesses in the Region's 23 towns, including the adjacent towns of Warren, Waitsfield, Moretown, Berlin, Williamstown and Roxbury. No comments were received by CVRPC or Northfield Staff. Public comments submitted will be reviewed by the Zoning Administrator (and CVRPC Staff dependant on funding) and attached as an appendix. In the future, the draft plan will be made available during Town Meeting Day and local meetings with State and local officials to allow for more public comment and review. Once the plan is conditionally approved by FEMA, the plan will go before the Select Board for adoption.

4.2 Plan Update Process

The Northfield Local Hazard Mitigation Plan was originally adopted by the Town as an Annex to the Central Vermont Regional Local Hazard Mitigation Plan in October 2005 and received FEMA final approval in January 2006. The 2011 update is intended to be submitted as a standalone Town Local Hazard Mitigation Plan.

The current plan is a complete overhaul of the 2005 plan. Below is a list of the revisions that have been made from the past plan and the appropriate sections for reference. Past hazards which Northfield no longer believes poses a threat are attached in Appendix A. New hazards identified include earthquakes and water supply contamination.

The entire plan was revised and the update process included:

General

- General reorganization/restructuring of the plan according to future FEMA/VEM checklist
    - New sections added – 4.2 Plan Update Process, 4.3 Plan Maintenance, 5.2 Earthquakes, 5.2 Water Supply Contamination
- Update of all data and statistics using 2011 Town Report and US Census Data (Section 3)
- Revaluation, identification and analysis of all significant hazards (new hazards identified from 2005 plan include earthquakes and railroad accident) (Section 5)

- Acknowledgment of implemented mitigation strategies since 2005 – see matrix below (section 4.2)
- Identification of on-going mitigation projects and strategies – see Existing Mitigation Programs, Projects and Activities section (section 4.2)
- Identification of new mitigation projects and strategies – see Hazard Mitigation Activity Matrix and Dog River Corridor Plan attachments

Hazard Analysis Updates (Sections 5 and 6)

- New hazards added – earthquakes and railroad accidents (Section 5.1)
- Added location/vulnerability/extent/impact/likelihood table for each hazard to summarize hazard description (Section 5.1-5.3 – after each hazard)
- Review of Norwich Hazard Mitigation Plan and A Report on the Seismic Vulnerability of the State of Vermont to develop earthquake hazard analysis
- Review of Vermont Hazard Mitigation Plan (Section 5 – hazard analysis table)
- Review of newspaper articles and Roxbury Hazard Mitigation Plan to develop railroad accident hazard analysis (Section 5.2 – Railroad Accident)
- Review of Dog River Corridor Plan for information regarding flood/fluvial erosion hazard and mitigation project ideas; review of Northfield Stormwater Mapping Report for information regarding culverts in downtown area for flooding information (Section 5.2 – Flooding)
- Review of Northfield Stormwater Mapping Report and maps of wellhead protection areas for information regarding water supply contamination hazard analysis (Section 5.2 – Water Supply Contamination)
- Updated federal declarations in flood/fluvial erosion occurrences (Section 5.2 – Flooding)

Maps

- Review of 2005 Areas of Concern map – added wellhead protection area, added culvert replacement project area, added railroad hazard area
- Review of 2005 Local Hazards Analysis map – information is still relevant Added Fluvial Erosion Hazard Zone Map from 2008 Dog River Corridor Plan

Town land-use planning and emergency preparedness documents, as well as Norwich University's Hazard Mitigation Plan, Vermont All Hazard Mitigation Plan, Northfield Stormwater Mapping Report, Dog River Corridor Plan, A Report on the Seismic Vulnerability of the State of Vermont, and Roxbury Local Hazard Mitigation Plan were also reviewed as part of the update process.

The following chart provides an overview of Northfield's proposed 2005 local hazard mitigation actions along with their current status. Additionally since the 2005 plan, the Town adopted new flood hazard regulations in April 2010. The regulations are based on Vermont's "model 4" which is the strictest model. The regulations include no new development in the floodplain or fluvial erosion hazard zone and are NFIP compliant. The jurisdiction of Northfield includes 48

NFIP policies and began participating in NFIP on May 15, 1978. Special flood hazard, fluvial erosion hazard, and floodway development ordinances exist. Any new development in these areas requires project review from the Zoning Administrator, Zoning Board of Adjustments, and NFIP Coordinator at the Agency of Natural Resources in order to obtain a permit. Enforcement actions are administered by the Zoning Administrator. Notices of violations are mailed to the State NFIP Coordinator. If violations remain, the ZA shall submit a declaration to the Administrator of the NFIP requesting denial of flood insurance to the property.

2005 Mitigation Action	2011 Status
Develop a hydrologic engineering study of the Dog River nearest to the Water Street area	A geomorphic study of the Dog River was performed by the State & Conservation Commission – mitigation activities included in plan
Develop a plan for flood damage control including temporary protection of the town, temporary relocation and storage of equipment, contents and furniture	Updates of BEOP were started – in process of identifying new emergency manager
Purchase equipment needed by community agencies for emergency response to a terrorist event	Mobile Command unit, thermal imaging cameras, oximeter purchased
Develop a plan for emergency response to the consequences of a terrorist event likely to occur at facilities located in Town	Yes – Updates of BEOP were started – in process of identifying new emergency manager
"Harden" the communication systems serving the Town to withstand the impacts of expected events	New radios town wide, new towers and base stations. Radio communications now meet national standards and can communicate with State Police
Conduct a detailed study of the vulnerability of hazardous materials facilities threatening the town and their likely impacts	Yes – updates of hazardous materials done through fire department
Provide educations explanatory materials regarding the hazardous materials risks to residents and property owners	No – loss of interest of Select Board and Fire department
Develop funding programs for property owners or community associations for deepening/re-drilling individual wells	No – no funding available

Conduct an engineering study regarding needs and options for eliminating or reducing town vulnerabilities to water supply outage	No – Town believes current water supplies and treatment facilities are sufficient. Have developed new well head area since last plan.

Existing Mitigation Programs, Projects and Activities
The ongoing or recently completed programs, projects and activities are listed by mitigation strategy and have been reviewed for the update of the plan.

Community Preparedness Activities

- Current Rapid Response Plan
- Current Emergency Operations Plan
- Y2K Vulnerable Population Survey (1999)

Hazard Control & Protective Works

- Maintenance Programs (Culvert Survey & Replacement)
- Participant in the Capital Mutual Aid System

Insurance Programs

- Participation in NFIP

Land use Planning/Management

- Conservation and Forestry District
    - Section 603 – All lands within this Town District (generally above 1800 feet, slopes greater than 25%, thin soils or not served by Town highways) shall not have development within 100 feet of any brook or river.
- Floodplain Zoning Regulations
    - Prohibit development in floodplain areas designated within the Flood Insurance Rate Map for Northfield.

Protection/Retrofit of Infrastructure and Critical Facilities

- Dry Hydrant Program – removed one since last plan

Public Awareness, Training & Education

- CPR Trainings/First Aid
- Drug Abuse Resistance Education (D.A.R.E.) Program
- Safety Day
- School Fire Safety Program

4.3 Plan Maintenance

The Northfield Local Hazard Mitigation Plan will be updated and evaluated annually at a September select board meeting. Updates and evaluation by the Select Board will also occur within three months after every federal disaster declaration and as updates to town plan/zoning and river corridor plans come into effect. The plan will be reviewed by the Select Board, Zoning Admin, Town Manager and public at the abovementioned September select board meeting. CVRPC will help with updates or if no funding is available, the Zoning Administrator/Town Manager will update the plan.

The process of evaluating and updating the plan will include continued public participation through public notices posted on the municipal website, town newsletter and CVRPC newsletter and blog inviting the public to the scheduled Select Board (or specially scheduled) meeting. These efforts will be coordinated by the Zoning Administrator and Town Manager.

Updates may include changes in community mitigation strategies; new town bylaws, zoning and planning strategies; progress of implementation of initiatives and projects; effectiveness of implemented projects or initiatives; and evaluation of challenges and opportunities. If new actions are identified in the 5 year interim period, the plan can be amended without formal re-adoption during regularly scheduled Select Board meetings.

Northfield shall also consider incorporation of mitigation planning into their long term land use and development planning documents. It is recommended the Town review and incorporate elements of the Local Hazard Mitigation Plan when updating the municipal plan, zoning regulations, and flood hazard/FEH bylaws. The incorporation of 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 future Dog River Corridor planning documents for ideas on future mitigation projects and hazard areas.

5. Risk Assessment

5.1 Hazard Identification and Analysis

The following natural disasters were discussed and the worst threat hazards were identified based upon the likelihood of the event and the community's vulnerability to the event. Hazards not identified as a "worst threat" may still occur. Greater explanations and mitigation strategies of non "worst threat" hazards can be found in the State of Vermont's Hazard Mitigation Plan.

Hazard	Likelihood [1]	Community Vulnerability[2]	Worst Threat
Avalanche/ Landslide	Low	No	X
Dam Failures	Low	No	X
Drought	Med	No	X
Earthquake	Low	Yes	✓
Extreme Cold	High	No	X
Flash Flood	High	Yes	✓
Flood	High	Yes	✓
Fluvial Erosion	Med	Yes	✓
High Wind	Med	No	X
Ice Jam	High	No	X
Hurricane	Low	No	X
Structure Fire	High	No	X
Tornado	Low	No	X
Water Supply Contamination	Med	Yes	✓
Wildfire/Forest Fire	High	No	X
Winter Storm / Ice Storm	High	No	X
Other – Railroad Accident	Med	Yes	✓

The Town of Northfield identified the following disasters as presenting the worst threat to the community:

- Earthquake
- Flash flood/flood/fluvial erosion
- Water Supply Contamination
- Railroad Accident

A discussion of each significant hazard is included in the proceeding subsections and a map identifying the location of each hazard is attached (See map titled *Areas of Local Concern.*) Each subsection includes a list of past occurrences based upon County-wide FEMA Disaster Declarations (DR-#) plus information from local records, a narrative description of the hazard and a hazard matrix containing the following overview information:

[1] High likelihood of happening: Near 100% probability in the next year.
Medium likelihood of happening: 10% to 100% probability in the next year or at least once in the next 10 years.
Low likelihood of happening: 1% to 10% probability in the next year or at least once in the next 100 years.

[2] Does the hazard present the threat of disaster (Yes)? Or is it just a routine emergency (No)?

Hazard	Location	Vulnerability	Extent	Impact	Likelihood
Type of hazard	General areas within municipality which are vulnerable to the identified hazard.	Types of structures impacted	Minimal: Limited and scattered property damage; no damage to public infrastructure contained geographic area (i.e., 1 or 2 communities); essential services (utilities, hospitals, schools, etc.) not interrupted; no injuries or fatalities. Moderate: Scattered major property damage (more than 50% destroyed); some minor infrastructure damage; wider geographic area (several communities) essential services are briefly interrupted; some injuries and/or fatalities. Severe: Consistent major property damage; major damage to public infrastructure (up to several days for repairs); essential services are interrupted from several hours to several days; many injuries and fatalities.	Dollar value or percentage of damages.	High: 10% to 100% probability within the next year or at least once in the next 10 years. Medium: less than 10% to 100% probability within the within the next year or less than once in the next 10 years.

5.2 Worst Threat Hazards

Earthquake

Vermont is located in a moderate hazard earthquake region. Since 1843, there have been 63 earthquakes which have had epicenters located in Vermont. The strongest of these earthquakes measured 4.1 on the Richter scale in Swanton (1943) and Middlebury (1962.) Stronger earthquakes originating in NY have also been felt in Vermont. In 1988 and 2002 quakes originating in Saguenay, Quebec (6.2) and Plattsburg, NY (5.2) were felt in Vermont

.A 1995 report titled A Report on the Seismic Vulnerability of the State of Vermont by John E. Ebel, Richard Bedell and Alfredo Urzua, states that it is very difficult to predict earthquakes in all of New England. No active faults have been identified in Northfield or New England. Hazus reports have been made for several counties in Vermont to determine the impacts of an earthquake. No such model has been made for Washington County; however, a model for Washington County could be a possible future study.

Northfield has had no history of earthquake damage. The age and building materials of many structures in Northfield makes them susceptible to earthquake damage. Unreinforced masonry buildings and buildings with stone and concrete decorative cornices/lintels are the most susceptible. In downtown Northfield, there are several larger 4-5 story apartment buildings,

which are older in age. Large buildings identified to be the most susceptible are Norwich University campus buildings, the senior living center, Mail Block Apartments and the Guest House Apartment. Gillespie's – a fuel dealer – also has several above ground fuel tanks, which may be a concern. There are also several mobile home parks which if a mobile home is not tied down, could be greatly impacted. The Town has identified 5 wooden bridges , which connect major roads that could be susceptible to failure if an earthquake were to occur.

Hazard	Location	Vulnerability	Extent	Impact	Likelihood
Earthquake	Village area, mobile home parks	Older/taller unreinforced masonry structures, mobile home parks, 5 priority bridges	Severe	$400,000/bridge >$5 million for buildings	Low

Flooding/Flash Flooding/Fluvial Erosion

History of Occurrences (within Central Vermont, town specific data not available):

- August 28, 2011
- May 28, 2011
- September 12, 2008 – DR 1790
- August 3, 2007 – DR 1715
- April 14, 2002
- May 10, 2000
- November 10, 1999 – DR 1307
- June 27, 1998 – DR 1228
- July 25, 1997 – DR 1184
- January 19, 1996 – DR 1101
- March 11, 1992 – DR 938

Historic floods occurred November 1927, September 1938, June 1973, and August 2011. Since 2005, Northfield has replaced over 100 culverts, and built 10 new culverts to better control runoff when storms occur. The Village is extremely interested in building two new culverts on Jarvis Street and under the railroad tracks near Jarvis Street, as that area is flooded on a regular basis. The municipality has had three recent stormwater studies conducted (DuBois & King 2008 Stormwater Drainage Study of the south end of the Village and Town; Stantec study of Northfield Falls; CVRPC 2011 Stormwater Mapping of the Village) and members of the staff are

now trying to prioritize the recommendations of these studies in order to seek funding for implementation.

The DuBois & King report identified 3 culverts which are failing, undersized and poorly designed – Central Street, Jarvis Street and the railroad culverts. According to State standards, culverts must be able to handle flow rate and water depth of a 25 year storm. Central Street was rated for a 10 year storm. Both Jarvis Street and the railroad culverts are only able to handle 2-5 year storm levels. In 2010, Northfield benefited from a HMGP grant for a culvert replacement and expansion on Central Street. The original culvert was severely undersized. During heavy rain events, the culvert would become backed up and flood properties around the crescent on the east side of Route 12. The newly resized culvert measures 8'x5'x145'. This was a complicated project as water, sewer and storm drain lines all had to be rerouted during the project. The sidewalk had to be excavated and rebuilt. Trees also had to be removed and replanted. To date, the project cost $303,728.26. Northfield provided a 25% match ($77,743.50) to FEMA funds. Northfield hopes to apply for HMGP funds to replace and expand both the Jarvis Street and railroad culverts in the next year.

Northfield lies in the heart of the Dog River valley, which is defined by the Northfield Range to the west and the Irish Hills to the east, both of which have elevations above 2,400 ft. The most significant body of water within the Town is the Dog River, which flows northward along Vermont Route 12 and through Northfield's three population centers, eventually terminating at the Winooski River in Montpelier. Its tributaries include Cox Brook, Union Brook, Stony Brook, Felcher Brook, Bull Run, Sunny Brook and Robinson Brook.

According to the National Flood Insurance Program, many properties within the Town are located within the designated 100-year floodplain. Based on the results of overlaying the FIRM flood maps with the location of the E911 points, there are 473 properties and 78 buildings in the 100 year floodplain. The total loss for these properties would be $61,239,310. This value is calculated from the median grand list property value. There are 225 properties in the fluvial hazard zone. The total amount of these properties based on the median grand list value is $29,130,750. There are repetitive loss properties in Northfield; the total number following the August 2011 event is not yet available. There is not detailed data for types of structures in the floodplain at this time; there is an intern for the municipality creating records in Substantial Damage Estimator and Excel for every structure located in a flood hazard zone. Acquisition of properties at risk of flooding is a high priority for the municipality. As of writing this plan, no new commercial or residential developments are planned in the floodplain/fluvial erosion hazard zone. Flood hazard/FEH bylaws prevent development in flood-prone and FEH zones.

As previous events have made clear, even areas beyond the NFIP-designated 100-year floodplain may be vulnerable to these types of hazards. The August 2011 event exceeded the 500-year floodplain limits. 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. The attached Hazard Analysis Map identifies the Fire Station, as well as other government buildings, as outside the designated floodplain, but near the river. The waste water facility and town garage (which includes the ambulance bay and emergency management offices) are also of concern due to their location in the floodplain. The relocation of emergency services equipment and personnel to a safe location outside the flood hazard zones is a top priority for the municipality. The sewer system in Northfield is also combined. When heavy flooding occurs, it overwhelms the system and causes untreated sewage to flow into the river – leading to other environmental contamination issues. Other facilities identified in the BEOP as in flood hazard areas include – Mayo Nursing Home, Tucker's Trailer Park, Northfield School, Four Seasons Nursing Home, and the Veterans Place.

A corridor plan for the Dog River was developed by VT Agency of Natural Resources. The plan assesses the Dog River until its convergence with the Winooski River in Montpelier. The stretch of river in Northfield was rated in "fair" condition; however the river is undergoing "high" to "extreme" bank adjustments and fluvial erosion. The fluvial erosion hazard map of Northfield is located as an attachment on page 33. The high rates of adjustment and erosion can be attributed to several factors – straightening of the river channel, development encroachments, high levels of stormwater runoff, historic gravel mining and dredging activities, undersized culverts and bridges, and lack of riparian buffers greater than 25 feet. In Northfield, there are 7 undersized bridges which should be replaced in order to decrease erosion and restore the River's health. In addition to bridge projects, the plan identifies 21 projects that could be completed in Northfield to restore and renew the River's health. The map and associated matrix of projects is located in Appendix B.

Bridges and roads are particularly susceptible to damage in the event of a flash flood. The Areas of Local Concern Map identifies four vulnerable bridges that have a rating of "Scour Critical": Pleasant Street Bridge and West Hill Road Bridge over Union Brook and Route 12A bridges over the Dog River and Sunny Brook. Water Street, Jarvis Lane, Lovers Lane, and the Route 12A Trailer Park are susceptible as well.

Hazard	Location	Vulnerability	Extent	Impact	Likelihood
Flooding	Water St, Dogwood Rd, Dog River Dr, Lovers Ln, Rte 12 A Trailer Park, Along Cox Brook, Union Brook,	Roads, Bridges, Senior Living Center, Sewer Facility, Fire Station, Town Garage	Moderate to severe depending on level of flooding	$400,000/bridge >$1 million per municipal building, treatment facility and senior living center	Medium/High

Water Supply Contamination

Northfield has two well fields that serve its municipal water supply – Garvey Hill and Cherry Hill. Both of these are located in a source protection area. To date, there has not been any water supply contamination. However, the Town worries that the supply is susceptible to contamination through hazardous materials, earthquake, bioterrorism and more likely – faulty septic systems. The system provides 500,000 gallons of water per day to roughly 4,000 customers. There is approximately 25 miles of water mains. The Town is looking to expand its sewer infrastructure to residents in the north part of town along the Dog River to reduce the number of individual septic systems. A reduction in the number of septic systems would reduce the likelihood of water supply contamination from faulty systems.

Northfield's sewer system is a combined system. When heavy flooding occurs, the treatment system become overwhelmed and releases some untreated sewage into the Dog River. Although the Northfield well head protection area is upstream from the treatment facility, the overflow from the facility could have environmental impacts on downstream users and water supplies. In case of power failure, the treatment facility does have standby generators.

Hazard	Location	Vulnerability	Extent	Impact	Likelihood
Water Supply Contamination	Well head protection areas, Sewer Treatment Facility	Municipal Wells, Downriver users	Moderate	$2 million	Med

Railroad Accident

The Central Vermont Railroad runs through Northfield from north to south along the valley floor. This stretch of railroad is a consistent steep downgrade from south to north, causing trains to brake through Northfield going towards Berlin. Rail activity includes both Amtrak passenger service from Boston to Burlington and cargo transport, to and from Canada. Cargo transport includes a variety of freight including hazardous materials including oil and propane. The train route runs along route 12 and 12A through Northfield. There are several major road and trail crossings in the town.

There have been several occurrences of railroad accidents in Northfield. A historic collision occurred in August of 1910 when two freight trains collided causing two oil tanks on the train to explode. Seven railroad employees were killed. The accident happened on a sharp turn, where an accident of similar nature had occurred two years prior. Damages were estimated to be $50,000. In February 2009, a woman on a snowmobile collided with an Amtrak train on Fairground Road. The snowmobile was damaged; however, no one was hurt.

The rail line runs directly above the ambulance headquarters and sewer treatment plant. The town is worried that the slope on which the rail line sits, is eroding away and fears the track could fail under the weight of a large freight train. A train derailment at that location could

cause significant and severe damages. The area of railroad concern is marked on the Hazards Analysis Map.

Hazard	Location	Vulnerability	Extent	Impact	Likelihood
Railroad Accident	Area behind sewage treatment plant/ambulance facility, road/trail crossings	Cars, pedestrians, water system, ambulances,	Severe if large crash	$2 million for treatment plant/ambulance facility	Medium

5.3 Additional Non Worst Threat Natural Hazards

Drought

Drought is a normal, recurrent feature of climate and occurs almost everywhere. Droughts originate from a deficiency of precipitation over an extended period of time resulting in a water shortage for some activities, groups or environmental sectors.

Droughts can reduce crop and forest productivity, increase fire hazard, damage fish and wildlife, and increase livestock/wildlife mortality rates. The impacts on these resources can have devastating economic effects. To date, there have been no drought events in Northfield. If an event were to occur it would be town wide.

Hazard	Location	Vulnerability	Extent	Impact	Likelihood
Drought	Town Wide	Farms, forest, fisheries, private/public water supplies	Varies depending on severity of event	Varies depending On severity of event	Medium

High Wind

Thunderstorms can generate high winds and down hundreds of large trees within a few minutes. The State can also experience tornadoes, which are capable of damaging or destroying structures, downing trees and power lines and creating injuries and death from collapsing buildings and flying objects. Tornadoes are less common than hail storms and high winds, but have occurred throughout Vermont. Across the State, however, 34 tornadoes have been recorded between 1950 and 1999, injuring 10 people and causing over $8.4 million dollars in estimated property damage. Nearly all of these incidents occurred from May through August with most of occurring in the afternoon. To date, no high wind events have occurred in Northfield.

Hazard	Location	Vulnerability	Extent	Impact	Likelihood
High Wind	Town Wide	Power lines, trees, structures	Depends on severity of event	Depends on severity of event	Medium

Ice Jams

Ice Jams are usually a result of heavy periods of rain in the winter months of February and March. Rain falls on frozen rivers and causes river ice to break into sheets. The large pieces of ice can cause blockages in the river and cause localized flooding until the pieces of ice are broken up or melted. Ice jams occur infrequently in Northfield along the Dog River. It is difficult to predict the location of ice jams; however, they tend to occur where the river is constricted. To date, there have been no occurrences of major ice jams that caused flooding. Mitigation for ice jams is similar to that of flood prevention. The appendix has suggestions from the Dog River Corridor plan for projects and locations of mitigation strategies.

Hazard	Location	Vulnerability	Extent	Impact	Likelihood
Ice Jam	Constricted points of Dog River – Village area	Low lying, flood prone areas	Minimal	<5%	Medium

Wildfire/Forest Fire

FEMA indicates there are three classes of wildland fires – surface fires, ground fires and crown fires, with the most common type indicated as a surface fire. Surface fires burn slowly along the forest floor, killing and damaging trees. Ground fires burn on or below the forest floor and are usually caused by lightning. Crown fires move quickly by jumping along the tops of trees. Crown fires can spread quickly during windy conditions. In Northfield, there have been no known occurrences of wildfires; however, changing landuse patterns and weather conditions may increase Northfield's vulnerability. The rural nature and vast tracts of forested land can make Northfield susceptible to forest fires. During rare drought occurrences, fire danger may be high.

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 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. The forest fire program focuses on prevention, fire awareness and fire fighter safety.

Hazard	Location	Vulnerability	Extent	Impact	Likelihood
Wildfire	Town Wide – areas outside Village development	Large Parcels of forested land, homes near urban forest interface, power lines	Depends on severity of event	Depends on severity of event	Medium

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:

- January, 16 1998 – DR 1201
- December 31, 2000
- March 22-23 2001
- January 4, 2003
- March 7, 2011

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 Northfield. 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. Northfield 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. In addition, Northfield should develop debris management procedures (to include the identification of debris storage, processing and disposal sites) so that the tree and other storm related debris could be handled in the most expedient, efficient and environmentally safe manner possible.

Hazard	Location	Vulnerability	Extent	Impact	Likelihood
Winter Storm/Ice Storm	Town Wide	Utilities, trees, roads, old/under insulated structures	Minimal to Moderate depending on severity	5-10% damages – routine emergencies	Medium

6. Mitigation

6.1 Town Plan (2009) Goals that Support Local Hazard Mitigation

- To identify, protect and preserve important natural and historic features of Northfield's landscape, which help define the community's unique identity and sense of place;
- To maintain and improve the quality of Northfield's air, water, wildlife and land resources;
- To accommodate a reasonable rate of growth which maintains a diverse year-round population and does not overburden existing or planned facilities and services; and
- The provision of effective and cost efficient community services, facilities, and utilities is needed to meet present and future demands of Northfield citizens and visitors.

Northfield's Town Plan will be updated in or before 2017. Mitigation goals that could be added to the Town Plan could include:

- To protect life and property from natural and manmade disasters.

6.2 Proposed Hazard Mitigation Programs, Projects and Activities

Hazard mitigation programs, projects and activities that were identified for implementation at the Town Local Hazard Mitigation meeting:

Earthquake

- Review and adapt building code so that new structures are earthquake resistant
- Retrofit bridges along emergency access routes
- Earthquake proof Gillespie fuel tanks in downtown Northfield
- Tie downs for mobile home parks
- Public information campaign instructing residents of earthquake dangers and remedies

Flood/Flash Flood/Fluvial Erosion

- Acquisition of properties with homes located in the floodway and SFHA
- Acquisition of substantially damaged properties
- Create an emergency route to the senior living center
- Relocate nursing home, senior housing, and public housing structures to safer areas
- Relocate the municipal garage and emergency services office to safer areas
- Relocate the solid waste transfer station outside the flood hazard zone
- Purchase a rescue watercraft
- Culvert expansion projects – Jarvis Lane and across railroad
- Tie downs for mobile homes
- Select projects identified in Dog River Corridor Plan

Water Contamination

- Build guard rails around well head protection area to prevent spills
- Extend sewer line to Route 12/12A intersection and north to Norwich University to serve wellhead protection areas

Railroad

- Relocate municipal facilities out of railroad hazard area– ambulatory services, waste water treatment facility, town garage, & food shelf
- Place cross bars at major Route 12 and railroad intersections

NFIP

- Work with elected officials, the State ANR and FEMA to correct existing compliance issues and prevent any future NFIP compliance issues through continuous communications, training and education.
- Base flood elevation home inspections - inspect foundations at time of completion prior to framing to determine if lowest floor is at Base Flood Elevation
- Public outreach – make and distribute NFIP pamphlets at Town Offices, Fire Department, and Police Department

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.

Northfield 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 as well.

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

- Hazard Mitigation Strategy Matrix
- Appendix A – Hazards from Previous Mitigation Plan
- Hazard Analysis Map
- Local Area of Concern Map
- Appendix B – Dog River Corridor Plan Project Matrix and Map
- Town Resolution Adopting Plan

Hazard Mitigation Strategy Matrix

Mitigation Action	Local Leadership	Prioritization (High, Med)	Possible Resources	Time Frame
Review and adapt building code so that new and municipal structures are earthquake resistant	Zoning Administrator, Planning Comm., Select Board	Low	Municipal Planning Grant, HMPG	5 years
Retrofit bridges along emergency access routes	Public Works	Med	HMPG	2-4 years
Earthquake proof Gillespie fuel tanks in downtown Northfield	Emergency Mgmt Dir., Tank Owners	Med	HMGP	4 years
Tie downs for mobile homes	Z.A, home and park owners	Med	HMGP	2-3 years
Public information campaign instructing residents of earthquake dangers and remedies	Em. Mgmt Dir, F.D, P.C, S.B.	High	HMGP	1-2 years
Create an emergency route to the senior living center	Public Works, Emergency Mgmt Dir.	Med	EMGP	2 years
Relocate the senior living center to a more appropriate area	Z.A., S.B., P.C.	Low	HMGP	5 years
Acquisition of properties with homes located in the floodway and substantially damaged properties	Z.A., S.B.	High	HMGP	1 year
Purchase a rescue watercraft	Em. Mgmt Director,	Med	EMGP	3 years
Culvert expansion projects – Jarvis Lane and across railroad	Public Works	High	HMGP, FMA	1 year

Build guard rails around well head protection area to prevent spills	Water Dept, Public Works	High	HMGP	1.5 years
Select Projects from Dog River Corridor Plan	S.B, VT ANR, landowners, P.C.	High	HMGP, ANR, FMA	2 years
Extend sewer line to Route 12/12A intersection and north to Norwich University to serve wellhead protection areas	Public Works, Water Dept, Sewer Dept	Med	EPA, Public Bond	4 years
Relocate municipal facilities – ambulatory services, waste water treatment facility, town garage, & food shelf	Public Works, Water Dept, Sewer Dept, Em. Mgmt Dir	High	Public Bond, EMGP, HMGP	2 years
Place cross bars at major Route 12 and railroad intersections	Public Works, VTrans	High	EMGP, HMGP	1.5 years
Work with elected officials, the State ANR and FEMA to correct existing compliance issues and prevent any future NFIP compliance issues through continuous communications, training and education.	Z. A., P.C., Conservation Comm., S.B.	Med	Town funds, Municipal Planning Grant, ANR funding	2 years
Base flood elevation home inspections - inspect foundations at time of completion prior to framing to determine if lowest floor is at Base Flood Elevation	Z.A, ANR	High	Town Funds	1-2 years
Public outreach – make and distribute NFIP pamphlets at Town Offices, Fire Department, and Police Department	Select Board, Planning Commission	Med	Town Funds	2 years

Structure Fire

The Northfield Fire Department responds to approximately 10 structural fires per year. Since the 1940s Northfield has not experienced a major multi-building structure fire. Despite the infrequency of incidents, the risk is increased due to the density of wood-constructed properties within the Town's population centers. Due to the close proximity between properties, a fire within one of these sections of Northfield has the potential to spread and create a hazardous situation. Approximately 1,183 buildings are located within Northfield's three population centers (Northfield Village [including Norwich University], Northfield Falls, and Northfield Center). Using Northfield's average grand list property value for 2003 ($150,721), the approximate total value of properties at risk of fire within the Town's three population centers is $178,302,943. This represents 89% of the grand list.

Hazardous Materials

History of Occurrences:

- January 19, 2004 - #2 Heating Oil – 3-4 Gallons
- September 18, 2003 - #2 Heating Oil – 25-100 Gallons
- September 11, 2003 - #2 Heating Oil – 20 Gallons
- September 5, 2003 –#6 Heating Oil – 2,600 Gallons
- March 15, 2003 - #2 Heating Oil – 200 Gallons
- May 6, 2002 – Hydraulic Oil – 5 Gallons
- April 4, 2001 – Kerosene – 200 Gallons
- January 23, 2001 – Ether – 8-10 Pints

The majority of Northfield's hazardous material spills take place in relation to the prevalence of #2 heating Oil in residential and commercial heating systems. Occasional hazardous material spills occur in the act of transportation, such as the 2,600 gallon spill of #6 heating Oil on Route 64 in September 2003. The steep grade of Route 64, and its connection between the Town and I-89, results in a high vulnerability to these types of events. Another location vulnerable to a hazardous materials spill is the New England Central Railroad corridor, which travels through the central portions of the Town and Village along Vermont Route 12 and Vermont Route 12A.

Terrorism

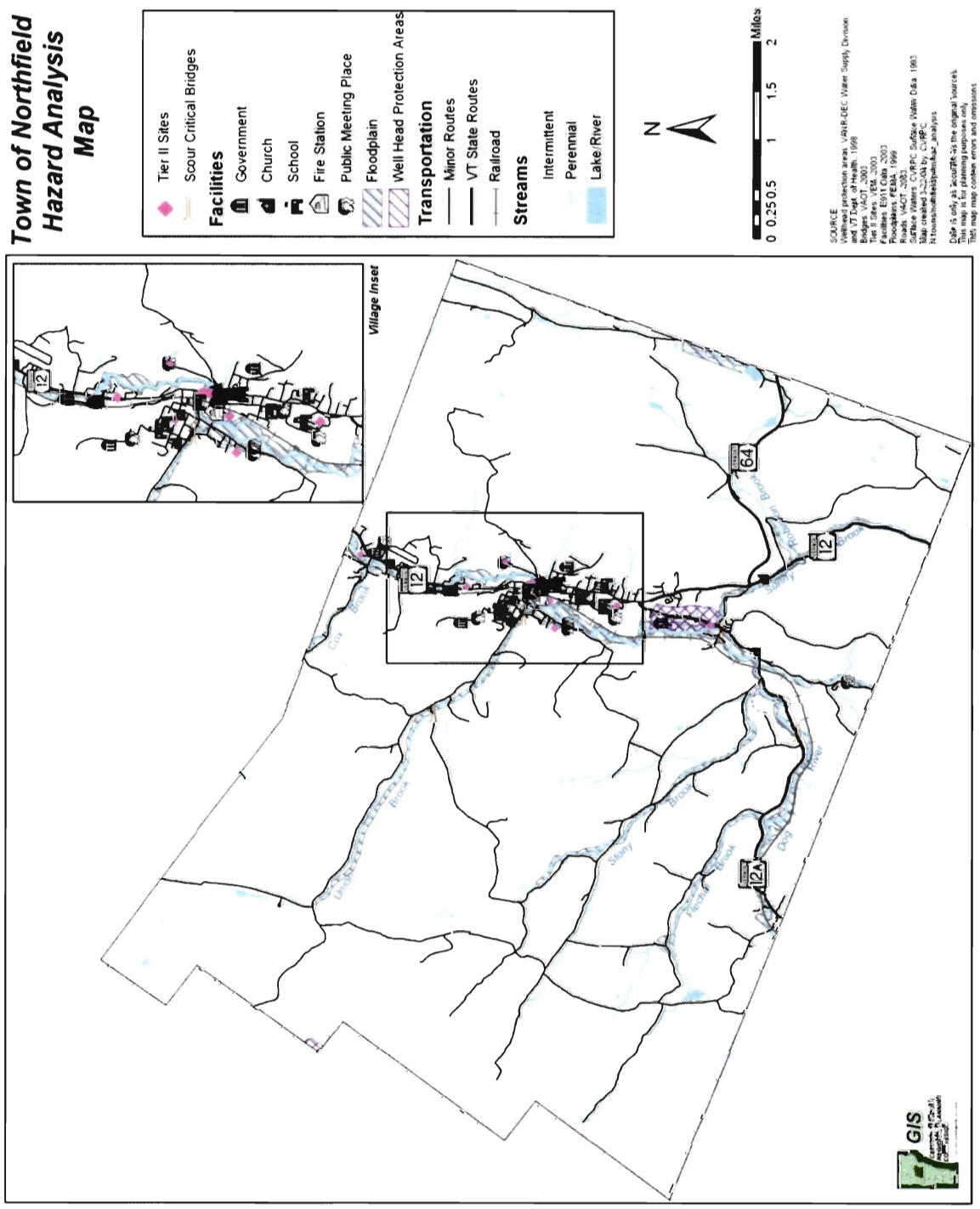
The Northfield Local Hazard Mitigation meeting highlighted a few of the Town's assets as vulnerable to a terrorist attack. Fortunately, Northfield has no history of any terrorism event.

Northfield is home to the National Center for the Study of Counter-Terrorism and Cyber-Crime at Norwich University (NCatNU). NCatNU is the nation's leading center for the study of counter-terrorism. Its functions include the development of related educational and training programs; execution of rapid research, development and deployment of needed technologies; and

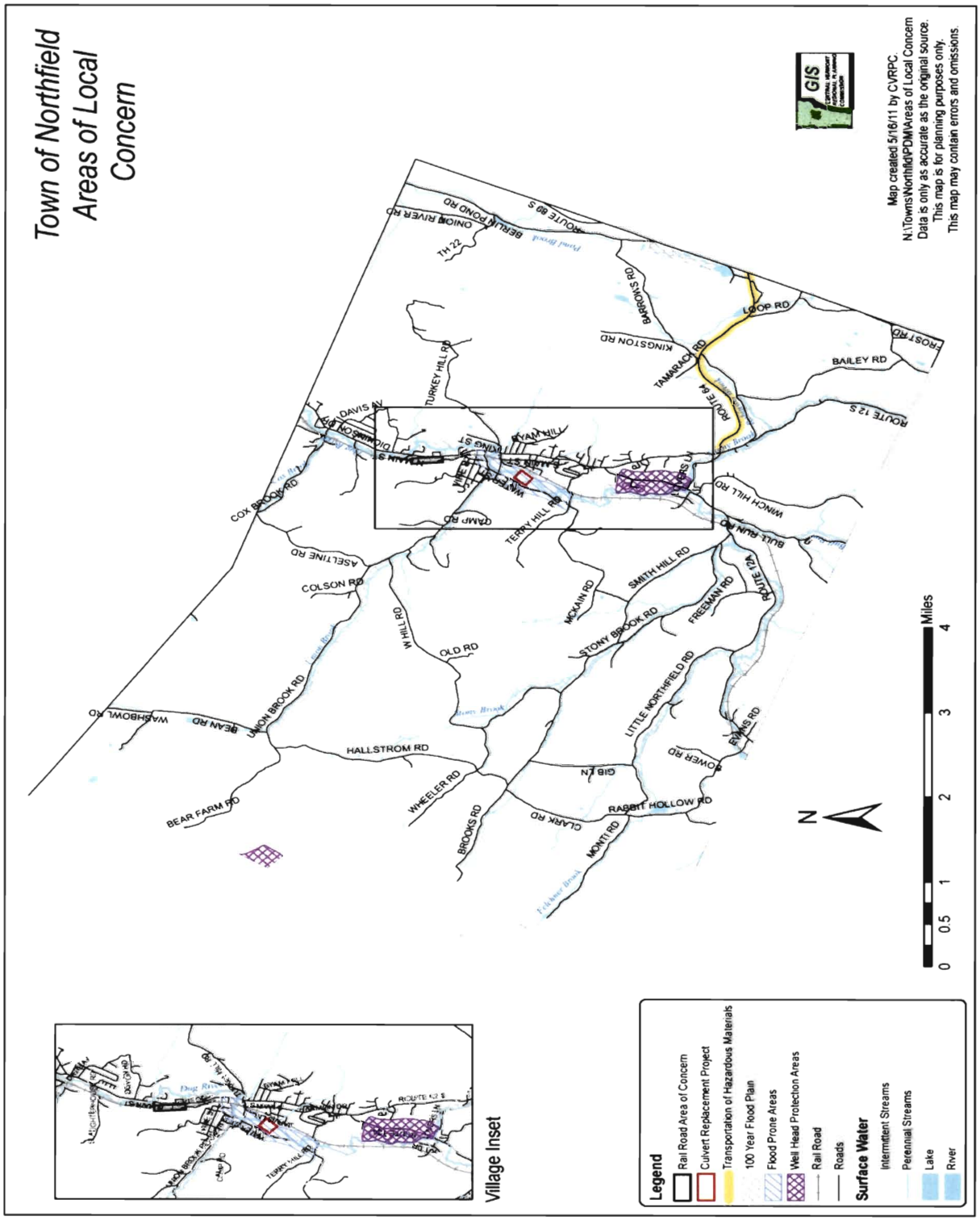
advancement of the nation's capability for preparedness and response through the generation of related policy, information management and technology issues. Ironically, the nature of the Center makes it an attractive target for terrorism.

A second asset vulnerable to a terrorist act is Northfield's water supply. Northfield Village, Northfield Falls and Northfield Center are served by a water source which includes a 1,000,000 gallon reservoir on Garvey Hill and two 250,000 gallon reservoirs on the Cheney Farm east of the Village off Hill Street. Despite precautions, such as fencing and regular patrolling, above ground water supplies represent a potential target for terrorist activity through deliberate contamination.

Hazard Analysis Map



Areas of Local Concern Map



Appendix B –Dog River Corridor Plan Projects and Maps

Table 7.2: Dog River Site Level Opportunities for Restoration and Protection – Town of Northfield

Project #, Reach	Condition and Channel Evolution Stage	Site Description including Stressors and Constraints	Project or Strategy Description	Technical Feasibility and Priority	Other Social Benefits	Costs	Land Use Conversion	Potential Partners
#1 M09-B	Good F I	Large breached dam structure on top of bedrock grade control	Remove dam structure	Moderate priority for improve aquatic organism passage at high cost	Improve aquatic organism passage	High cost for design, permitting and construction	None	VDEC, Vermont Fish & Wildlife Department
#2 M09-B	Good F I	Runs along residential properties on both sides	Improve riparian buffers and near bank vegetation next to managed lawns	Moderate priority due to multiple landowners	Improved habitat and geomorphic stability	Relatively low cost for native plant materials and labor	Residential land to forested buffer	Landowners
#3 M10-A	Good F I	Narrow valley channel	Protect river corridor	Moderate priority due to multiple landowners		Potentially high costs due to multiple landowners	No additional structures in corridor	Landowners
#4 M11-A	Good D II c	Segment runs along VSHA housing development with mowed lawns	Improve riparian buffer	High priority due to one landowner (Vermont Housing Authority)	Improved habitat and geomorphic stability	Relatively low cost for native plant materials and labor	Residential land to forested buffer	VSHA
#5 M11-C	Fair F II	Old agricultural field along east bank that looks like it has not been used in a few years	Natural revegetation	High priority due to one landowner	Improved habitat and geomorphic stability	Low cost for natural revegetation	Agricultural land to forested buffer	Landowners
#6 M12-B	Fair F III	Runs through downtown Northfield with urban development along banks	Manage stormwater	High priority to reduce sedimentation	Improved water quality and habitat	Moderate costs to design and maintain stormwater improvements	Not known	Town of Northfield
#7 M13	Fair D II c	River close to houses and development along Water Street on west bank	Implement FEH zones	Low priority due to multiple landowners and existing building restrictions	Flood and sediment attenuation asset	Unknown cost for FEH implementation	No additional structures in corridor	ANR
#8 M13	Fair D II c	Runs through Norwich University athletic fields	Improve riparian buffers	High priority due to one landowner (Norwich University)	Improved habitat and geomorphic stability	Relatively low cost for native plant materials and labor	Recreational land to forested buffer	Norwich University
#9 M14	Fair D II d	Runs along Northfield town wellfield	Improve riparian buffers along wellfield	High priority due to one landowner (Town of Northfield)	Improved habitat and geomorphic stability	Relatively low cost for native plant materials and labor	Managed town land to forested buffer	Town of Northfield
#10 M14	Fair D II d	Natural Attenuation reach	Corridor Easement	High priority for corridor easement	Increased sediment and flood attenuation	Potentially high cost for corridor easement	No additional structures within corridor	Town of Northfield, ANR

Table 7.2. Dog River Site Level Opportunities for Restoration and Protection – Town of Northfield

Project #, Reach	Condition and Channel Evolution Stage	Site Description Including Stressors and Constraints	Project or Strategy Description	Technical Feasibility and Priority	Other Social Benefits	Costs	Land Use Conversion	Potential Partners
#11 M16	Fair F II	Runs very close to Route 12A	Improve near bank vegetation along road	Low priority due to limited room for planting	Improved habitat and geomorphic stability	Relatively low cost for native plant materials and labor	Bare stream bank to vegetated stream bank	Town of Northfield
#12 M17-A	Fair F III	Natural attenuation reach downstream of channelized golf course	Corridor Easement	High priority due to channelized segments upstream contributing sediment	Increased sediment and flood attenuation	Potentially high cost for corridor easement	No additional structures within corridor	Landowners, ANR
#13 M17-B	Good F II	Runs through golf course at Northfield Country Club	Improve riparian buffers	High priority due to one landowner (Northfield CC)	Improved habitat and geomorphic stability	Relatively low cost for native plant materials and labor	Commercial to forested buffer	Northfield Country Club
#14 M18-B	Fair F III	Upper end of segment runs near agricultural land	Improve riparian buffers on small areas of north bank near farm	Low priority due to small area and channel widening	Improved habitat and geomorphic stability	Relatively low cost for native plant materials and labor	Agricultural land to forested buffer	Landowners, CREP
#15 M18-B	Fair F III	Natural attenuation reach	Corridor Easement	High priority for corridor easement	Increased sediment and flood attenuation	Potentially high cost for corridor easement	No additional structures within corridor	Landowners, CREP, ANR
#16 M20-B	Fair F III	Runs along residential property	Improve riparian and near bank vegetation on west bank	Low priority due to channel widening	Improved habitat and geomorphic stability	Relatively low cost for native plant materials and labor	Residential land to forested buffer	Landowners
#17 T1.01-B	Fair F III	Runs along Cox Brook Road with a driveway bridge crossing channel	Replace undersized driveway bridge	Moderate priority due to private ownership	Improved geomorphic compatibility	High cost for design, permitting and replacement	Wider span may take up more space	Landowners
#18 T1.01-C	Fair F II	Runs along Cox Brook Road and residential properties	Improve riparian buffers	Low priority due to 2 landowners and channel adjustment	Improved habitat and geomorphic stability	Relatively low cost for native plant materials and labor	Residential land to forested buffer	Landowners
#19 T2.01	Fair F II	Runs through downtown Northfield with urban development	Manage stormwater	High priority to reduce sedimentation	Improved water quality and habitat	Moderate costs to design and maintain stormwater improvements	Not known	Town of Northfield
#20 T3.01	Fair F II	Runs along Lovers Lane and Route 12	Manage stormwater	High priority to reduce sedimentation	Improved water quality and habitat	Moderate costs to design and maintain stormwater improvements	Not known	Town of Northfield

Table 7.2. Dog River Site Level Opportunities for Restoration and Protection – Town of Northfield

Project #, Reach	Condition and Channel Evolution Stage	Site Description Including Stressors and Constraints	Project or Strategy Description	Technical Feasibility and Priority	Other Social Benefits	Costs	Land Use Conversion	Potential Partners
#21 T3.01	Fair F II	Breached dam structure causing upstream deposition	Remove breached dam	High priority to improve aquatic organism passage; unknown historic preservation status	Improve aquatic organism passage	High cost for design, permitting and construction	None	Landowners
#22 T5.01-B	Good F I	Runs along Stony Brook Road near covered bridge	Manage stormwater to control road washout	High priority to reduce sedimentation	Improved water quality and habitat	Moderate costs to design and maintain stormwater improvements	Not known	Town of Northfield
#23 T6.01-A	Good F I	Channelized segment that runs through agricultural land	Improve riparian buffer	Moderate priority due to 2 landowners	Improved habitat and geomorphic stability	Relatively low cost for native plant materials and labor	Agricultural land to forested buffer	Landowners, CREP
#24 T6.01-B	Good Not Evaluated	Bedrock gorge segment	Conservation	Low priority due to only 2 landowners; not a concern for geomorphic stability	Conserve bedrock gorge	Moderate cost for conservation	No additional structures in corridor	Landowners
#25 T6.01-C	Good F I	Runs along Little Northfield Road	Conservation	Moderate priority due to only 2 landowners		Moderate cost for conservation easement	No additional structures in corridor	Landowners

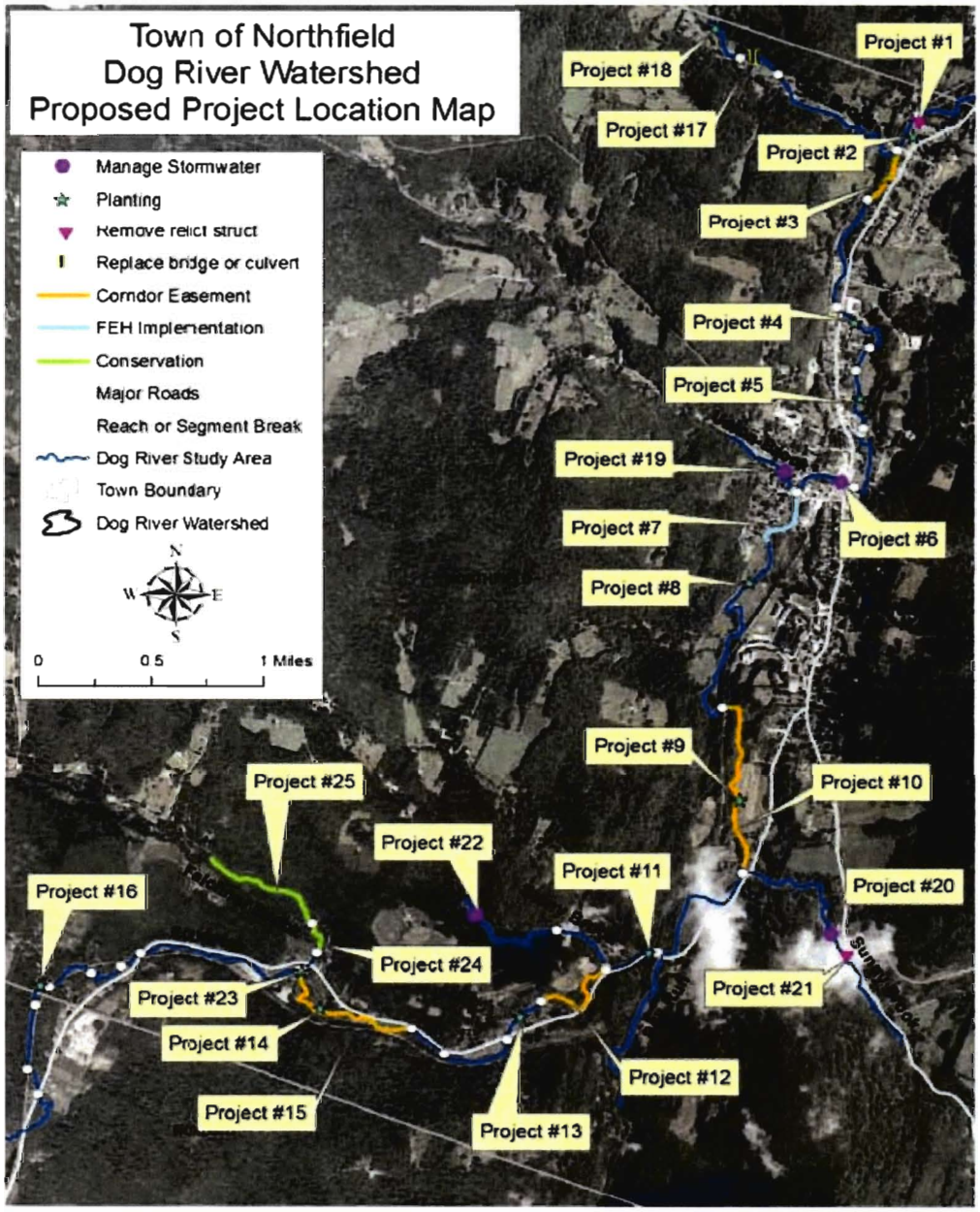


Figure 7.5 Proposed project location map for the Town of Northfield, Dog River watershed

Fluvial Erosion Hazard Zone Map (source Dog River Corridor Plan, 2008, Bear Creek Environmental)

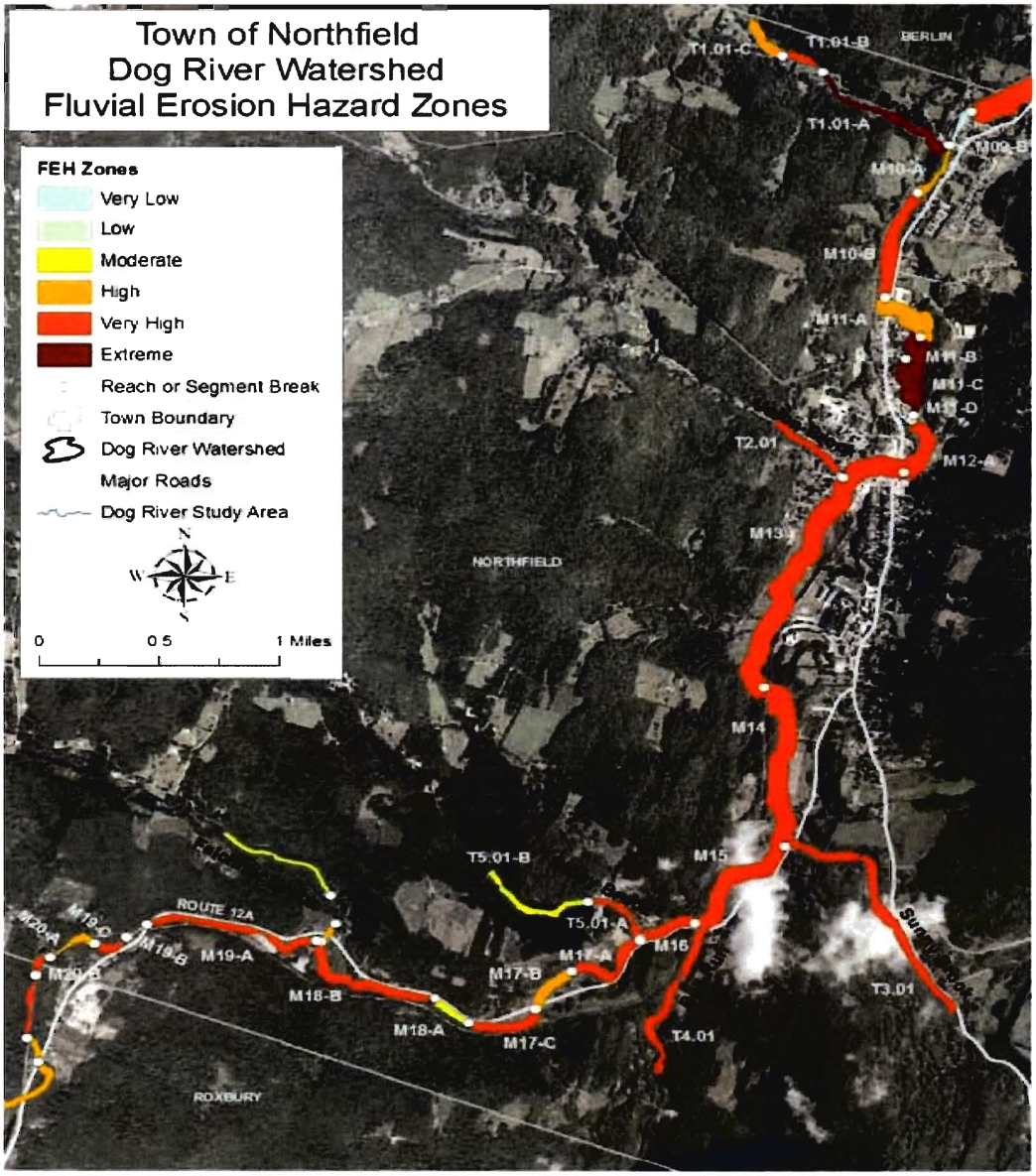


Figure 7.2. Draft Fluvial Erosion Hazard Zone Map for the Town of Northfield - Dog River watershed

Appendix C – Public Notices

Newsletter – May, 2011

Pre-Disaster Mitigation (PDM) Plans: Staff assisted Worcester and Roxbury with final revisions to their PDM plans which were submitted to VEM and FEMA for comments, and is working to update plans for Plainfield, Northfield, and Washington. Copies of Northfield's plan are available for review. Contact Jennifer Mojo at CVRPC for additional information and to get your PDM plans updated and to review plans -- mojo@cvregion.com. Northfield is hoping to apply for a HMGP grant in October for 2 culvert expansion projects. A town looking to apply must have a FEMA-approved and town adopted PDM plan. A benefit cost analysis workshop for the grant will be scheduled by VEM for June.

CVRPC Blog Entry

AM 0 COMMENTS

TUESDAY, MAY 3, 2011

Northfield Hazard Mitigation Plan Update

Northfield's Hazard Mitigation Plan is currently being updated and available for review and comments. Please contact Jennifer at mojo@cvregion.com if you would like to review and make comments.

POSTED BY CENTRAL VERMONT REGIONAL PLANNING COMMISSION AT 11:17 AM 0 COMMENTS

WEDNESDAY, APRIL 20, 2011

Build Your Best Future--Heart and Soul Community Planning

Build Your Best Future

Submit a Heart & Soul Community Planning Proposal

Certificate of Adoption

The Town of Northfield
Select Board
A Resolution Adopting the Local Hazard Mitigation Plan
January 23, 2012

WHEREAS, the Town of Northfield has worked with the Central Vermont Regional Planning 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 Northfield Local Hazard Mitigation Plan contains several potential projects to mitigate damage from disasters that could occur in the Town of Northfield; and

WHEREAS, a duly-noticed public meeting was held by the Town of Northfield Select Board on January 23, 2012, to formally adopt the Northfield Local Hazard Mitigation Plan;

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

Chair of Select Board

Member of Select Board

Member of Select Board

Member of Select Board

Member of Select Board

ATTEST

Clerk of Select Board