Town of Middlesex, Vermont

2018 Local Hazard Mitigation Plan

Prepared by the Town of Middlesex and
the Central Vermont Regional Planning Commission

Date of Town Adoption: June 12, 2018

Date of Final Approval by FEMA: June 18,2018

Plan is effective for Five years from FEMA approval.

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1. Introduction

Community planning can reduce the impacts of expected, though unpredictable, natural and human-caused events. With that in mind, the goal of this updated plan is to provide a local mitigation strategy in case Middlesex is struck by such disasters.

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 learned that it is less expensive to prevent disasters than to repeatedly repair damage after a disaster has struck. This plan addresses the 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 reduce their severity by identifying potential hazards and where they are most likely to strike. Local actions can be taken ahead-of-time to reduce the damage and losses from these hazards, and establish a coordinated process to implement the Plan. These actions and measures, also known as "hazard mitigation strategies," can 1) alter the hazard by eliminating or reducing the frequency of occurrence, 2) avert the hazard by redirecting the impact by means of a structure or land treatment, 3) adapt to the hazard by modifying structures or standards, or 4) avoid the hazard by preventing, limiting, or relocating development, improving public education, or ensuring development is disaster resistant.

2. Purpose

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

Middlesex strives to comply with the strategies, goals and objectives of the State Hazard Mitigation Plan, including an emphasis on proactive pre-disaster flood mitigation for public infrastructure, good floodplain and river management practices, and fluvial erosion risk assessment initiatives.

In preparation for the review of the 2010 Middlesex Town Report, 2013 Middlesex Town Plan, 2017 Local Emergency Operations Plan, and the 2009 North Branch Winooski Corridor Plan. Information from these documents is also incorporated into numerous sections of the plan. The Middlesex Hazard Mitigation Meeting focused on assessing past mitigation projects and compiling information on its current and future hazard mitigation programs, projects and activities.

The 2018 Middlesex Local Hazard Mitigation Plan is an update of the town's 2012 plan. The town reviewed, evaluated, and revised the 2012 plan to reflect changes in development, progress in local mitigation efforts and changes in priorities. New information has been incorporated into this plan making it up to date, stronger and more useful for the Middlesex town officials and residents who will implement the actions and measures going forward.

The 2018 Middlesex Local Hazard Mitigation Plan includes:

- Current information since the last plan update done in 2012.
- A status update of the 2012 mitigation strategies/actions.
- A new mitigation strategies/action section to reflect the current priorities and intended actions of the community over the next five years.
- Updates have been made to the Hazard Analysis Map.
- Addition of a new Transportation Vulnerability Analysis Map (Vulnerability Assessment).

- A copy of the Wrightsville Reservoir Dam Inundation Area Map has been added to this Plan attachment section. The Inundation Area Maps for the Wrightsville Reservoir and the dams EAP (Emergency Action Plan) are now on file at the Middlesex Town Clerk Office.
- The town has updated the hazards to reflect changes in the communities' priorities.
- Minor changes to the plan update and plan maintenance process to incorporate greater public participation and reflect scheduling changes of the Selectboard and Planning Commission since the last plan adoption.

3. Community Profile

The Town of Middlesex is approximately 39.9-square miles in size and is located in the northwest quadrant of Washington County. It is bordered by Worcester to the north, by East Montpelier and Montpelier to the east, by Berlin and Moretown to the south and by Waterbury to the east. Middlesex is classified as a rural town and is characterized by large forested areas and open fields. The Town is located within the Winooski Valley watershed and major waterways include Martins Brook which flows into the man-made Wrightsville Reservoir in the western quadrant. The Winooski River runs along the town's southern boundary from Montpelier toward Lake Champlain.

The major transportation corridor in Middlesex is Interstate 89 which runs parallel to Route 2, the Central Vermont railroad and the Winooski River. According to the *Middlesex Town Plan 2013* "the I-89 exit in Middlesex is along the most heavily traveled section of the highway in the state and the Middlesex exit is one of the least commercially developed exits in central Vermont." The village of Middlesex is located near the interstate exit at the intersection of Route 2 and Route 100 B. It is an historic settlement of residential, municipal and commercial buildings. Putnamville is additional historical residential hamlet located on Route 12, north of the Wrightsville Reservoir. Additional development in Middlesex is scattered low-density residential development.

According to the US Census, the estimated population of Middlesex in 2014 numbered 1,735 living in 764 housing units. According to the 2013 Middlesex Town Plan, two models predict that population in Middlesex will top out at either 1,994 or 2,460 by 2020. New development in Middlesex continues to be scattered rural residential. The new development is limited and scattered and not in the floodplain so does not increase the vulnerability for the Town.

Since the 2012 HMP, Red Hen Bakery has located its headquarters and bakery at the former Camp Meade property. Several other smaller businesses have moved to the former Camp Meade property as well, including Nutty Steph's confectionary, an art gallery, and a pottery studio. In 2015, Kingsbury Construction received permits to build a small office complex on property off Center Road near the Exit 9 interchange on I-89 which was completed in the summer of 2017.

Middlesex has no municipal water or wastewater treatment facility. Residents rely on private wells and springs and ground-treatment septic systems. The State of Vermont Regional Office issues water/waste water permits for soil based wastewater systems with flows less than 6500 gallons per day, for potable water supplies (water supplies that are not public), and for municipal water and sewer connections. Electricity is provided by Green Mountain Power (GMP) and Washington Electric Coop.

In regard to public safety, police services are supplied by Vermont State Police. The Middlesex Volunteer Fire Department (MVFD) is responsible for fire protection and also provides initial emergency medical services. The MVFD operates from two stations: one located in the village and one located on Shady Rill Road between the Rumney School and the Town Garage. According to the *Town of Middlesex, Vermont*

Annual Report 2015, the MVFD responded to a total of 81 FD calls. Some of these calls included: 6 structure fires, 2 brush/grass fire, 8 vehicle fires, 5 mutual aid calls, 37 vehicle accidents, 6 hazardous situations, and 10 false alarms.

In August 2014, the Middlesex Select Board created an Emergency Management Committee to coordinate community preparedness in anticipation of a natural disaster. The committee is made up of a certified and trained emergency management coordinator, the town's health officer, animal control officer, fire department chief, and representatives from the local school and select boards.

The *Middlesex Town Plan 2013* includes descriptions, goals, objectives and implementation strategies for public safety in regards to transportation, waste and sewage, and emergency services. The *Middlesex Land Use & Development Regulations September 2006* were being rewritten during the process of updating this Local Hazard Mitigation Plan. The *Middlesex Land Use & Development Regulations* were approved and adopted after a duly warned public hearing on January 10, 2017 and became effective immediately. These regulations incorporate and implement the Town Plan as most recently amended; and integrate all administrative and regulatory provisions for the Town's zoning and subdivision regulations into a single set of land use regulations. The "Middlesex Zoning Regulations," adopted March 1, 2011 are no longer in effect. The newly adopted regulations contain a Flood Hazard Overlay District and regulations for the review, conditional uses, permitting, and development standards to be used in Flood Hazard Areas. The location and boundaries of each zoning district are depicted on the official "Town of Middlesex Zoning Map" and the most current National Flood Insurance Program maps, which are incorporated by reference and are a part of these regulations.

The Town Zoning regulations approved as of January 10, 2017 states that all structures shall be set back a minimum of 75 feet from all streams, rivers and public lakes, and that development shall not take place on slope gradients in excess of 25%. To ensure the protection of groundwater resources to serve current and future Town residents, these standards shall apply to all development: (1) The following potential sources of contamination are specifically prohibited within designated Source Protection Areas, unless it is demonstrated to the satisfaction of the ZBA under conditional use review (Section 5.4), that no potential for contamination of a water supply exists: (a) gasoline and motor vehicle service and repair facilities; (b) machine and body shops; (c) car washes; (d) the outdoor storage of road salt and other de-icing chemicals; (e) public or community wastewater treatment facilities; (f) fuel storage, except for agricultural or residential use; (g) underground storage tanks; (h) solid waste disposal facilities and sanitary landfills; (i) dry cleaning, furniture stripping, metal plating, and photographic processing activities; (j) junk and salvage yards; (k) extraction and quarrying activities; (l) cemeteries; (m) lawn and garden stores; (n) power plants and substations; and/or (o) any other use which involves the generation, use, storage, treatment, transportation or disposal of potential contaminants greater than normal household use.

Middlesex has an adopted and approved Local Emergency Operations Plan (LEOP), formerly known as a Basic Emergency Operations Plan, which is updated and adopted annually. The LEOP was last updated in April 2017 and is due for renewal by May 1, 2018. In conjunction with the LEOP, on March 25, 2014, the town adopted the use of the National Incident Management System (NIMS) as the standard for management and systematic approach involving all threats and hazards, regardless of cause, size, location, or complexity, in order to reduce loss of life, property, and harm to the environment.

Much of the work of town government is accomplished by local volunteers. Middlesex is governed by an elected, five member select board. The select board is responsible for the general supervision of Town affairs. Among its duties are the enactment of local ordinances, the preparation of an annual budget, the maintenance of Town roads, real estate and equipment; the appointment of all non-elected positions, and the hiring of all Town employees except the assistant town clerk (Maryke Gillis). The Town also has an

appointed road commissioner (Steve Martin), fire warden (Jason Merrill), health officer (Liz Fortman), zoning administrator (Mitch Osiecki), and an active 5 member planning commission. Town Clerk, Sarah Merriman, maintains regular town office hours Monday through Thursday. A complete listing of Town officials (elected and appointed is found in the Attachments).

Elected Lister's (Richard Alderman and Eric Young, Amy Whitehorne) track and assess property values in Town. The Town's State Senator (Patrick Leahy) representing Washington County, does live part time in Town. Middlesex, as all Vermont towns, relies almost solely on the local property tax base and state aid to fund town government- including town offices and facilities, schools and local roads. The Town's property tax also supports local fire and rescue services through annual appropriations. The Town doesn't have the ability to expand its resources. Middlesex is an active member of the Central Vermont Regional Planning Commission and the 23-town Local Emergency Planning Committee #5.

4. Planning Process and Maintenance

4.1 Planning Process

The Middlesex Selectboard took the lead role on the Plan update process. CVRPC provided staff support. An ad hoc committee was formed and included the following 2016 members:

Name	Role
Peter Hood	Selectboard Chair
Sarah Merriman	Town Clerk and Assistant to the Selectboard
Mary Just Skinner	SB Member
William Callnan	SB member
Steve Martin	SB member and Road Commissioner
Liz Scharf	SB member
David Jablonski	Emergency Management Coordinator (2015 – 2017)
Paul Ontenti	Emergency Management Coordinator (2017, and currant EMC)
Jeff Koonz	Middlesex Fire Chief
Cindy Carlson	Zoning Administrator
Steve Gladczuk	CVRPC Transportation Planner (served until July 2016 due to illness and passed away January 2017)
Ashley Andrews	CVRPC GIS Planner (July 2016 going forward)

The Central Vermont Regional Planning Commission (CVRPC) coordinated the Middlesex local hazard mitigation process. CVRPC staff Steve Gladczuk, Senior Transportation Planner and later Ashley Andrews, GIS Planner, assisted the town committee with the plan revisions and update.

On December 10, 2015, CVRPC Executive Director Bonnie Waninger sent a letter to Middlesex Selectboard Chair Peter Hood notifying the town of the HMGP grant awarded to CVRPC to assist nine municipalities in the update of their local hazard mitigation plan, Middlesex being one of the nine towns. Steve Gladczuk, CVRPC Senior Transportation Planner followed up the letter with a phone call to Sarah Merriman, Town Clerk and Assistant to the Selectboard. A spring meeting was established. In the meantime, Steve Gladczuk met by phone with Select Board Chair Peter Hood and Town Clerk Sarah Merriman to discuss the update process and gather preliminary information to begin to update the Plan.

On April 12, 2016 Steve Gladczuk met with the Middlesex Select board to review the 2012 Hazard Mitigation Plan. A committee will be formed of the Emergency Management Coordinator David Jablonski, representatives from the MVFD, Rumney School and other town officials with a goal of finishing a revised draft by July. All Select board meetings are publicity warned and advertised in three locations, a legal add

in the Times Argus, town website, and Front Porch Forum. The Select board, Road Foreman, Town Clerk, and one member of the public attended.

On May 11, 2016, Steve met in person with Mr. Hood, Emergency Management Coordinator David Jablonski, MVFD President Jeff Koonz, Road Commissioner Steve Martin, Zoning Administrator Cindy Carlson and Sarah Merriman at the Town Clerk's Office for a working session.

The Middlesex Hazard Mitigation Meeting focused on assessing past mitigation projects and compiling information on its current and future hazard mitigation programs, projects and activities. The meeting indicated that the Town is most vulnerable to the same hazards identified in 2012 with the addition ice jams as a worst threat hazard. CVRPC staff drafted a plan based on input from the May meeting, subsequent conversations with committee members, and research.

A public meeting was planned for June 28, 2016 to gain public comment and input on the draft updated plan. The draft plan and notice of the upcoming public hearing regarding the plan were then mailed to the Town Clerk's in the following abutting towns: Cherilyn Brown, Moretown; Jon Odum, Montpelier; CJ Flynn, East Montpelier; Carla Lawrence, Waterbury; Katie Winkeljohn, Worcester; Donna Fitch, Calais; Alison Kaiser, Stowe; and Rosemary Morse, Berlin.

The updated draft plan was also made available at Middlesex municipal offices, the Middlesex website, and by request from CVRPC with the period for public review and comments from June 8, 2016 to June 28, 2016 so noted. On June 8, 2016, notices of a June 28, 2016 public hearing on the draft plan which had a discussion of the plan as a whole and to review the mitigation actions, were posted in three public places around town, on the town's official website, on Front Porch Forum (a community online newsletter), and in a legal advertisement published in the Times-Argus on June 11, 2016. In addition, the announcement of the draft update in the CVRPC newsletter was distributed to over 300 people and businesses in the Region's 23 towns, including the adjacent towns of Worcester, Waterbury, Montpelier, East Montpelier, Berlin, Moretown, and Calais. Residents and or Town officials were to contact CVRPC (Steve Gladczuk at gladczuk@cvregion.com) or the Town (Sarah Merriman at middlesxtwnclrk@comcast.net) with comments. No comments were received on the draft plan by CVRPC or Middlesex Staff.

In June of 2016, CVRPC GIS Planner, Ashley Andrews, CVRPC planning staff L. Ranker, and Transportation Manager Steve Gladczuk worked with the town on the Transportation Vulnerability Assessment. A meeting with the Town Road Foreman Paul Cerminara took place on later that month to review the computer generated Transportation Vulnerability Assessment Map prior to CVRPC staff field verifying the data. Critical infrastructure and hazardous sites were reviewed and priority areas identified. Data included identification of adequate and undersized culverts and bridges; road modifications for areas with low spots or high spots; identification of areas with steep slopes; and road alterations required to improve drainage such as ditches, swales, and cross bars. Later that month CVRPC staff A. Andrews, L. Ranker, and Steve Gladczuk drove all the roads in Middlesex to field verify the vulnerable assessment data and prioritize vulnerable sites and those at risk. Photos and notations were made. A. Andrews updated the maps generated to reflect on the ground conditions and identify priority sites which were then delivered to the Town of Middlesex planning team with the accompanying photos and list of priority sites. This vulnerability assessment information was considered in updating this Plan. See attachment for this map.

One Middlesex resident and the CVRPC Emergency Management Planner, Laura Ranker, attended the June 28th public hearing along with the Select Board and Town Clerk. No comments were received from

the public on the draft local hazard mitigation plan. One outcome of the public hearing was to have CVRPC staff meet with Road Commissioner Steve Martin and Road Foreman Paul Cerminara to review the Road Vulnerability Assessment results for consideration of incorporation into the LHMP. Ashley Andrews, CVRPC GIS Planner, performed the follow-up which included a consultation meeting with Road Foreman Paul Cerminara in the fall of 2016. The pertinent areas of vulnerability have been written into this plan.

CVRPC experienced significant changes in staffing with the medical leave and then passing of Steve Gladczuk, Transportation Planner in 2016. CVRPC reached out to the Town Clerk and arrangements were made to schedule a status meeting with the Selectboard prior to submitting the final draft to VEM and FEMA. CVRPC staff (Laura Ranker, Emergency Management Planner, and Ashley Andrews, GIS Planner) met with the Middlesex Selectboard on February 14, 2017. Present at this meeting were Selectboard members Peter Hood, Chair, Mary Just Skinner, Vice Chair, Steve Martin, Elizabeth Scharf, Phil Hyjek, and Sarah Merriman, Clerk. Also present was Dorinda Crowell, Middlesex Treasurer. As a result of this meeting, final revisions and edits were made and incorporated into the final draft for submittal to VEM and FEMA. On February 17, 2017 CVRPC staff submitted the final draft with the Local Plan Review Tool Checklist to Stephanie Smith at VEM. This started the review process with VEM and FEMA.

In the future, submitted public comments will be reviewed by the Select Board (and CVRPC staff dependent on funding) and attached as an appendix. In the future, the plan will be made available during Town Meeting Day and local meetings with State and local officials to allow for public comment and review. Once the plan is conditionally approved by FEMA, the plan will go before the Select Board for adoption.

Prior to formal adoption by the Selectboard, a Public hearing will be warned on a date to be determined, to get public comment on the final plan. Upon FEMA written notice of FEMA Approval Pending Adoption, the Middlesex Selectboard will hold a regular warned public Selectboard meeting to approve and adopt the hazard mitigation plan by resolution. Upon adoption the Selectboard will submit the adopted plan and certification to VEM/FEMA so that FEMA can issue the final plan approval letter. This plan will expire 5 years from the date of FEMA approval.

4.2 Plan Update Process

The Middlesex Local Hazard Mitigation Plan was originally adopted by the Town as an annex to the Central Vermont Regional Local Hazard Mitigation Plan in March 2009 and received FEMA final approval in September 2009. In 2012, the Town updated the plan creating a single jurisdiction local mitigation plan, which received FEMA approval in September 2012. This 2018 plan is an update of the 2012 Town of Middlesex Local Hazard Mitigation Plan and will guide the town into the next five years and maintain the town's eligibility as an applicant for mitigation grants.

This Plan reflects changes from the 2012 plan related to the town's vulnerabilities to hazards and how Middlesex addresses them based on changes in priorities and the effects of the implementation of past mitigation actions and strategies. Ice Jams have become more of a concern for the Town. With the fluctuation in temperatures becoming more common. The implementation of mitigation actions over the past five years, some not listed because the town considers them to be regular maintenance and program implementation measures, have reduced the town's vulnerability to specific hazards. Middlesex has benefitted from the collaborative approach to achieving mitigation on the local level, by partnering with Agency of Natural Resources (ANR), Vermont Agency of Transportation VTrans, Agency of Commerce and Community Development (ACCD), Vermont Emergency Management, Central Vermont Regional Planning Commission (CVRPC), Federal Emergency Management Administration (FEMA) Region 1 and

other agencies, all working together to provide assistance and resources to pursuing mitigation projects and planning initiatives in Middlesex.

Review of existing plans, studies, reports, and technical information

Preparation for the Planning meetings included a review of the following documents and resources as noted below as well as conversations with CVRPC GIS Planner, CVRPC Transportation Planner, Town Clerk Sarah Merriman, Road Foreman Paul Cerminara, VEM Critical Infrastructure and Hazard Mitigation staff, and DEC Dam Safety Program staff.

- Middlesex Local Hazard Mitigation Plan Update December 2011; FEMA approved 9/2012.
- Middlesex Town Plan adopted 2013.
- State of Vermont Hazard Mitigation Plan, November 2013.
- Emergency Action Plan, Wrightsville Dam, Montpelier, VT State ID #126.01, August 31. 2012, prepared by The Department of Environmental Conservation, Vermont Dam Safety Program.
- Emergency Action Plan Marshfield NO. 6 Dam, Marshfield VT State ID # 39.02. December 2013, prepared by Kleinschmidt
- Federal Emergency Management Agency, Repetitive Losses/BCX Claims, Vermont; and Non-mitigated repetitive loss properties data.
- FEMA Disaster Declarations in Vermont.
- National Weather Service.
- National Oceanic and Atmospheric Administration (NOAA), National Centers for Environmental Information and historical weather data.
- 2017 Town of Middlesex Local Emergency Operations Plan.
- Town of Middlesex 2016 Hazard Analysis Map
- 2016 Town of Middlesex Transportation Vulnerability Assessment and Map.
- Flood Ready VT.
- FEMA Local Mitigation Planning Handbook, March 2013
- FEMA Local Mitigation Plan Review Guide, October 1, 2011.
- NFIP FEMA FIRMS Town of Middlesex, 2013.
- Vermont Housing DATA.
- American Community Survey Demographic and Housing Estimates, 2011-2015 American Community Survey 5-Year Estimates.
- Middlesex Town Forest Management Plan 2010.
- 2010 Vermont Forest Resource Plan, Dept. Forest, Parks, and Recreation, Division of Forestry

In the process of updating the local hazard mitigation plan, the following is a list of revisions to the 2012 Plan. Hazards are clarified and reprioritized based on current town conditions and vulnerability with the addition of Ice jams.

General Updates:

- Update to the Community Profile.
- Reevaluation, identification and analysis of all significant hazards.
- Update to Planning Process and Maintenance.
- 2012 Mitigation Strategies Status Update Chart – acknowledgement of implemented mitigation strategies and actions since 2012 and update status of 2012 proposed actions/strategies.

- Added 2017 Mitigation Strategies/Actions Chart based on current reevaluation and prioritization. Identification of on-going, current, and proposed mitigation projects and strategies for the next 5 years.

- Incorporation of new data and information throughout the Plan since last update in 2011/2012 including town regulations, ordinances, and hazard data (events, declarations, non-declared disasters)

- Update Existing Hazard Programs, Projects, and Activities.

Hazard Analysis

- Flood/Flash Flood/Fluvial Erosion/ Dam failure, and Ice Storm remain on the list of "worst hazards", reflecting the community's belief that these hazards are the most significant and the town is still vulnerable to these hazards. Ice Jams are a new hazard identified as a worst threat hazard.
- Extreme Cold/Winter Storm and Hurricane/Severe Storm remain as a moderate threat hazard.

- For each hazard, a hazard matrix is used to summarize the hazard description in a table with a location/vulnerability/extent/impact/probability given.

- Review of Federally declared disasters, weather data, ANR resources, VT Flood Ready site, and NOAA site.

- Review of Vermont November 2013 State Hazard Mitigation Plan.

Maps

- Updated Hazard Analysis map is added; flood plain and surface waters added, tier II sites (critical facilities), structures in Special Flood Hazard Areas, river corridors.
- Transportation Vulnerability Assessment Map is added (new map)

Town Capabilities for Implementing Mitigation Strategy

A four-member volunteer Select board and the full time Town Clerk oversee services provided by Middlesex. The five-member volunteer Planning Commission (PC) is charged with "three main jobs, beginning with the process of making amendments to the Town Plan, Zoning Bylaw, and the Subdivision Ordinance. The PC also hears requests for allowed use determinations and multiple driveway requests." (Report of the Town Officers for Fiscal Year July 1, 2015 to June 30, 2016). The five-member citizen Zoning Board of Adjustment hears subdivision requests, site plan reviews, conditional uses, variances, and appeals of the Zoning Administrator. The Town employs several staff members to carry out services to its residents on a daily basis. The following are the paid positions which are involved in hazard mitigation:

- FULLTIME EMPLOYEE (1)
- Town Clerk

- PART TIME EMPLOYEES (9)
- Treasurer/Collector of Delinquent Taxes
- Zoning Administrator
- Assistant Town Clerk
- Town Health Officer

- Animal Control Officer
- Listers
- Bookkeeper
- Recreation Director

The Select board is at the center of town government in Vermont, and Middlesex is no exception. Middlesex has a five-member Select board. Members are elected by Middlesex voters at Town Meeting, for staggered terms of either two or three years. The Select board is responsible for the general supervision of town affairs. It has a number of functions, including: legislative (enacts local ordinances, regulations and policies), and administrative (prepares the budget, oversees all town expenditures, and supervises town employees and controls town buildings and property).

In a broad sense the Planning Commission is responsible for thinking ahead, with the help of Middlesex residents—for envisioning what we all want our town to be like in the future and then helping to make that happen.

In addition to drafting the Town Plan and zoning bylaws, the Planning Commission does site plan review of zoning applications for "allowed" uses (except one- or two- family residential uses and agricultural uses). The Commission can use this review to request certain conditions relative to the layout of roads and driveways, traffic flow, landscaping and screening and erosion control measures. (Zoning applications for uses defined as "conditional" are referred to the Zoning Board of Adjustment for consideration.)

In addition, the Planning Commission may study and make recommendations on land development, transportation, energy conservation, and many other related matters.

The Planning Commission makes a strong effort to contact town residents about meetings where citizens can provide input, and includes news in many issues of the Middlesex Monthly.

The Commission is made up of five members, elected for staggered three-year terms. The group always welcomes people who want to get involved, and encourages you to contact them with questions or comments. Meetings are held on the first Wednesday of each month from 6:30-8:30 p.m.

In Middlesex, the Town Plan is developed by the volunteer Planning Commission, with input from citizens. After a public hearing, the plan is then referred to the Select Board, which also holds a hearing. In towns that so choose (and Middlesex has been one), the Select Board then sends the plan to the voters for approval. The Town Plan may include recommendations for both voluntary and regulatory actions. It is also used as a benchmark in certain Act 250 proceedings. The plan is updated and readopted every five years. The Planning Commission is also charged with preparing Zoning Bylaws or amendments to implement the town plan, which are adopted in a similar fashion. There is a specific process for Zoning Bylaws or amendments

The Middlesex Conservation Commission's mission is to conserve the town's natural and cultural resources. The Conservation Commission works with the town's other governmental entities and the public to identify and assess resources, to offer the town and landowners guidance on planning for the conservation of these resources, and to educate the residents of Middlesex as to why conserving these

resources is so important. Updates on the Commission's work appear regularly in the Middlesex Monthly.

The Conservation Commission's nine volunteer members are appointed by the Middlesex Select board for staggered terms of four years. (Text about town government taken from the Middlesex Town website)

Status Update on Mitigation Actions Identified in 2012
The following chart provides an overview of Middlesex's proposed hazard mitigation actions under the 2012 plan and their current status. The team reviewed these actions and reported on the status of each.

Mitigation Action	2018 Status
Buy out of property on 3 Mile Bridge Rd	Completed
Expansion and upgrade of Shady Rill Culvert	Completed
Expansion and upgrade of lower Sunny Brook Road culvert	Included in 2018 LHMP
Hydraulic study for 3 Mile Bridge Rd culvert	Hydraulic Study Completed, next steps in 2018 LHMP
Improve communications with Montpelier and Waterbury during flood events	Ongoing
Work with State to help with inundation modeling of Wrightsville Dam	Included in 2018 LHMP
Work with Green Mountain Power to help with inundation modeling of Marshfield Dam	Included in 2018 LHMP
Work with elected officials, the State and FEMA to correct existing compliance issues and prevent any future NFIP compliance issues through continuous communications, training and education	Ongoing
Select projects from North Branch Corridor Plan	Included in 2018 LHMP
Install generator at Town Hall	Included in 2018 LHMP
Have school certified as Red Cross Shelter	Included in 2018 LHMP
Provide training to residents on how to insulate homes (pipes, attics) for extreme cold spells	Ongoing, Included in 2018 LHMP
Upgrade electrical systems in municipal buildings and shelters to prevent surge/equipment damage from fluctuating current during ice and wind storms	Included in 2018 LHMP

Additional Actions that have occurred since 2012	2018 Status
Implement an automatic notification system in the event of a disaster, such as flooding.	Through FPF and other modes of communication, the town has encouraged residents in low-lying or otherwise vulnerable areas to subscribe to the free VT-Alert system.

Purchase a back-up power generator for the emergency shelter at the Rumney Elementary school.	Generator purchased and installed
Participate in NFIP training offered by the State and/or FEMA that addresses flood hazard planning and management.	Emergency Management Coordinator David Jablonski has completed training and Select Board Chair Peter Hood is certified as well.

Existing Hazard Mitigation Programs, Projects & Activities

Middlesex is currently engaged in the following hazard mitigation programs, projects, and activities. These are listed by strategy and were reviewed for the development of this Plan. They share and incorporate the overall goals of the local hazard mitigation plan. Middlesex has the capacity to maintain these programs and initiatives using the staff and volunteers described in the Town Capacities.
The ongoing or recently completed programs, projects and activities are listed by strategy.

- Community Preparedness Activities

- Local Emergency Operations Plan, 2017, reviewed and adopted annually. No need to expand or change process.
- Capital Equipment Plan, This requires annual review and approval. Funding from Town budget. Process is satisfactory and there is no need to expand or improve program/policy.
- School disaster/emergency/evacuation plans, reviewed and adopted annually. No need to expand or change process.
- Creation of an Emergency Management Committee in 2014. This can be expanded upon, since at time of LHMP there is no active committee.
- Participation in LEPC5 Meetings, The EMF participates at regular meetings of the Local Emergency Planning Commission #5. Volunteer time. No need to expand or improve on attendance.
- Red Cross Shelter Agreement, Town shelter is in the process of being designated at Rumney Elementary School. Facilitated by Shelter Managers and community volunteers. Coordination with EMD, Select board, School Principal. No need to expand or change process.

Town Fire Warden, Appointment of a Town Fire Warden to serve a five year term. The Town Fire Warden is Jason Merrill. No need to expand program.

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- Insurance Programs

- Participation in NFIP

  - Authority/Program – Middlesex participates in the NFIP since 6/24/1974. It has adopted Flood Hazard regulations (lasted updated in 2017) and enforces the regulations. It uses the most recent FEMA FIRMs for Middlesex in Washington County, VT. Mitch Osiecki, Town Zoning Administrator serves as the NFIP administrator. Assistance is provided from ANR and CVRPC as requested. Funding from Town Budget. The Towns current Flood Insurance Rate Map was updated effective 3/19/2013. No need for expansion or improvement.

- Land Use Planning/Management

- On January 10, 2017 the Middlesex Selectboard approved the final revisions to the Middlesex Land Use and Development Regulations. No need for expansion or improvement at this time.

- Middlesex Town Plan, amended 2013 to include updated population, transportation and business data as well as goals of local development. No need to expand or change process. This 2013 plan update included a review of the previously adopted 2012 LHMP by the planning commission.
- North Branch Corridor Plan – March 2009 CVRPC No need to expand or change process.

Completed Action – Study presented a series of recommendations. Town is not in the position to implement the recommendations due to a lack of funding, coordination and cooperation among parties, and lack of staff capacity and time. This is a one-time action, so there is not a need to expand or improve on it. When the town has the financial and personnel capacity and cooperation of other parties, it may look to implement some of the recommendations of the study/plan.

- Protection/Retrofit of Infrastructure & Critical Facilities and Hazard Control

- Maintenance Programs (Town Culvert Inventory – 2015)
- Mutual Aid Agreements
- Repair and expansion of TH2 Bridge 5 (Shady Rill Road) and culvert in 2015
- Buyout of two properties on 3 Mile Bridge Rd (2013)
- Hydraulic study for 3 Mile Bridge Rd culvert (2012)
- Town Road and Bridge Standards (2016)
- Flood Hazard Regulations (2017)
- Generators installed at critical facilities (2015)

- Public Awareness, Training & Education

- Fire safety educational programs ongoing
- Motor vehicle accident response training
- First responder CPR & hazmat trainings
- School Fire Safety Program (SCHOOL)
- Town Website/ Front Porch Forum

4.3 Plan Maintenance Process

The Middlesex Local Hazard Mitigation Plan is updated and evaluated annually at an April Select Board meeting to assess whether the goals of the plan are being met. The Town will also review of the Local Emergency Operations Plan. Updates and evaluation by the Select Board will also occur within three months after every federal disaster declaration that affects Middlesex and as updates to town plan/zoning and river corridor plans come into effect. The plan will be reviewed by the Select Board, Planning Commission, Emergency Management Committee, Select Board Assistant, Zoning Administrator, and public at the above mentioned April Select Board meeting. The Select Board 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, notice in the municipal building, the Times-Argus, Front Porch Forum and CVRPC newsletter inviting the public to the scheduled Select Board (or specially scheduled) meetings. Additional stakeholders invited to the meeting will be a representative from the Rumney School and Wrightsville Dam. Also invited in the future will be the VT Agency of Natural Resources (VT ANR), as they are able to provide assistance with NFIP outreach activities, models for stricter floodplain zoning regulations, delineation of fluvial erosion hazard areas, and other applicable initiatives. These efforts will be coordinated by the Select Board.

Monitoring of plan progress, implementation, and the five-year update process, will be undertaken by the Select Board in conjunction with the Road Commissioner, the MVFD, and the Emergency Management Coordinator. The Select Board Assistant will take the Plan maintenance activities to the Select Board per agenda and discussion. Monitoring updates may include changes in community mitigation strategies; 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 five year interim period, the plan can be amended without formal re-adoption during regularly scheduled Select Board meetings. After a five year period, the plan will be submitted for re-adoption following the process outlined the schematic found in the Attachments section. In order to maintain a current up to date unexpired plan, within one year of this plan expiration data, the plan update process with FEMA should begin.

Middlesex shall also incorporate 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 North Branch Corridor planning documents for ideas on future mitigation projects and hazard areas.

5. Community Vulnerability by Hazard

5.1 Hazard Identification

The team identified avalanche, drought, earthquakes, extreme heat, landslide/ debris flow, nuclear power plant failures, rock cuts, structure fire, terrorism, tornados, ~~and~~ wildfires, and hurricanes as a low probability of occurrence and low impact. Accordingly, and due to a lack of resources and capacity at the town, these hazards will not be discussed in detail in this plan. Hazards not identified as a "worst threat" may still occur. Greater explanations and mitigation strategies of these threat hazards can be found in the State of Vermont's Hazard Mitigation Plan. Like the State of Vermont Hazard Mitigation Plan, Middlesex did not include the following hazards in the risk and vulnerability assessment due to the low occurrence, low vulnerability, and or geographic proximity: civil disturbance, coastal erosion, expansive soils, karst topography, sinkholes, tsunami, and volcano.

In determining the likelihood of a hazard happening in Middlesex the following method was used:

--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.

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

The following natural disasters were discussed and the top priority hazards were identified based upon the likelihood of the event and the community's vulnerability to the event. The Hazard Assessment Table reflects the hazards Middlesex feels can be expected, or at least are possible, to occur in Town.

Hazard	Likelihood [1]	Community Vulnerability[2]	Worst Threat
Avalanche/ Landslide	Low	No	
Dam Failures	Low	Yes	X
Drought	Low	No	
Earthquake	Low	No	
Extreme Cold/Winter Storm/Ice Storm	Medium	Yes	X
Flash Flood/Flood/Fluvial Erosion/ Ice Jam	High	Yes	X
High Wind	Medium	Variable	WIDESPREAD
Hurricane/Severe Storms	Medium	Yes	WIDESPREAD
Structure Fire	Low	No	
Tornado	Low	No	
Water Supply Contamination	No	No	
Wildfire/Forest Fire	Low	No	

Just because the town has not identified a hazard as a top priority or significant threat, does not mean the hazard will not occur in the future, they are just not the focus of this Plan.

Town of Middlesex identified the following hazards be the most significant to the community:

Worst Threat hazards include:
- Dam Failure
- Flood/Flash Flood/Fluvial Erosion/ Ice Jam
- High wind/prolonged power outages

The Town is interested in focusing a majority of mitigation efforts into reducing impacts from flooding, as the events occur most frequently, severely and cause the most damage to public and private infrastructure.

Moderate threat hazards include:
- Extreme Cold/Winter Storm/Ice Storm
- Hurricane/Severe Storm

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-#) if available, plus information from local records, a narrative description of the hazard and a hazard matrix containing the following overview information:

Overview Information in 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, systems, populations, or other assets as defined by the community that are susceptible to damage and loss from hazard event	Strength or magnitude and general details of the most notable event(s): Minimal, Moderate; or Severe*	Dollar value or percentage of damages	Likelihood of hazard occurring based on past events: Low Likelihood: 1% to 10% probability in the next year or at least once in the next of occurrence pre year, or at least one chance in next 100 years. Medium Likelihood: 10% to 100% probability in the next year or at least once in the next 10 years. High Likelihood: near 100% probability in the next year.

5.2 Worst Threat Hazards

Dam Failure

There are three dams of concern that affect Middlesex. The first is the Marshfield #6 Dam. (State/ FERC ID# 39.02) The Marshfield No.6 dam is located on Molly's Brook in Cabot, a rural area of the town. The earthen dam was built in 1927 using fill material borrowed locally. The earthfill dam has a chute-type spillway structure at the left abutment, a control structure that serves as an emergency spillway, and an intake structure with 6-foot diameter penstock. The latest Emergency Action Plan (EAP) was last updated in 2013. Information from the 2013 Emergency Action Plan (EAP) prepared by Kleinschmidt of Maine, describes the dam as follows:

> The dam has a drainage area of 23.76 square miles, which includes the Peacham Dam subbasin with a drainage area of 5.77 square miles. Molly's Pond is approximately 2.3 miles long with a maximum width of approximately 0.3 miles. The pond has a maximum surface area and storage capacity of approximately 400 acres and 12,000 acre-feet, respectively. The normal maximum pool is at the top of the spillway stanchion stop logs at elevation 536.55 feet Local Datum (1,228.2 feet NGVD29). The crest of the dam is at elevation 547.5 Local Datum (1,239.15 feet NGVD29). The pool is normally up during the months of June through November with drawdown from December through March before the spring runoff period. The pool is normally drawn down over the winter to about elevation 523.35 feet Local Datum (1,215 feet NGVD29) by March of each year. Note that, unless indicated otherwise, elevations herein pertaining to the dam, impoundment, and vicinity reference the Local Datum that is in use by GMP.

According to the EAP, Green Mountain Power employs an operator that typically visits the dam on Monday-Friday sometime between 7:00 a.m. - 3:30 p.m. Otherwise, the facility is not staffed and operated remotely from the continuously manned Control Center in Colchester, VT. The EAP provides information on the potential impacted area and the people, businesses, and public infrastructure at risk of flooding if the dam should fail. Inundation maps are included in the EAP. Three different scenarios are discussed and individuals are referred to the EAP for further detail. In the event of failure, the immediate downstream communities of Marshfield, Plainfield, East Montpelier, and Montpelier would be impacted

the most, followed by other downstream communities located along the Winooski River, including Middlesex.

The Agency of Natural Resources (ANR) Dam Safety Program identifies Marshfield No. 6 dam as a "high hazard dam". It is important to note, the town of Middlesex along with the towns of Cabot, Marshfield, and Plainfield are in communications with the state Dam Safety Program and the dam owner, Green Mountain Power, to address concerns with the dam's infrastructure and the process of notification in the event of a dam breach. It is not well documented; however, high water levels during severe storms, such as in 2011, have raised concern with the ability of the dam gates to function properly and communication to happen at the local level. All parties are collaborating to improve functions at the Marshfield No.6 dam and power generation site.

The ranking as a "high hazard" dam is based on Vermont Emergency Management classification, "according to the dam's potential for causing loss of life and property damage in the area downstream of the dam if it were to fail" and uses a Downstream Hazard Classification system like that used by the U.S. Army Corps of Engineers as found in Table 4-24 in the Vermont State Hazard Mitigation Plan, November 2013 on page 4-95 and as shown below. The ANR Dam Safety Program inventory has 1240 dams of which 61 are high hazard dams. Of the 61 high hazard dams, ANR has jurisdiction for 40 of them. According to the State Hazard Mitigation Plan, none of the ANR regulated dams are in imminent danger of failure.

Table 4-24
Downstream Hazard Classification of Dams

Class	Hazard Category	Potential Loss of Life	Potential Economic Loss
3	Low	None expected (No permanent structures for human habitation)	Minimal (Undeveloped to occasional structure or agriculture)
2	Significant	Few (No urban developments and no more than a small number of inhabitable structures)	Appreciable (Notable agriculture, industry, or structures)
1	High	More than few	Excessive (Extensive community, industry, agriculture)

Since the adoption of the 2012 Town of Middlesex Hazard Mitigation Plan, the ANR Dam Safety Program has updated and performed studies on the various dams throughout the state and has made available the EAP and inundation area maps to the communities and posted them on their website. Josh Cox, Critical Infrastructure Planner at VEM and Steven Hanna, Dam Safety Engineer with ANR DEC provided the Marshfield No.6 dam EAP and inundation area maps to CVRPC as part of this Plan update process. The full EAP is available in the Middlesex Town Offices for review or can be obtained electronically from CVRPC.

The following provides an overview of the Marshfield #6 Dam hazard: The general areas in the community that may be vulnerable to the hazard are depicted in the mapped Inundation Area found in the EAP. The area includes US Route 2, Porter Road Bridge, Porter Road, Winooski River, and residences, the public and private infrastructure, roads, businesses, natural features, and historic structures within the vicinity mapped Inundation Area. In addition, the downstream communities of Marshfield, Plainfield, East Montpelier, Montpelier and Middlesex would be susceptible to damage and loss from a dam failure. To date, no known events of dam failure or breaching have occurred. There are news reports of close calls most recently in 2011 during the tropical storm Irene event where the dam was in danger of breaching. The potential if failure occurs is severe with loss of life and property probable. The likelihood of a hazard occurring based on past events is considered to be low, 1-10% probability of occurrence pre year, or at least one chance in next 100 years.

The Wrightsville Dam and Reservoir (State/ FERC ID # 126.01)is located on the north east border of Middlesex and the North Branch of the Winooski River about 4.4 miles about the confluence with the Winooski River and Montpelier. The Dam is used mainly for flood control; however a small conservation pool is maintained for recreational and small hydropower uses. The dam is owned by the State of Vermont and operated by the Agency of Environmental Conservation. The dam consists of a rolled earth embankment, having a maximum height of 115 feet and an embankment length of 1525 Feet, exclusive of a spillway. The spillway consists of a concrete overflow-section. The concrete over-flow section has an effective crest length of 155 feet. The low-level outlets of the dam consist of reinforced concrete rectangular conduit divided into three barrels. The latest Emergency Action Plan (EAP) was last updated in 2013. Information from the 2012 Emergency Action Plan (EAP) prepared by DuBois & King.

The dam has a drainage area of 68.1 square miles. The Dam height at top of the dam is 115 feet. The Surface area at the conservation pool is 90 acres with an elevation at 620 feet. The storage at the conservation pool is 520 acre feet. The distance from the fixed concrete spillway to the top of the dam is 30 feet with the elevation of the spillway at 685 feet and the elevation at the top of the dam at 715 feet. Wrightsville Reservoir can store up to 6.6 billion gallons of water for flood control purposes. This is equivalent to 5.6 inches of water covering its drainage area of 68.1 square miles.

The Middlesex Dam #2 is a hydroelectric dam located on the confluence of the Winooski and the Mad River. Bordering the village or Middlesex and the town of Moretown. The Dam is operated by Green Mountain Power and at this time the only available data from Green Mountain Power is that "the dam is safe and GMP continues to make improvements to it. (John Greenan conversation/email Oct 27, 2017)

There have been no occurrences of any of these three dams breaching. The extent of flooding from dam failure in Middlesex is unknown. Maps of a Wrightsville Dam breach only maps location, not depth. For the next plan update, Middlesex can work with Green Mountain Power and the State to determine the extent of flooding if a dam were to breech.

Hazard	Location	Vulnerability	Extent	Impact	Probability
Dam Failure	Area along North Branch and Winooski Rivers	Private property, roads, culverts, bridge infrastructure.	Marshfield dam during TS Irene – 542 ft above sea level (normally at 536 feet),	$70 million based on potential residential home loss (average grand list value $200,000)	Low

Flood/Flash Flood/Fluvial Erosion/Ice Jam

Recent History of Occurrences (from NCDC website and FEMA DR List. The closest river gauges are Montpelier located 5 miles upstream, and Winooski located 10 miles downstream):

Date	Event	Location	Extent
6/29-	Flooding	Washington County	Flood occurred in surrounding

7/1/2017			towns but Middlesex was not impacted.
2/25/2016	Flood/Ice Jam	Middlesex	2-2.5" of rain, 1-3" of ice pack melted, resulted in 2-4' of water on US 2
6/11/2014	Flooding	Washington County	Montpelier flood gauge at N.A.
8/2/2013	Flooding	Washington County	Montpelier flood gauge at 4.23
11/8/2011	Flooding	Washington County	Montpelier flood gauge at 4.05 DR 4043
8/28/2011	Flood/Tropical Storm	Statewide, Middlesex	Winooski Flood gauge knocked out – above 423.3 feet (flood stage is 419 feet) – DR 4022
5/27/2011	Flood	Middlesex	Winooski flood gauge at 423.3 feet DR 4001
4/11/2011	Flood	Middlesex	2-4" of rain and heavy snowmelt, Winooski flood gauge at 421.0 feet DR 1995
8/2/2008	Flash Flood	Washington County	3-5" of rain, not a historical crest in Montpelier
7/11/2007	Flash Flood	Washington County	3-6" of rain in 2 hrs – DR 1715, not a historical crest in Montpelier
6/26/2006	Flood	Washington County	3-4" of rain, not a historical crest in Montpelier
9/16/1999	Tropical Storm Floyd	County Wide	Montpelier flood gauge at 9.30 feet, 5-7" rain county wide DR 1307
1/19/1996	Ice Jam	Middlesex	Failure of a jam on the Winooski River upstream of Montpelier caused extensive ice damage to the Town
6/17/1998	Flash Flood	County Wide	3-6" of rain over 2 day period - DR 1228, not a historical crest in Montpelier
8/5/1976	Flood	County Wide	Montpelier flood gauge at 12.31 feet – DR 518
6/30/1973	Flood	County Wide	Montpelier gauge at 17.55 ft DR 397
9/22/1938	Flood/Hurricane	County Wide	Montpelier flood gauge at 14.11 feet
11/03/1927	Flood	County Wide	Montpelier flood gauge at 27.10 feet

Flooding/flash flooding/fluvial erosion/Ice Jam is Middlesex's most commonly recurring hazard in limited low-lying areas. Flooding is the overflowing of rivers, streams, drains and lakes due to excessive rain, rapid snow melt or ice. Flash flooding is a rapidly occurring flood event usually from excessive rain. Fluvial erosion is the process of natural stream channel adjustments. Fluvial erosion causes erosion of sediment in some areas, while causing aggradation of sediment in other. Fluvial erosion processes occur more quickly and severely during flood events. Ice jams have been identified as an increasingly dangerous hazard in Vermont, as these can lead to sudden and catastrophic flooding in many locations. The Winooski River and Montpelier have been identified as particular areas of interest, given the history of ice jams and flooding in these locations. More than a dozen serious ice jam events have occurred in Montpelier since 1900. Due to Middlesex's location as the next town downstream from Montpelier on the Winooski it is safe to assume they will continue to pose a threat to Middlesex for the foreseeable future. An Ice Jam occurs when warm temperatures and heavy rain cause snow to melt rapidly. Snowmelt combined with heavy rains can cause frozen rivers to swell, which breaks the ice layers on the top of the river. The ice layers often breaks into large chunks, which float downstream and often pile up near narrow passages or other obstructions, such as bridges and dams. There are no know critical facilities other than roadway infrastructure immediately endangered by ice jams in Middlesex.

Specific extent data for flood levels in Middlesex is lacking as the closest flood gauge is located in Montpelier and downstream in Waterbury. During Tropical Storm Irene, the Montpelier flood gauge was 4 feet above flood stage and the Waterbury flood gauge was knocked out. The worst flooding event in Middlesex's history was the 1927 event; however, exact data from that event is not available. In 1927 event, the Montpelier flood gauge was at 27.10 feet; however, since the 1927 flood a number of flood control dams have been installed in the region to prevent the same flooding extent. Lesser but more regular flash flooding occurs in Middlesex, with generally 1-2 foot of water in areas designated on the maps. Data on the fluvial erosion damage in number of acres lost was not found for the events. Fluvial erosion extent data is unavailable for Middlesex. For the next update, Middlesex can better monitor flood waters by having individuals record flood water levels and submit to the Town Clerk for the Town's records. During Tropical Storm Irene three properties on Three Mile Bridge Rd flooded, and in January 2018 with a warming event there was an ice jam that caused houses on Three Mile Bridge Road to be evacuated and will be resulting in a FEMA buy out of a property on Rich Rd.

Middlesex is located entirely within the Winooski Watershed. As stated in the 2013 Middlesex Town Plan, approximately 48% of the land within town boundaries exceeds 15% slope and the streams of Middlesex flow either east to the North Branch of the Winooski River, or south to the main stem of the Winooski. Middlesex does participate in the National Flood Insurance Program (NFIP) and has adopted a flood hazard area overlay district into local zoning regulations which limits development within the floodplain. Flooding is the more commonly occurring natural hazard and is more likely to recur compared to other natural disasters. It is important to note that Vermont has experienced a majority of their flooding in areas along upland streams and in road drainage systems that do not adequately convey the amount of water they are receiving. Flooding in these areas should be expected and planned for. The National Weather Service has seen a trend in recent years of more intense, locally severe storms with high intensity rain and flooding associated with them. Middlesex has experienced the damage caused by these severe storms.

Based on the results of overlaying Middlesex's current Flood Insurance Rate Maps (FIRM) with the location of E911 points, 129 properties are located within the National Flood Insurance Program's designated 100-year floodplain. The estimated loss for a severe flooding event for all properties located within the Middlesex 100-year floodplain is approximately $19,233,900. As previous events have made clear, however, even areas beyond the NFIP designated 100-year floodplain may be vulnerable to flood related hazards. There are 36 properties in the fluvial erosion hazard zone. The estimated loss for these properties is $5,367,600. Middlesex has 17 NFIP policies in force for a total coverage of $2,585,900. As

of 2016, Middlesex had reported three repetitive loss properties which are all residential. Two of these properties have undergone a buyout and the homes have been removed (As of 2018 the third house would like to be bought out and the Town is considering it). There are four commercial properties, one industrial, two public gathering places, and 31 residential structures in the floodplain. None of the town's critical facilities are in the flood plain. The Zoning Administrator is responsible for enforcing the flood hazard regulations.

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, have frequently been documented to have devastating consequences. The Hazard Analysis Map (see attached) identifies areas that have experienced flooding in the past.

Middlesex fared relatively well during the May 2011 and Irene events. During Irene, Lower Sunny Brook Rd was badly damaged when a culvert overflowed and undermined the road. The repairs to the culvert cost $36,000. In 2013, the Town of Middlesex, through a FEMA Tropical Storm Irene Federal Buyout Program, purchased two abutting properties on Three Mile Bridge Road that were located in the flood plain and heavily damaged. Both mobile homes on the properties were demolished and removed, power lines were butted off and septic was filled so that the 1-acre parcel in total could be restored to park land with a conservation easement to insure they remained undeveloped.

During the May 2011 storms the following roads were damaged:

- Portal Road - $28,400 to repair
- Barnett Hill Road - $26,000 to repair
- Shady Rill Road – $209,000 to repair, completed in 2015 with $175,000 grant from VT Agency of Transportation grant.

The North Branch Corridor Plan is a valuable tool to help restore the River's health and prevent future flooding impacts. Mitigation and restoration strategies for Middlesex's section of the North Branch are attached as an appendix for the Town to refer to if future project ideas area needed.

The following matrix provides an overview of the hazard:

Hazard	Location	Vulnerability	Extent	Impact	Probability
Flood/Flash Flood/ Fluvial Erosion	Areas along Winooski River and Shady Rill Brook, North Branch in Putnamville, Barnett Hill Rd, Portal Rd, Brook Rd,	Roads, bridges, culvert infrastructure, private property. Middlesex Village is out of the flood plain however several commercial properties on Three Mile Bridge are at risk for flooding.	Data gap for Middlesex – 5-7" of rain during Irene, localized flooding of 1-2 feet, higher in floodplain areas; no fluvial erosion data available.	$19,233,900 for floodplain properties	HIGH

High Wind/ Prolonged Power Outage

High Winds are usually associated with severe thunderstorms in Vermont. When winds are sustained at 31 to 39 mph for at least an hour or any gusts at 46 to 57 mph, the National Weather Service will issue a wind advisory. If winds reach 58 mph or more, the National Weather Service will issue a High Wind Warning. The National Weather Service has classifications for hurricane and tropical storm winds which can be found in the Saffir-Simpson Scale graphic found later on in this Plan as well as the Beaufort Wind Chart used to estimate wind speeds. High winds cause damage to property and personal safety, and are a concern for the electrical and telecommunication utilities in Washington County and throughout the state due to customer power outages and damage to infrastructure.

Date	Event	Location	Extent
10/29/-10/30/2017	High Wind	Washington County	Numerous tree damage and power outages with measured wind gusts in the 40-50 mph range with a measured 58 mph at Barre-Montpelier airport in Berlin.
9/11/2016	High Wind	Washington County	Scattered severe thunderstorms knocked down numerous trees and utility lines; caused subsequent power outages. In addition, numerous cloud to ground lightning strikes caused power outages. Winds 50 knots.
6/2/2013	Wind	Washington County	55 knot winds. County wide, widespread thunderstorms with pockets of damaging winds and large hail. At the peak of the event, roughly 20,000 customers had lost power.
5-29/2012	Wind/Lightning	Washington County	Numerous thunderstorms with heavy rain, damaging lightning & some isolated large hail & strong winds. Some of these thunderstorms deposited up to 2 inches of rainfall in portions of north-central and northeast Vermont.
7/06/2011	Wind/Thunderstorm	County Wide	50 knot winds; 15,000 people in VT lost power
7/18/2008	Wind/Hail	County Wide	1” Hail, 30 knot winds
6/9/2005	Wind/Severe thunderstorms	Calais (adjacent town)	Downed power lines, 60 knot winds
9/16/1999	Wind/Tropical Storm Floyd	Statewide	Tropical storm winds and flooding – DR 1307
5/19/1982	Thunderstorm Winds	County Wide	56 knot winds
9/22/1938	Winds/Hurricane	Statewide	Category 1 force winds

Beaufort Wind Chart – Estimating Winds Speeds

Beaufort Number	MPH Range	MPH Average	Terminology	Description
0	0	0	Calm	Calm. Smoke rises vertically.
1	1-3	2	Light air	Wind motion visible in smoke.
2	4-7	6	Light breeze	Wind felt on exposed skin. Leaves rustle.
3	8-12	11	Gentle breeze	Leaves and smaller twigs in constant motion.
4	13-18	15	Moderate breeze	Dust and loose paper is raised. Small branches begin to move.
5	19-24	22	Fresh breeze	Smaller trees sway.
6	25-31	27	Strong breeze	Large branches in motion. Whistling heard in overhead wires. Umbrella use becomes difficult.
7	32-38	35	Near gale	Whole trees in motion. Some difficulty when walking into the wind.
8	39-46	42	Gale	Twigs broken from trees. Cars veer on road.
9	47-54	50	**Severe gale**	**Light structure damage.**
10	55-63	60	**Storm**	**Trees uprooted. Considerable structural damage.**
11	64-73	70	**Violent storm**	**Widespread structural damage.**
12	74-95	90	**Hurricane**	**Considerable and widespread damage to structures.**

Webpage: http://www.weather.gov/iwx
Twitter: @nwsiwx
Facebook: NWSNorthernIndiana

Hazard	Location	Vulnerability	Extent	Impact	Probability
High Wind	Town Wide, but more significant at higher elevations	Utilities, and old out buildings, Large trees, power lines.	Most significant observed 56 knots	Unknown	Medium

5.3 Moderate Threat Hazards

Hurricanes/Severe Storms/Tropical Storms/ Hail

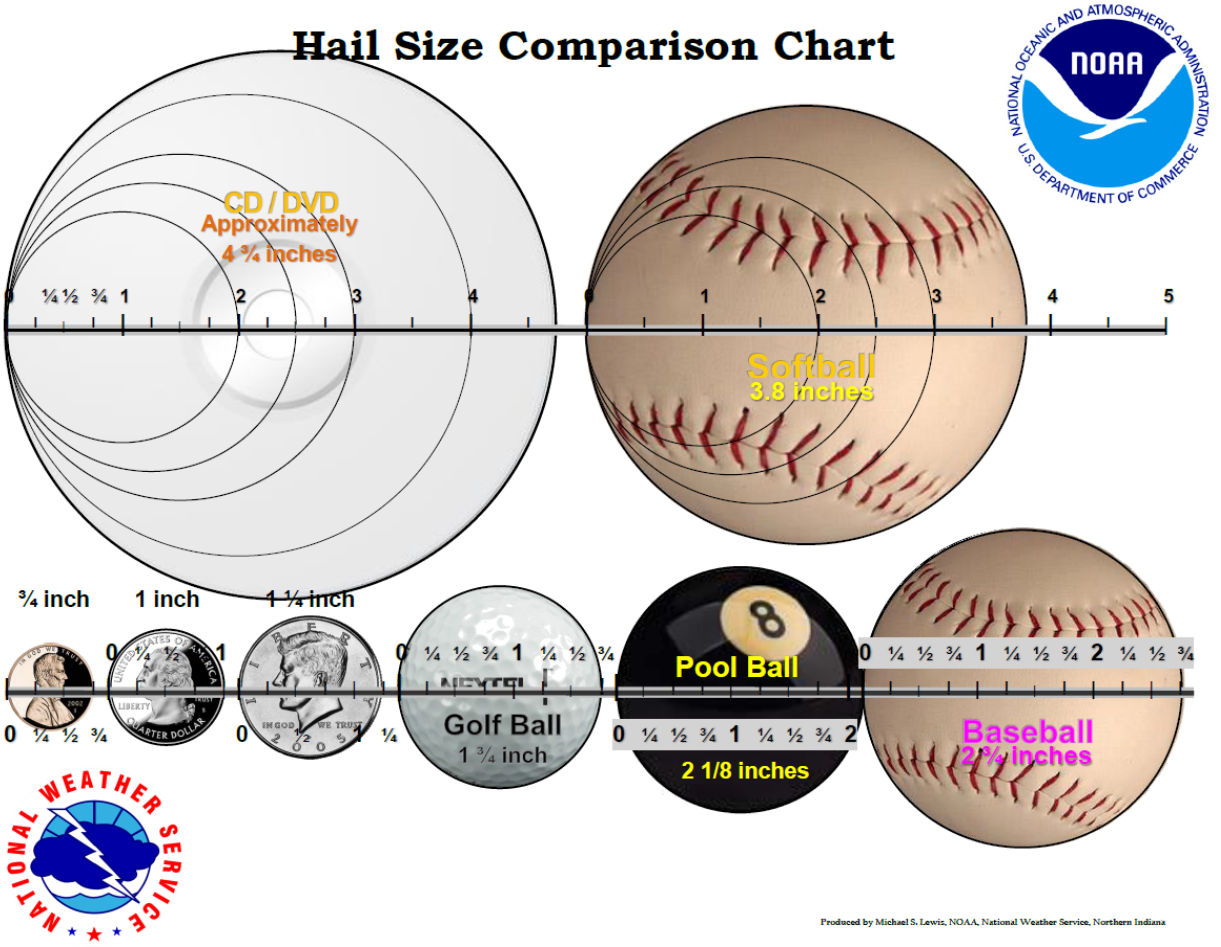
History of Occurrence (from NCDC website and FEMA DR List). No significant storms have happened in Middlesex since 9/11/2016:

Date	Event	Location	Extent
9/11/2016	Thunderstorm Wind	Washington County	Scattered severe thunderstorms knocked down numerous trees and utility lines; caused subsequent power outages. In addition, numerous cloud to ground lightning strikes caused power outages. Winds 50 knots.
6/2/2013	Thunderstorm Wind	Washington County	55 knot winds. County wide, widespread thunderstorms with pockets of damaging winds and large hail. At the peak of the event, roughly 20,000 customers had lost power.
5-29/2012	Lightning	Washington County	Numerous thunderstorms with heavy rain, damaging lightning & some isolated large hail & strong winds. Some of these thunderstorms deposited up to 2 inches of rainfall in portions of north-central and northeast Vermont.
8/28/2011	Tropical Storm, Flash Flood (TS Irene)	East Montpelier, Washington County	Montpelier flood gauge at 19.05', flood stage at15'; 5" of rain – DR 4022
7/06/2011	Thunderstorm	County Wide	50 knot winds; 15,000 people in VT lost power
5/26/2011	Hail/Thunderstorms/Flash Flooding	County Wide	1" hail, 50 knot winds, 25,000 customers lost power in VT, 3-5" of rain - DR- 4001
8/9/2010	Thunderstorm/Wind/Hail	Worcester (adjacent town)	50 knot winds
7/21/2010	Hail	County Wide	1" Hail
7/18/2008	Hail	County Wide	1" Hail, 30 knot winds
7/9/2007	Hail, thunderstorms	County Wide	Baseball sized hail - DR 1715
6/19/2006	Hail, thunderstorms	County Wide	50 knot winds
6/9/2005	Severe thunderstorms	Calais (adjacent town)	Downed power lines, 60 knot winds

9/16/1999	Tropical Storm Floyd	Statewide	Tropical storm winds and flooding – DR 1307
6/17/1998	Severe Storms	County Wide	3-6” of rain, DR 1228
7/15/1997	Severe Storms	County Wide	3-5” of rain
5/19/1982	Thunderstorm winds	County Wide	56 knot winds
7/3/1964	Hail	County Wide	1.5” hail
9/22/1938	Hurricane	Statewide	Category 1 force winds

Hurricanes and tropical storms are violent rainstorms with strong winds that have large amounts of rainfall and can reach speeds up to 200 mph. The Vermont State Hazard Mitigation Plan further defines a hurricane as, "a tropical cyclone with sustained winds that have reached speed of 74 mph or higher. A storm reaches hurricane status only after strengthening over a period of days or even weeks." In contrast, "a tropical storm has a maximum sustained one-minute wind speed of 39-73 mph. The National Weather Service names a tropical cyclone (hurricane) once it reaches the status of a tropical storm. Many hurricanes are downgraded to tropical storms before they reach Vermont. Hurricanes and tropical storms bring the additional hazards of flooding, high winds, heavy precipitation, and fluvial erosion. According to the Vermont State Hazard Mitigation Plan, severe hurricanes are not considered likely nor pose a recurring threat to Vermont but tropical storms do.

Hail is defined in the Vermont State Hazard Mitigation Plan as, "a form of precipitation composed of spherical lumps of ice. Known as hailstones, these ice balls typically range from 5-50 mm in diameter on average, with much larger hailstones forming in severe thunderstorms. The size of a hailstone is a direct function of the severity and size of the thunderstorm that produces it." Hail is known to cause devastating crop damage, property damage, and bodily injury if one is struck. NOAA has created a diagram to help visualize the size of hail in relation to common items like a softball or golf ball or coins as depicted below.



In Vermont, the storm season is between the months of June and November. These types of storms originate in the warm waters of the Caribbean and move up the Eastern seaboard where they lose speed in

the cooler waters of the North Atlantic. Severe storm events can occur late spring and early summer as temperatures increase in the summer season. The frequency and intensity of hurricanes and tropical storms is expected to increase with climate change.

The Saffir-Simpson Hurricane Wind Scale is used to determine the rating of a hurricane based on sustained wind speed. There are five categories used to classify a hurricane based on the potential for significant loss of life and property damage. Category 1 is very dangerous, Category 2 is extremely dangerous, Category 3 is devastating (major), Category 4 is catastrophic (major), and Category 5, the worst, is catastrophic (major). For further detail on the types of damage due to hurricane winds go to the table 4-15 in the VT State Hazard Mitigation Plan, November 2013

Saffir-Simpson Scale for Hurricane Classification				
Strength	Wind Speed (Kts)	Wind Speed (MPH)	Pressure (Millibars)	Pressure
Category 1	64-82 kts	74-95 mph	>980 mb	28.94 "Hg
Category 2	83-95 kts	96-110 mph	965-979 mb	28.50 - 28.91 "Hg
Category 3	96-113 kts	111-130 mph	945-964 mb	27.91 - 28.47 "Hg
Category 4	114-135 kts	131-155 mph	920-944 mb	27.17 - 27.88 "Hg
Category 5	>135 kts	>155 mph	919 mb	27.16 "Hg
Tropical Cyclone Classification				
Tropical Depression		20-34 kts		
Tropical Storm		35-63 kts		
Hurricane		64+ kts or 74+ mph		

Similar to flooding, the extent of severe storms is not well documented in the Town of Middlesex. The impact of storms is usually flood related. See flood extent description in flood section above. Wind extent from storms is not well documented as there is no monitoring station in Middlesex. Estimates for wind are gathered from countywide data off the NCDC website. In the future, Middlesex could consider installing a monitoring station and training spotters to better gather data for wind events.

On Aug 28, 2011, Tropical Storm Irene hit Vermont and proceeded to deposit 4-5" of rain over Middlesex, and caused $733 million in damage to Vermont. In all, it checked in at $14.3 billion, the sixth costliest hurricane in American history.

In 1999, Tropical Storm Floyd passed through Vermont. The primary impact from Floyd was downed trees and power lines due to high winds. 5-7" of rain fell over the Central Vermont Region; however, flood impacts were offset by drought conditions caused earlier in the year.

Hazard	Location	Vulnerability	Extent	Impact	Probability
Hurricane/ Tropical/ Severe	Town Wide for Wind impacts;	Large trees, power lines, culverts,	Tropical Storm/Cat 1 hurricane	$310,000 + for damages in May and	Medium

Storms	Flooding – See above locations	Bridges. Vulnerability due to tropical storm/flooding is addressed above under flooding	wind speeds; 5-7" of rain	August 2011	

Extreme Cold/Winter Storm/Ice Storm
History of Occurrences (from NCDC website and FEMA DR List.)

Snow and/or ice events occur on a regular basis. Recent significant events have included. No significant weather events have occurred since March of 2017 in Middlesex:

Date	Event	Location	Extent
3/14/2017-3/15/2017	Winter Storm	Statewide	Major Nor'easter with heavy intense snowfall. Snowfall totals across Washington county generally ranged from 14-24 inches with isolated higher totals. Blizzard conditions during heaviest snow fall. Snow rates at times 4/5 inches/hour. Numerous schools, businesses and local government offices closed, and numerous vehicle accidents and stranded vehicles.
2/1/2015-2/28/2015	Extreme Cold	Statewide	In February many sites recorded 15to 20+ day below zero with wind chills of 30 below zero or colder. Many communities witnessing the coldest month since December 1989 or January 1994. Damage to infrastructure.
1/7/2015-1/8/2015	Extreme Cold	Statewide	15 to 25 below with winds 15-30 mph, created wind chills colder than 20-30 below. School opening delays.
12/9/2014-12/13/2014	Winter storm	Middlesex, 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	Middlesex, County wide	12-18” of snow, 10,000 customers lost power statewide
2/23/2010	Winter Storm	Middlesex, County wide	20” of snow and 50,000 customers lost power statewide
2/22/2009	Winter Storm	Middlesex, County Wide	16” of snow, 30 mph wind gusts
2/1/2008	Winter storm	Middlesex, County wide	3-7” of snow and ice ¼-1/2”thick, 50 mph wind gusts
2/14/2007	Winter storm	Middlesex, County wide	22” of snow
2/14/2006	Winter storm	Middlesex, County Wide	30” of snow
1/4/2003	Winter storm	Middlesex, County wide	19” of snow
3/5/2001	Winter storm	Middlesex, County wide	15-30” of snow
12/31/2000	Winter storm	Middlesex, County wide	10” of snow
1/15/1998	Winter storm	Middlesex, County wide	10-12” snow (not a DR in Washington County)
12/29/1997	Winter storm	Middlesex, County wide	21” of snow
12/7/1996	Winter Storm	Middlesex, County wide	12” of snow
3/21/1994	Winter storm	Middlesex, County Wide	5-11” of snow
11/1/1993	Winter storm	Middlesex, County wide	15” of snow
1/3/1993	Freezing Rain	Middlesex, 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, trees, buildings, overhead wires and other exposed objects with ice, sometimes causing extensive damage. Periods of extreme cold tend to occur with these events.

The extent of winter storms on Middlesex is difficult to estimate as it is dependent on the size and path of the storm. For the next plan update, Middlesex will more closely monitor winter storms to determine the worst impacts possible on the Town.

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 Middlesex. 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. Middlesex 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. Sheltering areas in Middlesex include the Rumney Elementary School and the Fire Department. The Town encourages residents who are in remote locations to be equipped with generators and backup fuel supplies in the event of prolonged power outages and travel restrictions

Hazard	Location	Vulnerability	Extent	Impact	Probability
Extreme Cold/Winter or Ice Storm in conjunction with power failure	Town Wide	Elderly & handicapped populations, remote structures, old/under insulated structures, utilities, trees.	Below freezing and severe wind chill factor for multiple days; depends on severity of event; 18+" snow in March 2011 storm/ extreme cold events 2015 below zero for extended period of time	Depends on severity – additional sheltering/ plowing/ emergency services costs for town	High

6. Mitigation

6.1 Hazard Mitigation Goals and Strategies

- The goal of this Plan is to update the local mitigation strategy that makes Middlesex more disaster resistant and reduces its risk from natural hazards. Further, it is the goal of this

Plan to take actions to reduce or eliminate the long-term risk to human life and property from:

1. the natural hazard of flood/flash flood/fluvial erosion/ice jams;
2. the natural hazard of hurricane/severe storm
3. the natural hazard of extreme cold/winter storm/ice storm;
4. the natural hazard of high wind/ prolonged power outages
5. the hazard of dam failure (Marshfield Dam No. 6, Wrightsville Dam, and Middlesex Dam #2);

6.2 Middlesex Town Plan (2013) Polices that Support Pre-Disaster Mitigation

The Middlesex Town Plan (2013) has a five year life span and expires in 2018. The goals and objectives of the Middlesex Hazard Mitigation Plan will be incorporated into the next municipal plan update. The next time Middlesex updates its Town Plan, it may consider adding additional mitigation goals.

- Our roads should provide the level of safe reliable access expected in a rural community (Transportation Goal)
- We should have adequate fire protection and emergency medical service for our community and its residents. (Emergency Service Goal)

Specific hazard mitigation strategies related to goals of the 2017 local hazard mitigation 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 Middlesex and ways they can protect themselves and insure their property
- Ensure that emergency response services and critical facilities functions are not interrupted by natural hazards

6.3 Identified Hazard Mitigation Programs, Projects & Activities

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

Hazard	Mitigation Action (MA) or Preparedness Action (PA)	Local Leadership	Prioritization	Possible Resources	Time Frame
All Hazards	**PA**- Ensure Local Emergency Operations Plan is maintained and up to date	Middlesex Town Select board, Emergency Management Coordinator, Town Clerk	High	local resources with support and assistance from CVRPC and VEM	Annually, March-May 2018-2023

Dam Failure	**MA** Work with the state to develop inundation modeling of Wrightsville Dam and develop mitigation strategies	Select board, Planning Commission	High	local resources with support and assistance from ANR, VEM, and VCGI	2 years (2019-2020)
Dam Failure	**MA-** Work with Green Mountain Power to develop inundation modeling of Marshfield Dam and Middlesex Dam #2 and develop mitigation strategies	Select board, Planning Commission	High	local resources with support and assistance from ANR and VCGI	2 years (2019-2020)
Dam Failure	**PA-** Meet with Dam owners to discuss maintenance, EAP, and evacuation procedures. Add Middlesex to Notification Contact list and emergency procedures flow chart in EAP for all three dames. Open line of communication between dam owners and the Town	Select board, EMC, Town Clerk, Road Foreman, School Principal	Medium	Local resources, CPVRC, ANR Dam Safety Program, VEM Critical Infrastructure Planner, Green Mountain Power	At each update of EAP public participation process; Spring 2018 initial meeting.
Dam Failure	**PA-** Attend trainings and seminars on Dam Safety provided by the state, Army Corp of Engineers and CVPRC, as offered.	Select Board, EMC, Town Clerk, Road Foreman, School Principal	High	ANR Dam Safety Program, VEM Critical Infrastructure Planner, local resources	As offered
Winter Storms/ Severe Cold/ Ice Storms	**MA/ PA-** Provide educational materials to residents and sensitive populations on how to insulate homes (pipes, attics) for extreme cold spells; protect	Select Board, Town Clerk	Medium	HMGP-Planning, local funds	Available at the town office.

	against snow loads; inform residents about the access services of Capstone Community Action				
All Hazards	**PA-** Develop a citizen group with a Coordinator to activate volunteers as needed to assist with town wide emergencies such as traffic control, help open roads where debris, trees, have blocked roadways, and similar matters.	Town Clerk, EMC, Select Board, Road Foreman	Medium	VEM, local funds	2-3 years (2019-2020)
Flood	**MA/PA-** Work with elected officials, the State and FEMA to promote and support NFIP compliance through communications, training and education	Planning Commission and ANR	Med	HMGP	2 years (2019-2020)
Flood	**MA** Select and implement Flood Plain restoration projects from North Branch Corridor Plan to complete	Planning Commission and ANR	Med	ANR, EPA	3 year (2021-2023)
All Hazards	**PA** Maintain and improve the Emergency Management Committee	Emergency Mgt. Coordinator and Select board	High	None	Annually 2018-2023
All Hazards	**PA-** Obtain and keep copies available for distribution to local residents of the VEM publication booklet, "Family Emergency Preparedness"	Town Clerk	Medium	VEM,CVRPC	New printing Fall 2017
All Hazards	**PA-** Explore Town of Middlesex participation in VT	Select Board, EMC, Town Clerk	High	Vermont Emergency Management,	Summer 2018

	Alert System			local resources	
All Hazards	**MA** Updated Middlesex Town Plan before it expires in May 2018 and include a Flood Resiliency element with will identify goals, policies, and recommendations to mitigate risks to public health and infrastructure. Integrate this 2018 LHMP into the updated Municipal Plan	Planning Commission, Select Board, and CVRPC	High	Local resources, VCDP Municipal Planning Grant funds, CVPRC	June 2017-May 2018
All Hazards	**PA**- enter into and execute an Agreement to have Rumney School certified as a Shelter	Emergency Mgt. Coordinator, Select board, and Red Cross	Med	EMPG; local funding; ARC funding	1 year (2018)
Extreme Cold/Winter Storm/Ice Storm; Severe weather/ Hurricanes	**PA**- Work with GMP to continue regular tree line trimming and cutting along power lines though their service area to ensure clear and maintained utility corridors and to protect all customers, town and utility infrastructure.	Select board, Road Foreman	Med	Utility resources, local resources	Annually, fall or spring when leaves are off the trees is the best time to cut.
Flooding	**PA**- Establish a Communication alert system to residents on 3 Mile Bridge Rd	Emergency Mgt Coordinator; Fire Department; VEM	High	VT-Alert Telephone Tree	Ongoing

Flooding	**MA**-Expansion and upgrade of Sunny Brook Road Culvert	Select board, Road Foreman	High	HMPG, Town Funds	2 years (2019-2020)
Flooding	**MA-** Buyout of remaining repetitive loss property Middlesex VT	Select board, Town Clerk, and Homeowner	High	HMGP 4330	1 year (2018-2019)
Severe weather/ Hurricanes; Flood/flash flood	**MA** - Upgrade and improve 3 Mile Bridge Road culvert based on recommendations in Hydraulic Study.	Select board, Road Foreman	High	HMPG, Town Funds, AOT funding Better Roads grant	2 years (2019-2020)
Severe weather/ Hurricanes	**PA –** Update and adopt Middlesex Forest Plan	Selectboard, town forest warden, EMC, UVM Extension Service Forestry Program, ANR FPR	Med - low	local funds, UVM Extension Service, ANR	3-5 years 2020-2023
All Hazards	**PA-** Install generator at Town Hall	Select board, Town Clerk	Med	HMGP, Town funds	2 years (2019-2020)
All Hazards	**PA/MA-**Upgrade electrical systems in municipal buildings and shelters to prevent surge/equipment damage from fluctuating current during ice and wind storms	Select board,	Med	Town Funds, other federal funding	2 years (2019-2020)

The Vermont Division of Emergency Management and Homeland Security also emphasizes a collaborative approach to achieving mitigation on the local level, by partnering with ANR, VTrans, ACCD, Regional Planning Commissions, FEMA Region 1 and other agencies, all working together to provide assistance and resources to towns interested in pursuing mitigation projects and planning initiatives.

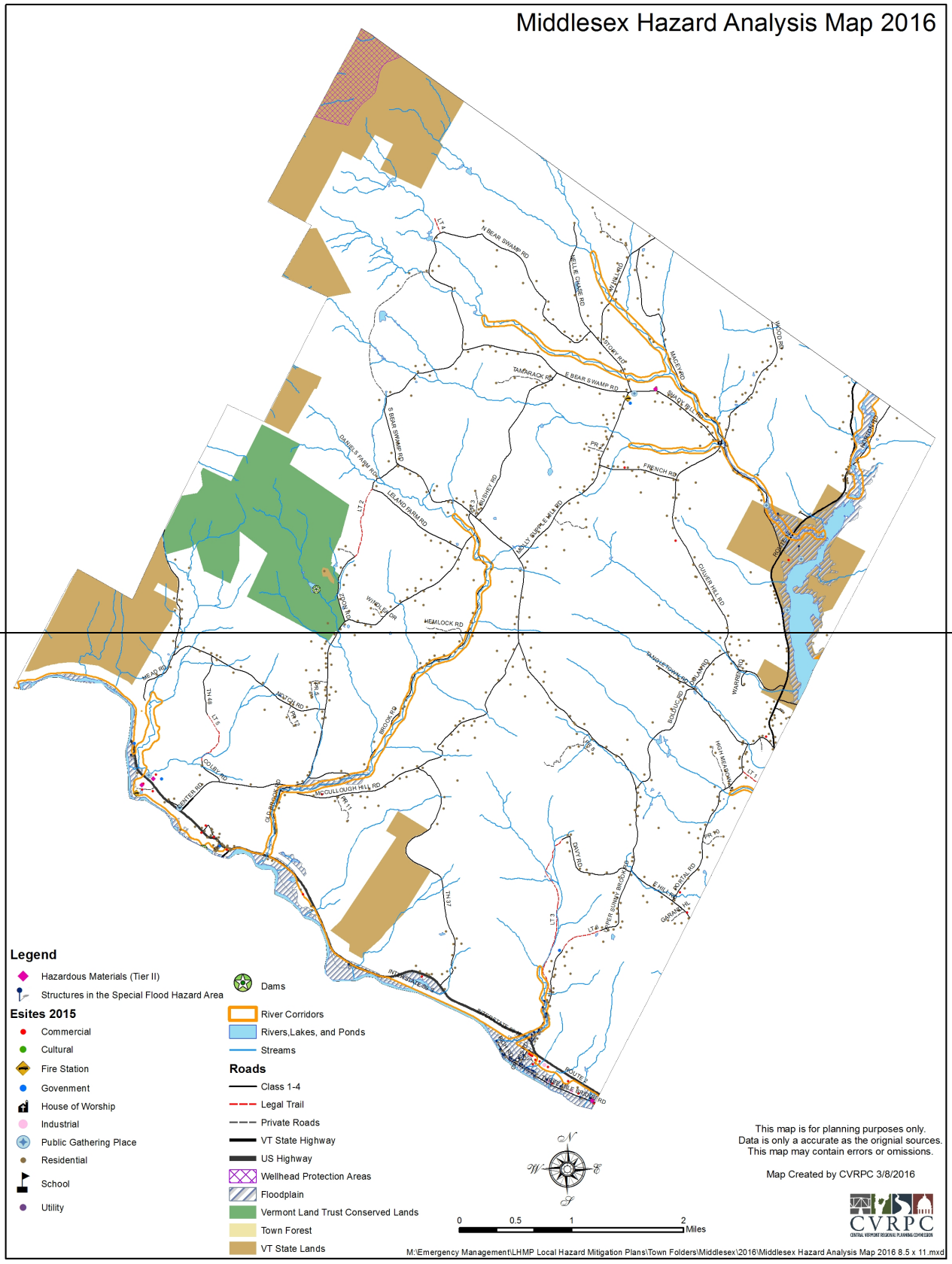
The mitigation activities are listed in regards to local leadership, possible resources, implementation tools, and prioritization. Prioritization was based upon the economic impact of the action, the Community's need to address the issue, the action's cost, and the availability of potential funding.

Middlesex 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 significantly reduces vulnerability in Middlesex and should have a timeframe of implementation of less than two years. A Medium prioritization is warranted where the action is less critical, and does not have as significant of a benefit in reducing vulnerability 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

- 2016 Hazard Analysis Map
- 2016 Transportation Vulnerability Analysis Map
- Maps and Strategies for North Branch Corridor Plan
- 5 year plan maintenance and review process
- Town Contact List
- Wrightsville Dam Break Flood Analysis Maps
- Certificate of Adoption


Middlesex Hazard Analysis Map 2016
Legend
Hazardous Materials (Tier II)
Structures in the Special Flood Hazard Area
Esites 2015
Commercial
Cultural
Fire Station
Govenment
House of Worship
Industrial
Public Gathering Place
Residential
School
Utility
Dams
River Corridors
Rivers,Lakes, and Ponds
Streams
Roads
Class 1-4
Legal Trail
Private Roads
VT State Highway
US Highway
Wellhead Protection Areas
Floodplain
Vermont Land Trust Conserved Lands
Town Forest
VT State Lands
N
W
E
S
0
0.5
1
2
Miles
This map is for planning purposes only.
Data is only a accurate as the orignial sources.
This map may contain errors or omissions.
Map Created by CVRPC 3/8/2016
CVRPC
CENTRAL VERMONT REGIONAL PLANNING COMMISSION
M:\Emergency Management\LHMP Local Hazard Mitigation Plans\Town Folders\Middlesex\2016\Middlesex Hazard Analysis Map 2016 8.5 x 11.mxd

CVRPC Transportation Vulnerability Analysis MIDDLESEX

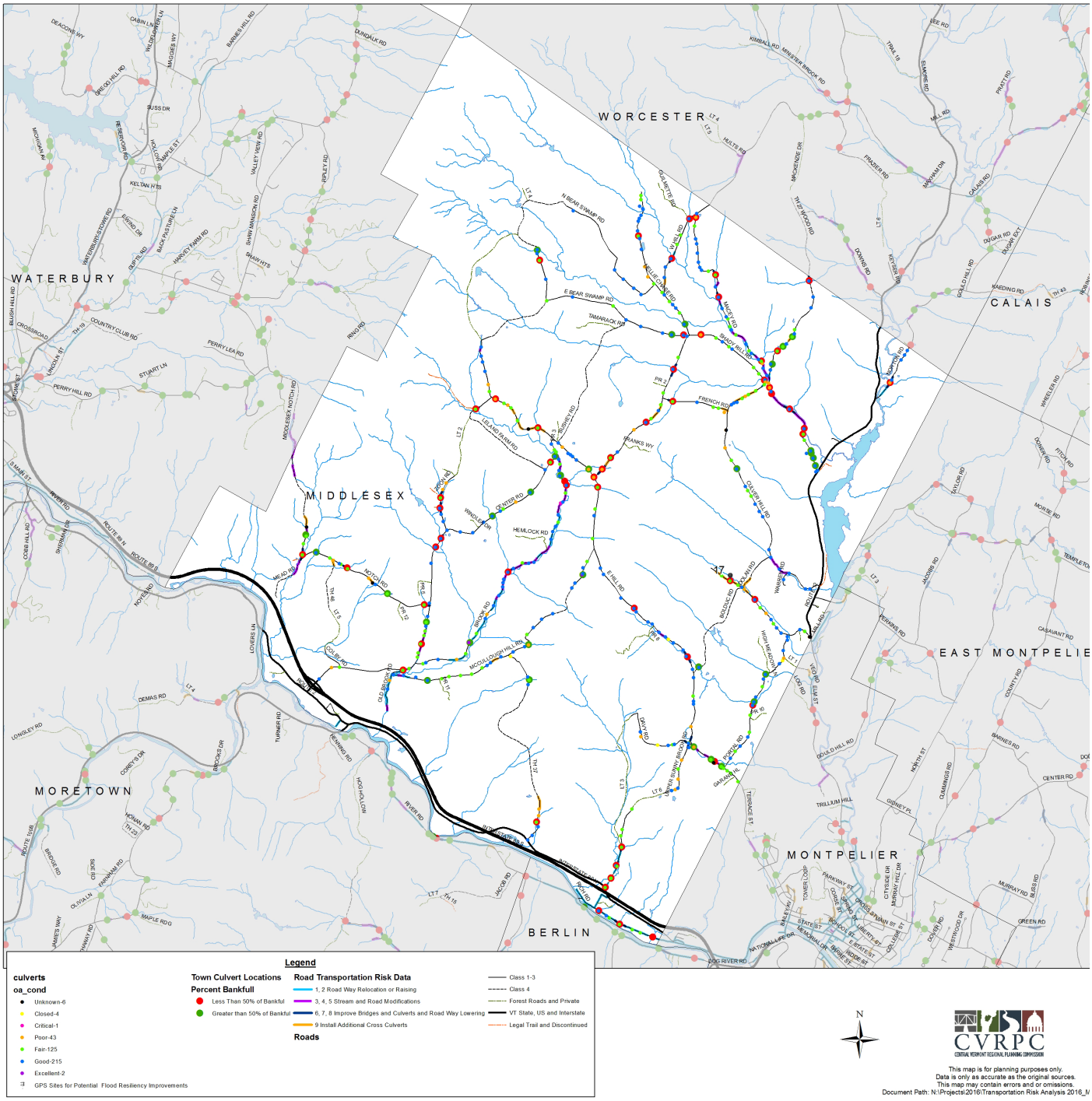


Table 9: Projects and Practices Table - North Branch - Winooski Reach M08						
River Segment	**Restoration/Conservation Technique**	**Reach Priority**	**Watershed Priority**	**Table 33 Project Number**	**Completed Independent of other Practices**	**Next Steps/Project Notes**
M08A	Protect River Corridor - Most of Segment is forested/wetland with little impact within corridor. Incision ratio of 1.8.	Low as stand alone project	Low as stand alone project	53	Yes	Landowner cooperation - Should be combined with active floodplain restoration.
M08A	Restore Incised Reach - Reach no longer has access to floodplain (incision of 1.8), corridor protection project could be combined with active restoration (create new floodplain) to enhance sediment attenuation and reduce erosion	High	High	2	Yes	Should be combined with corridor protection and stream buffer planting projects, Landowner cooperation and more detailed assessment needed
M08B	Protect River Corridor - Most of Segment is forested/wetland with little impact within corridor except for right bank along upper reach which is impacted by Route 12. Incision ratio of 1.8.	Low as stand alone project	Low as stand alone project	54	Yes	Landowner cooperation - Should be combined with active floodplain restoration.
M08B	Restore Incised Reach - Reach no longer has access to floodplain (incision of 1.9), corridor protection project could be combined with active restoration (create new floodplain) to enhance sediment attenuation and reduce erosion	High	High	3	Yes	Should be combined with corridor protection and stream buffer planting projects, Landowner cooperation and more detailed assessment needed

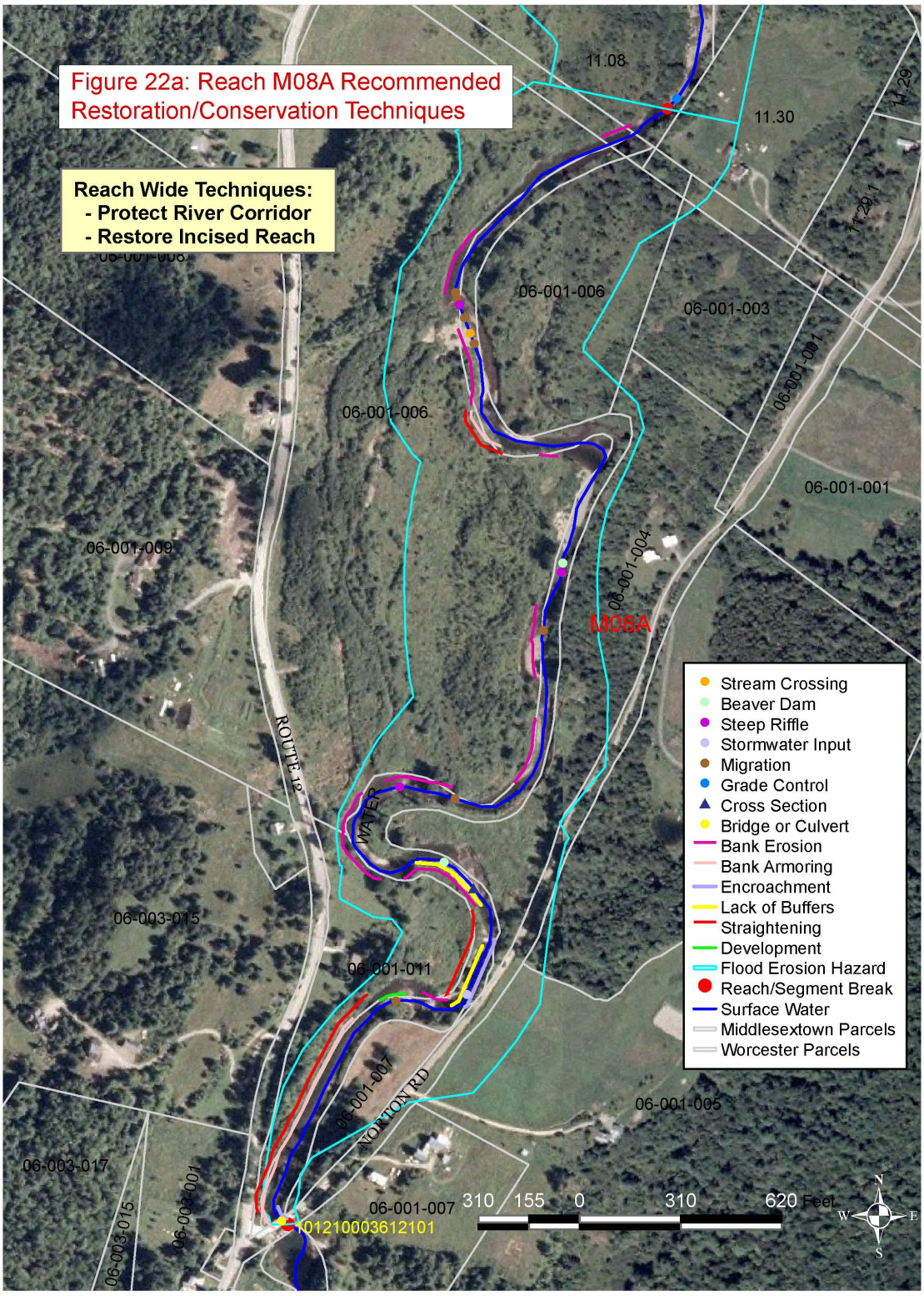


Figure 22a: Reach M08A Recommended Restoration/Conservation Techniques
Reach Wide Techniques:
- Protect River Corridor
- Restore Incised Reach
11.08
11.30
11.29
11.28.1
06-001-006
06-001-003
06-001-001
06-001-009
06-001-004
M08A
ROUTE 12
WATER
06-003-015
06-001-011
06-001-007
NORTON RD
06-001-005
06-003-017
06-003-001
06-001-007
01210003612101
310 155 0 310 620 Feet
N
W
E
S
Stream Crossing
Beaver Dam
Steep Riffle
Stormwater Input
Migration
Grade Control
Cross Section
Bridge or Culvert
Bank Erosion
Bank Armoring
Encroachment
Lack of Buffers
Straightening
Development
Flood Erosion Hazard
Reach/Segment Break
Surface Water
Middlesextown Parcels
Worcester Parcels

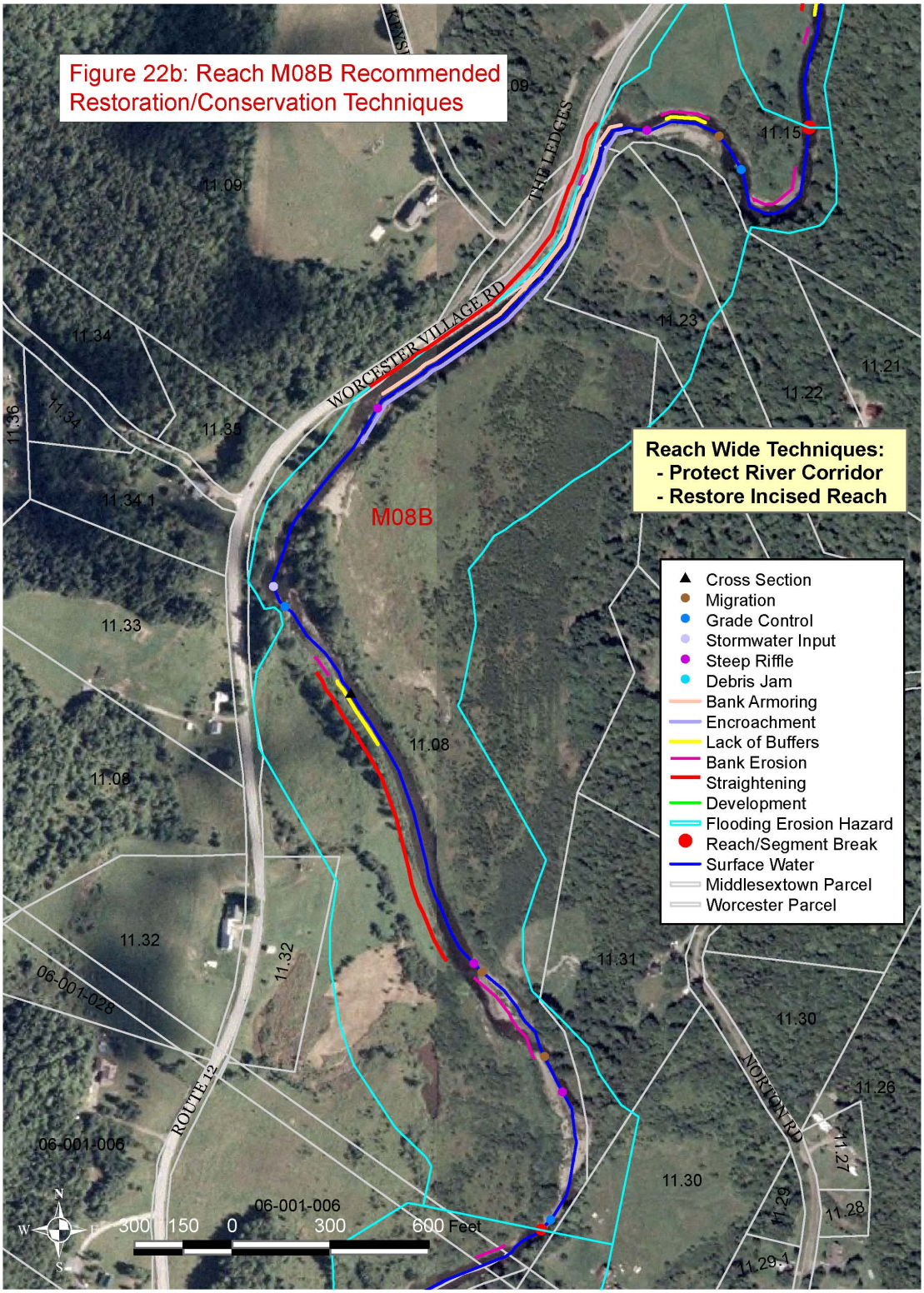


Figure 22b: Reach M08B Recommended Restoration/Conservation Techniques
WORCESTER VILLAGE RD
TREE LEDGES
NORTON RD
ROUTE 12
M08B
Reach Wide Techniques:
- Protect River Corridor
- Restore Incised Reach
Cross Section
Migration
Grade Control
Stormwater Input
Steep Riffle
Debris Jam
Bank Armoring
Encroachment
Lack of Buffers
Bank Erosion
Straightening
Development
Flooding Erosion Hazard
Reach/Segment Break
Surface Water
Middlesextown Parcel
Worcester Parcel
11.09
11.15
11.23
11.21
11.22
11.34
11.35
11.34.1
11.33
11.08
11.32
11.31
11.30
11.26
11.27
11.28
11.29.1
06-001-025
06-001-006
300 150 0 300 600 Feet
N
W
E
S

Table 20: Projects and Practices Table - North Branch - Winooski Reach T1.01						
River Segment	**Restoration/Conservation Technique**	**Reach Priority**	**Watershed Priority**	**Table 33 Project Number**	**Completed Independent of other Practices**	**Next Steps/Project Notes**
T1.01A	Protect River Corridor - Corridor largely undeveloped except near Route 12 bridge. Reach currently has good floodplain access (incision ratio of 1.0) and acts as sediment and nutrient attenuation zone. Corridor protection needed to retain this function.	High	High	14	Yes	Landowner negotiations and agreements needed. Downstream of Route 12 bridge segment influenced by Wrightsville reservoir.
T1.01B	Protect River Corridor - Corridor largely undeveloped and mostly forest on left. Righ side encroached by Shady Rill Road and picnic area. Segment only slightly incised (ratio of 1.1) and experiencing aggradation. Corridor protection needed to allow for future adjustments and retain sediment and nutrient retention.	High	High	32	Yes	Landowner negotiations, public picnic area located along right bank
T1.01B	Plant Stream Buffer - Approximately 700 feet along right bank has buffers less than 25 feet.	Medium	Low	73	Yes	Landowner cooperation needed, part of this area is public picnic area.

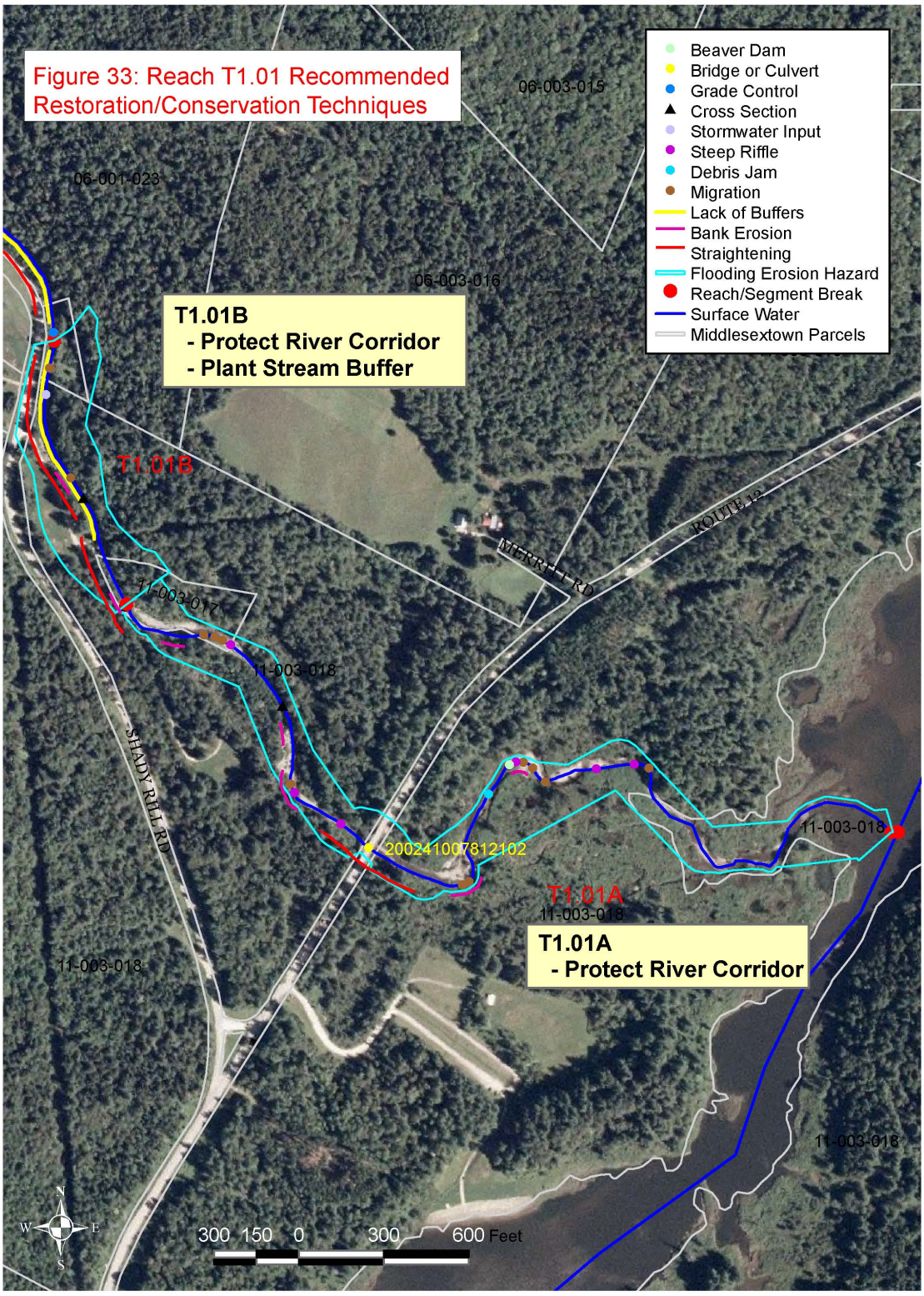


Figure 33: Reach T1.01 Recommended Restoration/Conservation Techniques
Beaver Dam
Bridge or Culvert
Grade Control
Cross Section
Stormwater Input
Steep Riffle
Debris Jam
Migration
Lack of Buffers
Bank Erosion
Straightening
Flooding Erosion Hazard
Reach/Segment Break
Surface Water
Middlesextown Parcels
06-003-015
06-001-023
06-003-016
T1.01B
- Protect River Corridor
- Plant Stream Buffer
T1.01B
ROUTE 12
MERRITT RD
11-003-017
11-003-018
SHADY RILL RD
200241007812102
T1.01A
11-003-018
T1.01A
- Protect River Corridor
11-003-018
11-003-018
11-003-018
N
W
E
S
300 150 0 300 600 Feet

Table 21: Projects and Practices Table - North Branch - Winooski Reach T1.02						
River Segment	**Restoration/Conservation Technique**	**Reach Priority**	**Watershed Priority**	**Table 33 Project Number**	**Completed Independent of other Practices**	**Next Steps/Project Notes**
T1.02B	Protect River Corridor - Corridor largely undeveloped, dominated by hay and shrub/sapling on left and residential/roadway on right. Reach not incised (ratio of 1.1) Corridor protection needed to maintain floodplain access and sediment and nutrient attenuation zone.	High	Medium	24	Yes	Cooperation/negotiations with landowner needed
T1.02B	Plant Stream Buffer - Right corridor dominated by hay and residential, left by sparse shrub/sapling.	High	Medium	78	Yes	Landowner cooperation and planting plans needed
T1.02C	Protect River Corridor - Corridor largely undeveloped, dominated by forest on left and roadway on right. Reach not incised (ratio of 1.0) Corridor protection needed to maintain floodplain access.	Medium	Low	39	Yes	Cooperation/negotiations with landowner needed, Segment is naturally B type stream, and acts at more of a transport system so corridor protection not as high priority as downstream segment.

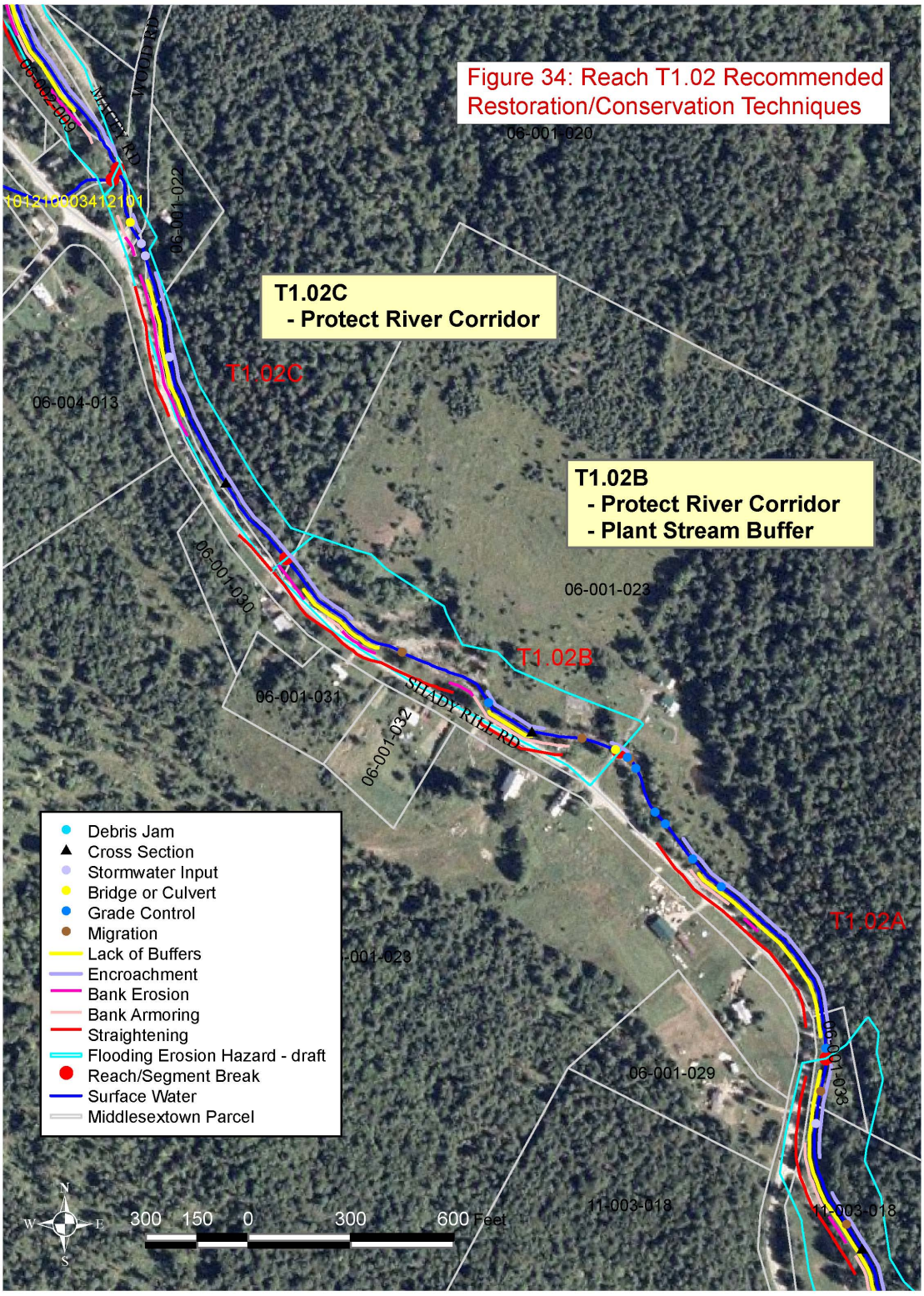


Figure 34: Reach T1.02 Recommended Restoration/Conservation Techniques
T1.02C
- Protect River Corridor
T1.02B
- Protect River Corridor
- Plant Stream Buffer
T1.02C
T1.02B
T1.02A
06-001-020
06-001-022
06-001-030
06-001-031
06-001-032
06-001-023
06-001-029
06-001-033
06-004-013
11-003-018
SHADY RIDGE RD
Debris Jam
Cross Section
Stormwater Input
Bridge or Culvert
Grade Control
Migration
Lack of Buffers
Encroachment
Bank Erosion
Bank Armoring
Straightening
Flooding Erosion Hazard - draft
Reach/Segment Break
Surface Water
Middlesextown Parcel
N
W
E
S
300 150 0 300 600 Feet

Table 22: Projects and Practices Table - North Branch - Winooski Reach T1.03						
River Segment	**Restoration/Conservation Technique**	**Reach Priority**	**Watershed Priority**	**Table 33 Project Number**	**Completed Independent of other Practices**	**Next Steps/Project Notes**
T1.03A	Protect River Corridor - Corridor largely undeveloped along right bank, left bank dominated by Macey Road, berms and residentail development. Reach not incised (ratio of 1.0) Corridor protection needed to maintain floodplain access and sediment and nutrient attenuation zone along left bank.	High	Medium	33	Yes	Cooperation/negotiations with landowner needed, existing encroachments along left bank prevent any actions on this side, but righ bank undeveloped sediment attenuation zone.
T1.03A	Plant Stream Buffer - Most of the segment has adequate woody buffer. Few areas in lower portion with less than 25 foot buffer. Planting should be concentrated here.	Medium	Low	76	Yes	Landowner cooperation and planting plans needed
T1.03B	Protect River Corridor - Corridor largely undeveloped, dominated by forest with minimal encroachment by Macey Road. Reach not incised (ratio of 1.0) Corridor protection needed to maintain floodplain access.	Medium	Low	37	Yes	Cooperation/negotiations with landowner needed, Segment is naturally B type stream, and acts at more of a transport system so corridor protection not as high priority as downstream segment.

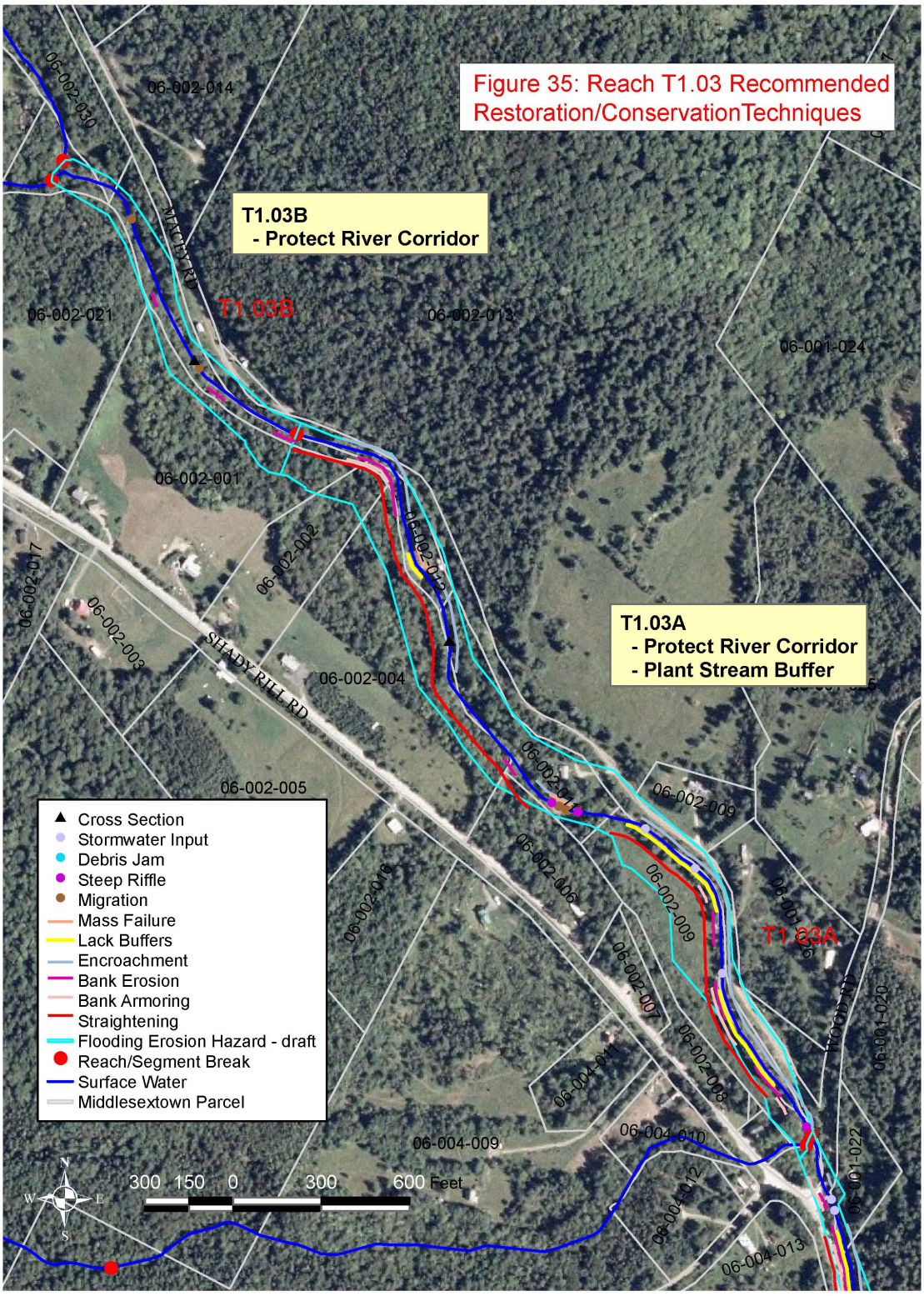
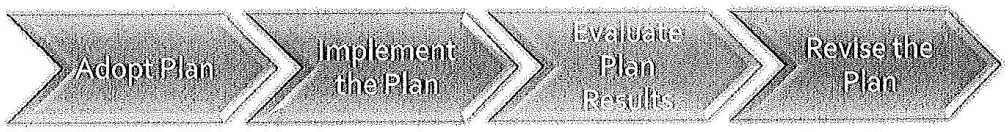


Figure 35: Reach T1.03 Recommended Restoration/ConservationTechniques
T1.03B
- Protect River Corridor
T1.03A
- Protect River Corridor
- Plant Stream Buffer
T1.03B
T1.03A
WATERY RD
SHADY RILL RD
06-002-030
06-002-014
06-002-021
06-002-013
06-001-024
06-002-001
06-002-002
06-002-012
06-002-017
06-002-003
06-002-004
06-002-005
06-002-011
06-002-009
06-002-016
06-002-006
06-002-007
06-002-008
06-001-026
06-001-020
06-001-022
06-004-011
06-004-009
06-004-010
06-004-012
06-004-013
Cross Section
Stormwater Input
Debris Jam
Steep Riffle
Migration
Mass Failure
Lack Buffers
Encroachment
Bank Erosion
Bank Armoring
Straightening
Flooding Erosion Hazard - draft
Reach/Segment Break
Surface Water
Middlesextown Parcel
N
W
E
S
300 150 0 300 600 Feet

5-Year Plan Review/Maintenance



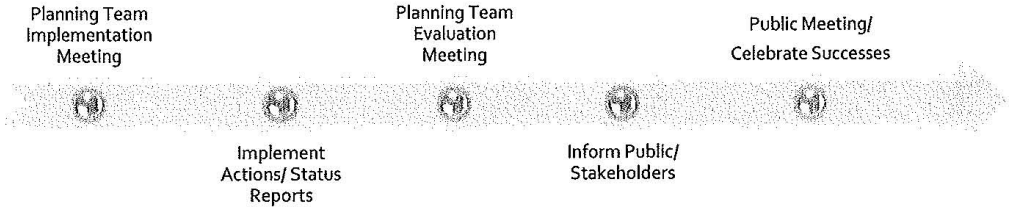
- Brief local leadership on plan approval
- Formally adopt plan
- Publicize plan approval and adoption
- Celebrate success

- Confirm/clarify responsibilities
- Integrate mitigaction actions
- Monitor and document implentation of projects and actions
- Establish indicators of effectiveness or success

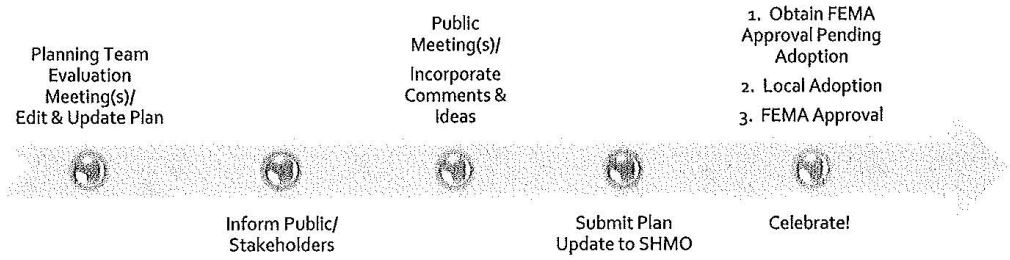
- Effectiveness of planning process
- Effectiveness of actions
- Document success & challenges of actions
- Update and involve community
- Celebrate successes

- Review factors affecting community's context
- Analyze findings; determine whether to revise process or strategy
- Incorporate findings into the plan

After Plan Adoption-Annually
Implement and Evaluate



Fifth Year, and After Major Disaster
Evaluate and Revise



Middlesex Town Office and Officials

Town Clerk: Sarah Merriman
Assistant Town Clerk: Maryke Gillis
Address: 5 Church Street, Middlesex, VT 05602
Phone: 802-223-5915 **FAX:** 802-223-1298
E-mail mdxclerk@comcast.net
Hours: Monday – Thursday 8:30-4:30
Closed on Fridays.
Middlesex Town Garage: 229-0838 (Paul Cerminara, Road Foreman)
Animal Control Officer

Erika Holm, Cell: 249-2127 Home: 223-3556. If Erika is unavailable, please contact Health Officer Liz Fortman (802)249-1058.

Budget Committee
George Longenecker, 229-9787
Bill Dorigan, **223-1030**
Barry Bolio, 229-0433
Elias Gardner, 778-0899
Ruth Dockter, 229-5744
Collector of Delinquent Taxes
Dorinda Crowell 223-7781
Cemetery Contacts
Middlesex Center Cemetery
Earle Ellingwood (Lot Sales) 223-7555

Middlesex Cemetery Commission (Carr Cemetery, North Branch Cemetery, and Middlesex Village Cemetery)
Gary Lamell, 223-2710
Janet McKinstry, 223-5997
Evelyn Gant, 223-6488
Health Officer

Liz Fortman, (802)249-1058

Justices of the Peace
Peter Hood, 223-6518
Theo Kennedy, 223-4748
Doug Lombard, 229-9600
Chris McVeigh, 223-6558
Charles Merriman, 249-8096
Dexter Lefavour, 223-7829
Listers
Richard Alderman, 223-3953
Eric Young, 229-9908
Amy Whitehorn 229-2082
Middlesex Fire Department

Chief: Doug Hanson – 229-6361

Moderator

Susan Clark, 42 McCullough Hill Rd; 223-5824, Click Here to Send Me Email

Recreation Director (Please contact him to reserve the Town Field by Rumney School for baseball/soccer.)
Mitch Osiecki: (802) 760-9674

Road Commissioner
Steve Martin (C), 371-8697
Road Foreman
Paul Cerminara, (C) 802-399-7216 (W) 229-0838
Town Service Officer
Liz Scharf, 223-9189 (H)
Treasurer/Trustee of Public Funds
Dorinda Crowell, 223-7781
Zoning Administrator
Mitch Osiecki: (802) 760-9674

	MITIGATION ACTION TRACKER									
	Action	Information in Hazard Mitigation Plan				Current Status				Other notes; Difficulties encountered
		Responsible Party	Timeframe for Completion	Funding Source	Project Priority	Date Began	Current Status	Completion Timeframe	Completion Goal	
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										

CERTIFICATE OF ADOPTION
_____, 2018
TOWN OF MIDDLESEX, Vermont Selectboard
A RESOLUTION ADOPTING THE Town of Middlesex, Vermont 2017 Local Hazard Mitigation Plan

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

WHEREAS, the Town of Middlesex has developed and received conditional approval from the Federal Emergency Management Agency (FEMA) for its 2017 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 Middlesex; and

WHEREAS, the Plan recommends several hazard mitigation actions (projects) that will provide mitigation for specific natural hazards that impact the Town of Middlesex 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 Middlesex eligible for funding to alleviate the impacts of future hazards;

WHEREAS, a duly-noticed public meeting was held by the Town of Middlesex Select Board on _____ __, 2018 to formally adopt the Middlesex Town Local Hazard Mitigation Plan; now therefore be it

RESOLVED by Town of Middlesex Selectboard:

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

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 as town capacity and funding allows;

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 Assistant to the Selectboard.

IN WITNESS WHEREOF, the undersigned have affixed their signature and the corporate seal of the Town of Middlesex this ____ day of _____ 2018.

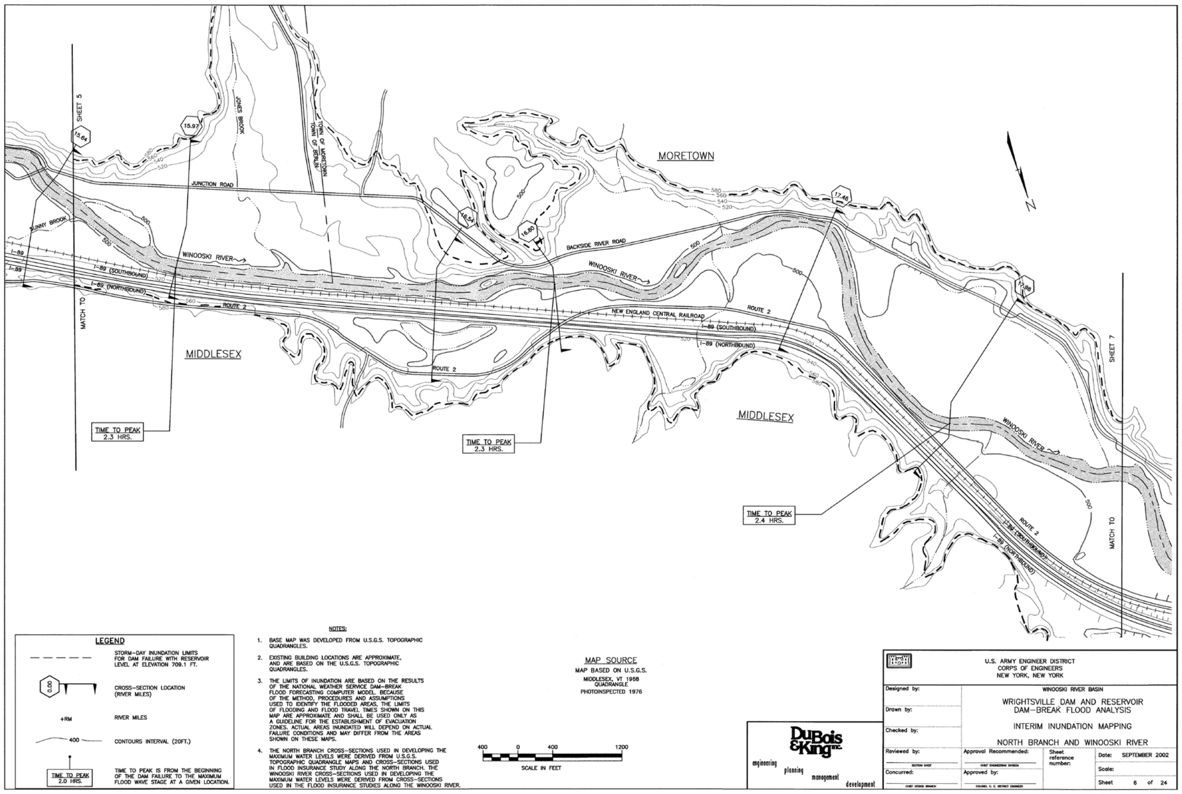
_____
Selectboard Chairman

_____ _____
Member of Selectboard Member of Selectboard

_____ _____
Member of Selectboard Member of Selectboard

ATTEST

_____
Sarah Merriman, Town Clerk


MORETOWN
MIDDLESEX
MIDDLESEX
WINOOSKI RIVER
JUNCTION ROAD
BACKSIDE RIVER ROAD
NEW ENGLAND CENTRAL RAILROAD
ROUTE 2
I-89 (SOUTHBOUND)
I-89 (NORTHBOUND)
SUNNY BROOK
JONES BROOK
TOWN OF MORETOWN
TOWN OF BERLIN
MATCH TO SHEET 5
MATCH TO SHEET 7
15.64
15.97
16.34
16.80
17.46
17.88
TIME TO PEAK 2.3 HRS.
TIME TO PEAK 2.3 HRS.
TIME TO PEAK 2.4 HRS.
LEGEND
STORM-DAY INUNDATION LIMITS FOR DAM FAILURE WITH RESERVOIR LEVEL AT ELEVATION 709.1 FT.
CROSS-SECTION LOCATION (RIVER MILES)
RIVER MILES
CONTOURS INTERVAL (20FT.)
TIME TO PEAK 2.0 HRS.
TIME TO PEAK IS FROM THE BEGINNING OF THE DAM FAILURE TO THE MAXIMUM FLOOD WAVE STAGE AT A GIVEN LOCATION.
NOTES:
1. BASE MAP WAS DEVELOPED FROM U.S.G.S. TOPOGRAPHIC QUADRANGLES.
2. EXISTING BUILDING LOCATIONS ARE APPROXIMATE, AND ARE BASED ON THE U.S.G.S. TOPOGRAPHIC QUADRANGLES.
3. THE LIMITS OF INUNDATION ARE BASED ON THE RESULTS OF THE NATIONAL WEATHER SERVICE DAM-BREAK FLOOD FORECASTING COMPUTER MODEL. BECAUSE OF THE METHOD, PROCEDURES AND ASSUMPTIONS USED TO IDENTIFY THE FLOODED AREAS, THE LIMITS OF FLOODING AND FLOOD TRAVEL TIMES SHOWN ON THIS MAP ARE APPROXIMATE AND SHALL BE USED ONLY AS A GUIDELINE FOR THE ESTABLISHMENT OF EVACUATION ZONES. ACTUAL AREAS INUNDATED WILL DEPEND ON ACTUAL FAILURE CONDITIONS AND MAY DIFFER FROM THE AREAS SHOWN ON THESE MAPS.
4. THE NORTH BRANCH CROSS-SECTIONS USED IN DEVELOPING THE MAXIMUM WATER LEVELS WERE DERIVED FROM U.S.G.S. TOPOGRAPHIC QUADRANGLE MAPS AND CROSS-SECTIONS USED IN FLOOD INSURANCE STUDY ALONG THE NORTH BRANCH. THE WINOOSKI RIVER CROSS-SECTIONS USED IN DEVELOPING THE MAXIMUM WATER LEVELS WERE DERIVED FROM CROSS-SECTIONS USED IN THE FLOOD INSURANCE STUDIES ALONG THE WINOOSKI RIVER.
MAP SOURCE
MAP BASED ON U.S.G.S.
MIDDLESEX, VT 1968 QUADRANGLE
PHOTOINSPECTED 1976
SCALE IN FEET
DuBois & King inc.
engineering planning management development
U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
NEW YORK, NEW YORK
WINOOSKI RIVER BASIN
WRIGHTSVILLE DAM AND RESERVOIR
DAM-BREAK FLOOD ANALYSIS
INTERIM INUNDATION MAPPING
NORTH BRANCH AND WINOOSKI RIVER
Designed by:
Drawn by:
Checked by:
Reviewed by:
Concurred:
Approval Recommended:
Approved by:
Sheet reference number:
Date: SEPTEMBER 2002
Scale:
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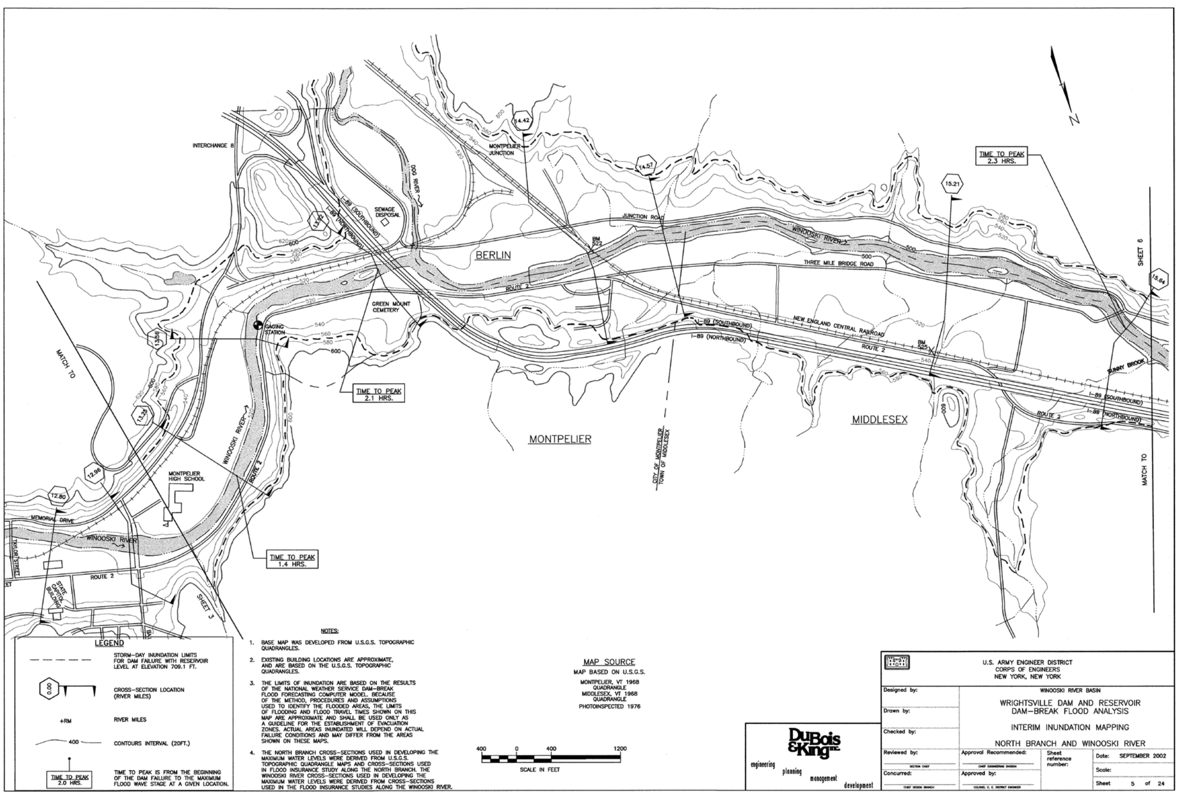
BERLIN
MONTPELIER
MIDDLESEX
INTERCHANGE 8
MONTPELIER JUNCTION
DOG RIVER
SEWAGE DISPOSAL
JUNCTION ROAD
THREE MILE BRIDGE ROAD
WINOOSKI RIVER
NEW ENGLAND CENTRAL RAILROAD
ROUTE 2
I-89 (SOUTHBOUND)
I-89 (NORTHBOUND)
GREEN MOUNT CEMETERY
GAGING STATION
MONTPELIER HIGH SCHOOL
MEMORIAL DRIVE
SUNNY BROOK
CITY OF MONTPELIER
TOWN OF MIDDLESEX
MATCH TO
MATCH TO SHEET 6
SHEET 3
14.42
14.57
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WINOOSKI RIVER BASIN
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Designed by:
Drawn by:
Checked by:
Reviewed by:
Concurred:
Approval Recommended:
Approved by:
Sheet reference number:
Date: SEPTEMBER 2002
Scale:
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