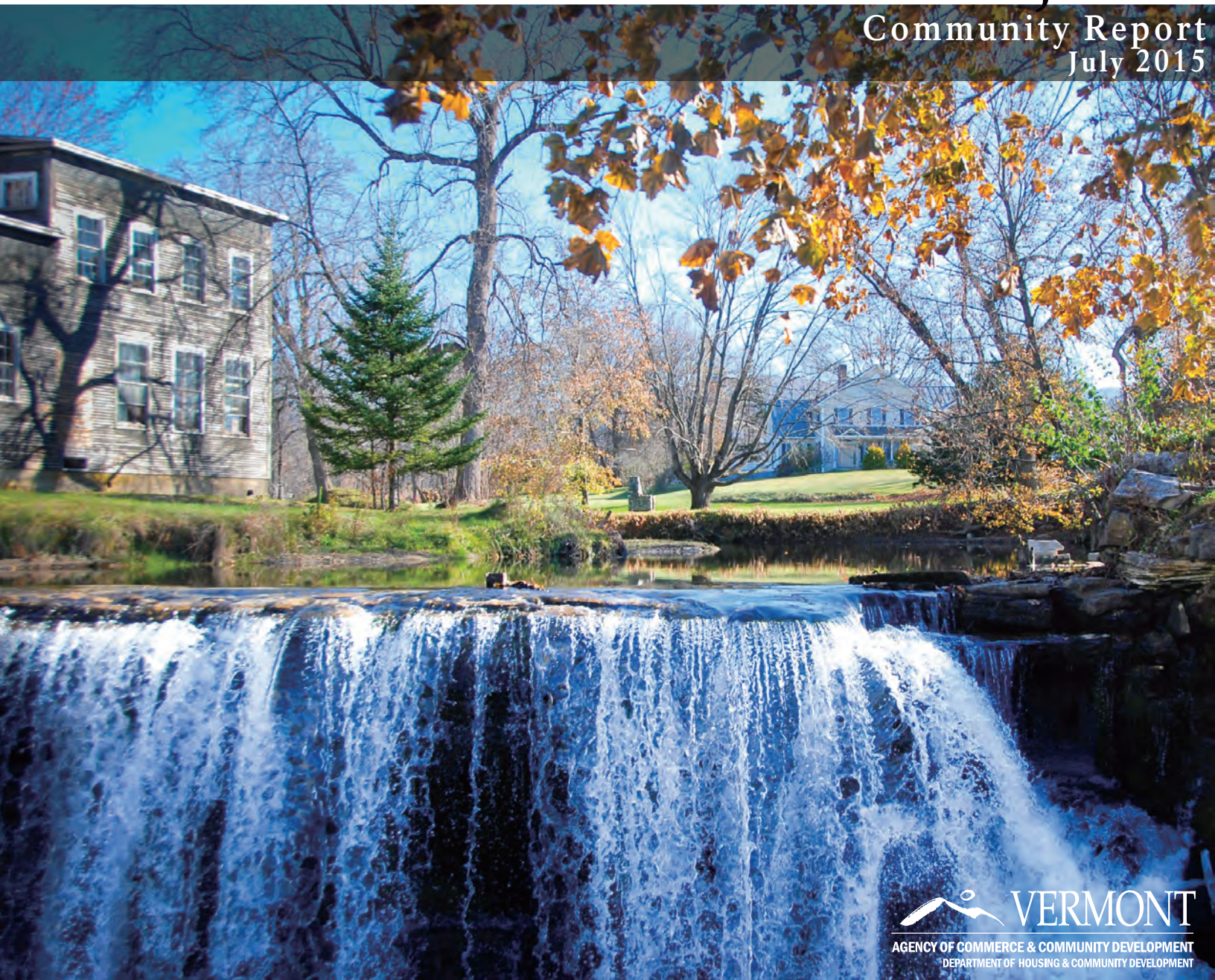


Vermont Economic Resiliency Initiative [VERI]

Brandon, VT

Community Report
July 2015



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Noelle MacKay, Commissioner of Housing and Community Development

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Vermont Economic Resiliency Initiative (VERI): Brandon Executive Summary

In communities around Vermont, rapidly melting snow and torrential downpours bring nightmares of washed out bridges, closed roads, flooded basements and shuttered businesses. To calm these fears, Vermonters have been working to better understand the flood risks they face and identify and implement projects that reduce, avoid or minimize these risks. The goal: to protect lives, help businesses remain open and reduce costs to taxpayers for repetitive repair to infrastructure.

After Tropical Storm Irene, Governor Shumlin challenged us to “build back stronger than Irene found us.” This project, the Vermont Economic Resiliency Initiative (VERI), is designed to help meet that challenge. It is modeled after a successful project in Bennington, Vermont that minimized business interruption and saved tax payers money by substantially reducing flood recovery costs (DHCD, 2015 a). With funding from the US Department of Commerce, Economic Development Administration, the Agency of Commerce and Community Development, working with the Agencies of Natural Resources and Transportation and the Regional Planning Commissions, launched VERI to help ensure Vermont recovers quickly and remains open for business after disaster strikes.

In the first phase of the project, the VERI team evaluated and ranked areas where economic activity and associated infrastructure are at high risk of flooding. Based on this state-wide assessment, input from the team’s economic steering committee and interest from local municipalities, five areas in seven communities (Barre City and Town, Brandon, Brattleboro, Enosburg Village and Town, and Woodstock) were selected for a more detailed analysis of the local flood risks to the community and businesses.

Brandon was selected because it has a densely developed downtown area with significant economic activity and critical transportation infrastructure and commercial buildings at risk of flooding. Brandon also has a history of strong local support of initiatives to reduce flood risks, including past efforts to identify and prevent flood risks throughout the town. For example, Brandon is one of a handful of towns in Vermont that have adopted flood hazard regulations above and beyond the minimum National Flood Insurance Program (NFIP) requirement. As a result of its proactive regulations, Brandon qualifies for the highest level for federal and state reimbursement (75% federal and an additional 17.5% state) of federally-declared disasters through the Emergency Relief Assistance Fund (ERAF). The town has also encouraged the permanent conservation of key floodplains upstream of the downtown to help protect downstream properties and infrastructure during future floods by allowing flood waters to spread out over a large area and slow down the energy and speed of flood waters.

The team hosted two community forums, as well as smaller group meetings and worked directly with local leaders, municipal staff, local businesses and interested citizens to determine the locations of greatest risk and cost, identified potential projects and highlighted the work Brandon has

accomplished to date to reduce the impact of floods. Based on this community insight, along with data collection and analysis, the team evaluated local flood risk to business and infrastructure and identified strategies and projects Brandon can implement to minimize rebuilding and recovery costs and ensure businesses stay open -- saving jobs and maintaining the local economy.

This report summarizes the team's work and identifies municipal policy and program recommendations and 13 site-specific projects in Brandon, including the following 10 projects deemed high priority by the team.

Municipal Policy and Program Recommendations

Top recommendations include the following:

- **Document Road, Sewer, and Water Infrastructure Vulnerabilities in Municipal and Capital Plans:** Specific areas that were damaged or have known vulnerabilities such as those identified in this report should be documented so the community can plan for their replacement in long-term budgets, easing the impact on taxpayers. While capital programs and budgets are not common in smaller towns, the town of Brandon has begun this process. With help from the Rutland Regional Planning Commission (RRPC) and financial advisors, the town should develop a priority project list and process to allocate funds and make these improvements over time.
- **Identify Areas for Conservation:** The Neshobe River Corridor Plan identifies potential riparian easement sites. The town can identify and work with willing landowners to establish conservation sites along the river to prevent future development in flood-prone locations.
- **Identify VERI Project Recommendations in Brandon's Hazard Mitigation Plan:** Once the community has chosen the top recommendations for further action, include these in the town's Hazard Mitigation Plan (HMP). This will help when applying for future Hazard Mitigation Grant Program funding.

High Priority Specific Project Recommendations

Building and Site Improvements: These are projects which lower the risk of flooding and/or erosion to specific properties through improvements to the building and/or surroundings.

- **Floodproof Downtown Businesses:** Multiple buildings in downtown Brandon were flooded during Tropical Storm Irene and one was destroyed. Flood risk may be lowered with the completion of the overflow culvert project, however some risk of flood damage will likely remain during extreme floods. Floodproofing projects (e.g., sealing off buildings to prevent water infiltration) would protect nine businesses and the town offices with a total of 83 employees.

Channel and Floodplain Improvements: These types of projects lower the risk of flooding and/or erosion to properties along the river through the improvement of natural river and floodplain functions.

- **Remove Berms Downstream of Route 53 in Forest Dale:** Historic berms along the south bank of the Neshobe River downstream of VT Route 53 in Forest Dale restrict the river's access to a forested floodplain in an area of major flood flow and sediment transport. Berm removal would allow the river to access an undeveloped floodplain upstream of an area along Newton Road where homes were flooded in Tropical Storm Irene, thereby reducing flooding and erosion risks and helping protect several homes and one business with five employees.

Infrastructure Improvements: These are projects which lower the risk of flooding and/or erosion to utilities, roadways and other municipal or state-owned infrastructure.

- **Install Downtown Brandon Overflow Culvert:** The Town of Brandon has received a FEMA Hazard Mitigation Grant (Phase 1; \$250,000) to design an overflow box culvert in the Village to prevent or reduce flood damage to Route 7 and downtown businesses.
- **Stabilize Bank at Wheeler Road:** An eroding slope along the west bank of the Neshobe River was likely initiated by river erosion on the lower bank. Wheeler Road and a town water main are at-risk if the erosion continues.
- **Replace Route 53 Bridge:** The Route 53 bridge over the Neshobe River in Forest Dale is undersized (i.e., does not accommodate all floods) and should be replaced with a larger span to reduce risk for bridge closure, damage to surrounding property and impacts to local businesses due to bridge closure. This project will significantly reduce flood and erosion risks affecting two businesses with nine employees, a state highway that is a major connector, and several private residences.
- **Replace Wheeler Road Bridge:** The abutments for the Wheeler Road Bridge over the Neshobe River are in poor condition and the bridge is undersized (i.e., does not accommodate all floods). This project will significantly reduce flood and erosion risks along Wheeler Road and VT Route 73, helping to ensure this critical thoroughway is kept open during floods.
- **Stabilize or Relocate Wastewater Treatment Facility:** Brandon's businesses are highly dependent on a functioning Wastewater Treatment Facility (WWTF), however flooding and erosion have negatively affected Brandon's WWTF for years. The WWTF is aging and major upgrades will be required in the near future, at which point steps to reduce flood risks should be considered in any proposed upgrades or planning of a new facility. This could include the reconnection of adjacent floodplains to take the pressure off of the existing WWTF location, or the planning of a new facility in a different location outside flood hazard zones. This will ensure that the WWTF remains up and running after an event, ensuring businesses can remain open for employees and customers as this facility services over 1,000 residential and commercial connections.

Two of these high-priority projects (berm removal/floodplain restoration in Forest Dale along Newton Road and bank stabilization along Wheeler Road) are further detailed in the report to

help Brandon take the next steps and to create model project designs to help other communities learn from this project.

Next Steps

As part of the ongoing community discussion regarding the VERI effort, the team recommends the following steps to incorporate the community's input into the final prioritization and advance the projects over time:

- Solicit input from individuals and businesses at future community meetings regarding specific projects and overall project prioritization.
- Prioritize one to two projects to pursue each year with assistance from the Vermont Department of Environmental Conservation and Rutland Regional Planning Commission staff to identify appropriate funding sources and partners.
- Apply for one to two grants each year to advance project development and/or designs.
- Implement projects as funding allows.
- Monitor project success.

Irene taught us many lessons -- a key one was that no one individual, business, organization, town or state agency can address and tackle large and complicated projects alone. Reducing the risk of future floods in Brandon will require partnerships, funding and time implement. The Agency of Commerce and Community Development, its sister agencies and the Rutland Regional Planning Commission are committed to help Brandon take the steps outlined in this report to save lives and protect jobs and its economy from future storms and floods.

Flooding due to severe storms will happen again, the question is how can we best reduce the recovery costs to communities and ensure businesses remain open.

List of Acronyms

ACCD – Vermont Agency of Commerce and Community Development

ANR – Vermont Agency of Natural Resources

CDBG – Community Development Block Grant

CRS – Community Rating System

DEC – Vermont Department of Environmental Conservation

DHCD – Vermont Department of Housing and Community Development

EDA – US Economic Development Administration

ELJ – Engineered Log Jam

EPA – United States Environmental Protection Agency

ERAF – Emergency Relief Assistance Fund

FEMA – Federal Emergency Management Agency

HMP – Hazard Mitigation Plan

NFIP – National Flood Insurance Program

RCP – River Corridor Plan

RRPC – Rutland Regional Planning Commission

SFHA – Special Flood Hazard Area

USGS – United States Geological Survey

VERI – Vermont Economic Resiliency Initiative

VTrans – Vermont Agency of Transportation

WWTF – Waste Water Treatment Facility

Glossary of Terms

Terms are bolded the first time they appear in the text.

100-Year Floodplain – The area that will be inundated by the flood event having a 1% chance of being equaled or exceeded in any given year. Also called 100-Year Flood Zone or 100-Year Flood Hazard Area.

500-Year Floodplain – The area that will be inundated by the flood event having a 0.2% chance of being equaled or exceeded in any given year. Also called 500-Year Flood Zone or 500-Year Flood Hazard Area.

Base Flood Elevation – The computed elevation to which floodwater is anticipated to rise during a 100-year flood.

Berm – An artificial ridge or embankment, e.g., a raised bank bordering a river that prevents flow out of the main channel.

Community Rating System (CRS) – Program that provides a flood insurance premium rate reduction based on a community's floodplain management activities. CRS recognizes community floodplain management activities that exceed the minimum NFIP standards. Besides the benefit of reduced insurance rates, CRS floodplain management activities enhance public safety, reduce damages to property and infrastructure, avoid economic disruption and losses, and protect the environment.

Culvert – A pipe or tunnel underground, usually under roads, that transports flowing water, sediment, debris and ice from one side to the other.

Emergency Relief Assistance Fund – This program allows towns in Vermont to increase the amount of state aid money they could receive as a match to federal aid for post-disaster recovery.

Erosion – The wearing away of rock or soil by flowing water.

Flash Flooding – Rapid, short-term flooding often caused by severe rain and/or rapid snowmelt.

Floodplain – Area of land adjacent to a stream or river that stretches from the banks of its channel to the base of the enclosing valley walls and experiences flooding during periods of high discharge.

Floodway – The area within and immediately adjacent to the channel containing the highest velocity flows that must remain open to allow floodwaters to pass.

Flood Chute – A short cut taken by a river or similar waterway during high water, rather than following the normal meandering route.

Flood Resiliency – The ability of individuals, communities, organizations and states to adapt to and recover from flooding without compromising long-term prospects for development.

Fluvial Erosion – The erosion caused by rivers and streams that ranges from gradual bank erosion to catastrophic changes in river channel location and size during flood events.

Hamlet – A small rural community.

Hazard Mitigation Plan – A document and planning process that provides actions to reduce the long-term risk to human life, property, and the economy from natural disasters.

Mitigation – Any sustained action taken to reduce or eliminate the long-term risk to life and property from hazard events. It is an on-going process that occurs before, during, and after disasters and serves to break the cycle of repetitive damage and repair.

National Flood Insurance Program – A federally funded and locally implemented program to reduce the impacts of flooding through individual insurance policies and incentives for floodplain regulations.

Riparian Buffer – Mixed composition, vegetated land adjacent to a stream separating it from other land uses.

Riprap – The application of rocks to reduce erosion and protect nearby infrastructure or private property. Also known as rock armoring.

Special Flood Hazard Area – The area that will be inundated by the flood event having a 1% chance of being equaled or exceeded in any given year. Also called 100-Year Flood Zone or 100-Year Flood Hazard Area.

Project Overview

In May 2013, the Vermont Agency of Commerce and Community Development (ACCD) received disaster recovery funding from the US Economic Development Administration (EDA) for the Vermont Economic Resiliency Initiative (VERI). The objectives of VERI are to:

1. Analyze threats to areas of economic activity and their associated infrastructure;
2. Develop plans to reduce impacts and avoid future losses and costs; and
3. Identify projects that communities and businesses can implement that avoid, minimize or reduce the risk and thus, ensure businesses stay open, and communities save money in repair costs.

The overarching goal is to ensure that businesses and communities bounce back quickly when disaster strikes, saving time and money in recovery costs.

VERI is led by ACCD's Department of Housing and Community Development (DHCD) in partnership with the Agency of Natural Resources (ANR), Agency of Transportation (VTrans), and Vermont's Regional Planning Commissions, which in Brandon is the Rutland Regional Planning Commission (RRPC). Early in the process, these agencies mapped places where flood hazard risks intersect with areas of economic activity and infrastructure. Five priority communities were selected for a detailed assessment of those risks. These five areas include: Barre City and Town, Brandon, Brattleboro, Enosburg Village and Town, and Woodstock. A river scientist and engineering team consisting of five consulting companies - Bear Creek Environmental, LLC, DuBois & King, Inc., Fitzgerald Environmental Associates, LLC, Landslide Natural Resource Planning, Inc., and Milone & MacBroom, Inc. - were hired to analyze the rivers in each community and assist in developing recommendations to reduce the vulnerability of infrastructure and businesses to flood damage.

The primary objective of the focus area assessments is to develop strategies and projects to make businesses and the communities more resilient to floods and other disasters.

A number of factors played a role in the selection of the five communities for more detailed assessments. First, the project team ranked towns across the state by flood risk, economic activity and infrastructure at-risk. Then the team looked at the 20 highest ranking communities and removed any that had undergone or had funding for similar analysis (e.g., Bennington and Waterbury). Next, the team selected five pilot communities that represented different economic profiles (e.g., agriculture, tourism, downtowns) as well as different sizes. Other considerations included risk of future damage, economic factors, and level of community engagement and interest. Together, these factors helped determine the five pilot communities selected.

Why was Brandon Selected?

Brandon was selected as one of the pilot communities for the following reasons:

- The community has significant economic activity and it is a state-designated downtown;
- Critical transportation infrastructure was identified to be at-risk that, if closed, would impact employees and customers trying to get to businesses and the flow of goods and services;
- Commercial buildings were identified to be at-risk;
- Brandon has strong local support for **flood resiliency** initiatives; and
- Previous efforts have been made to identify flood and **erosion** risks in Brandon and mitigate the risk.

Study Area

Approximately six miles of the Neshobe River are included in the study area for this project. The area begins approximately one tenth of a mile upstream (east) of the North Street (VT Route 53) bridge in the **hamlet** of Forest Dale, and continues downstream to Brandon's Wastewater Treatment Facility (WWTF) on Union Street. The study area includes the hamlet of Forest Dale and Brandon's downtown. Figure 1 is a map of the VERI study area, shown in red, in relation to roads and populated areas.

The Town of Brandon is located in Rutland County in central Vermont. The town was founded in 1761, originally named the Town of Neshobe, and was changed to its current namesake in 1784. The 2010 census population was approximately 4,000 people, making

Brandon the fourth largest town within Rutland County (Brandon Town Website, 2015). The downtown was built around two churches and now contains a wide range of businesses including restaurants and retail. Commercial and residential development continues along the roads radiating out from the town center. Two additional areas of concentrated development are located within the town: Forest Dale, and an actively developing mixed use area at the historic Brandon Training School. The major economic assets within the town are primarily located within these three areas of development (RRPC, 2011). The remainder of the 40 square mile town is predominantly agriculture along the valley bottoms and forests climbing the slopes of the Taconic Mountains to the west and

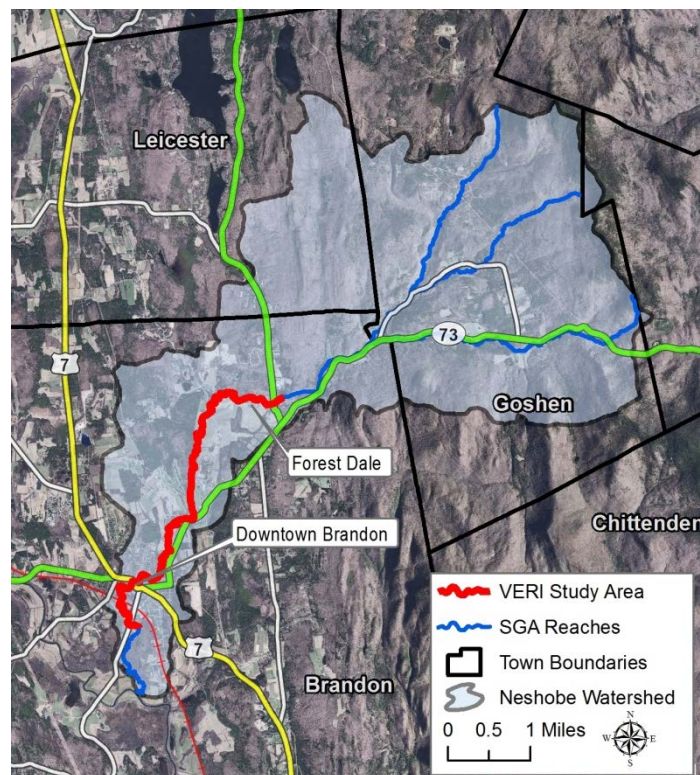


Figure 1: Study area

the Green Mountains to the east. The downtown contains several important transportation corridors including the Vermont Railway line, US Route 7, a major north-south arterial highway, and VT Route 73, an important connector to central Vermont.

The Neshobe River is a significant natural feature in the town, passing through Forest Dale and downtown. The river drains a 20 square mile watershed and empties into the Otter Creek west of downtown Brandon. The headwaters flow from the western slopes of the Green Mountains in Goshen. The North Branch and the mainstem converge as the two streams enter the town. The river valley transitions from steep and narrow to very wide and flat near Forest Dale at the intersection of VT Route 73 and VT Route 53 (North Street).



Figure 2: Neshobe River in Forest Dale



Figure 3: Neshobe River in downtown Brandon

Upstream of this transition in Forest Dale, the Neshobe River is a steeper river channel with a rocky stream bed and is typically lined by steep, wooded banks (Figure 2). Below this transition, the river has a lower slope and winds across the valley (RNRCD, 2011). Not including downtown Brandon, land use in the Neshobe River corridor is predominantly agriculture and forest, with small pockets of development along the banks in Forest Dale. The Neshobe Golf Course is located along the east bank of the river for approximately 2,500 feet along Town Farm Road.

Dense development fills the river corridor through downtown Brandon, which was built around and over the Neshobe River. Several buildings span or overhang the river (Figure 3) before it enters the twin stone arches under US Route 7 (Center Street) and plunges over a large waterfall. Downstream of downtown the river continues through a broad, flat, and predominantly forested valley to meet the Otter Creek.

Research and Outreach

The team initiated efforts to gather information about Brandon’s flood risks with a kick-off meeting in August 2014 in Brandon. Several community members representing the downtown business association and the Selectboard were present to share information about completed and ongoing flood resiliency efforts initiated by the town.

Following this meeting, the team reviewed existing information about the town, the Neshobe River, and associated community hazard planning (see table of data sources in Appendix A). Following the kick-off meeting, DHCD and the Rutland Regional Planning Commission (RRPC) hosted a community forum at the Brandon Town Hall on October 16, 2014 (Figure 4). Community members, business owners, and homeowners attended the forum. DHCD Commissioner Noelle MacKay and Evan Fitzgerald of Fitzgerald Environmental Associates, LLC, provided background about the VERI study and then the floor was open for ideas and questions from community members, and discussion with the group.



Figure 4: Community forum

Brandon community members highlighted successfully completed and ongoing flood resiliency projects carried out by the Town along the Neshobe River, including:

- Restoration of **riparian buffers** and **floodplains** following Tropical Storm Irene;
- Adopting more stringent flood hazard regulations, including restriction of development in the **100-year floodplain** and the **fluvial erosion** hazard zone;
- Beginning a study of an “overflow **culvert**” in downtown Brandon to reduce flood risks in future floods; and
- Creating river corridor easements to protect areas vulnerable to flooding.

Participants also highlighted areas vulnerable to flooding and erosion, including:

- Flooding and drainage problems along Newton Road and Furnace Road in Forest Dale, and along Route 7 (Center Street) and Pearl Street in the downtown;
- Risks to the Forest Dale Mobile Home Park and the Town Hall (and other buildings downtown) located in the **floodway**; and
- Vulnerability of the wastewater infrastructure along Maple Street and Briggs Lane.

The river scientists on the team also completed field surveys of the Neshobe River to gain a first-hand understanding of the state of the river following flooding caused by Tropical Storm Irene in 2011. Local community insight gained at the community forum helped guide this fieldwork. The

river scientists visited the watershed on several occasions between August and December 2014 and walked the entire length of the Neshobe River within the study area (see maps in Appendix E). The team made the following observations:

- Locations and dimensions of bank erosion and armoring;
- Locations of significant wood debris accumulation in the channel;
- Historic and recent **berms** that restrict or prevent floodplain access;
- Bridge and culvert dimensions and conditions;
- Riparian buffer conditions;
- Areas of severe river channel instability; and
- Areas of high quality aquatic habitat.

Input gathered at the workshops and meetings, along with the research completed by the VERI team, were used to develop the recommendations to help the community prepare for, manage, decrease risk, and reduce the economic costs of future losses due to flooding. In the sections that follow, the team has outlined specific projects as well as plan and bylaw updates that can help ensure businesses remain open and infrastructure continues to function. Estimated costs, funding sources and benefits associated with implementing the recommendations are included.

Flood History and Town Accomplishments

The Town of Brandon has experienced severe property and infrastructure damage from flooding along the Neshobe River since the 1920's. Severe and widespread damage occurred during Tropical Storm Irene throughout Brandon. With input from RRPC and the community, the team has identified key flood risks in Brandon.



Figure 5: Flooding in downtown Brandon during Tropical Storm Irene (Janet Mondlak, 2011)

Flood History and Risk

Major flooding damage along the Neshobe occurred during three very large storm events in 1927, 1938, and 2011 (Figure 5). It is likely that each of these three floods equaled or exceeded the 100-year flood events. Photographs and descriptions of damage in the downtown area during the 1938 flood are very similar to impacts from Tropical Storm Irene in 2011 (The Reporter, 2011). The Town **Hazard Mitigation Plan** (HMP) also lists several repeat flood damage areas along the Neshobe River including: the Wastewater Treatment Facility, Newton Road, Union Street, and the downtown area (Center Street and Conant Square). Damage during recent and historic flooding events, and associated recovery costs, are summarized below in Table 1 (RRPC, 2011). Smaller scale **flash flooding** events over the last decade have typically affected smaller areas within the watershed, such as Newton Road in Forest Dale.

Table 1: Description of Neshobe River Flood Events and Damage		
Flood Date	Damage Description	Estimated Recovery Cost
November, 1927	Major flooding damage to downtown	Unknown
September, 1938	Major flooding damage to downtown	Unknown
April, 1996	Flooding affects Brandon	\$10,000
June, 1996	Flash flooding	\$10,000
July, 2003	Flash flooding in Brandon and Forest Dale	\$25,000
February, 2008	Flash flooding affects Forest Dale	\$100,000
August, 2011	Major damage throughout Town	>\$800,000

The team analyzed maps to identify at-risk businesses and facilities in the flood hazard zones (Appendix B). The businesses at highest risk have at least a portion of their building in the designated Federal Emergency Management Agency (FEMA) floodway. During a flood event, the floodway typically conveys the highest velocity waters. The team also identified businesses and

important facilities and utilities in the 100-year floodplain (also known as the **Special Flood Hazard Area**) and the Fluvial Erosion Hazard (FEH) Zone adopted by the Town of Brandon. Within these three flood zones, over 25 businesses with over 100 employees are at-risk.

Measure	Floodway	100-Year Flood Zone	FEH
Number of Businesses	2	14	14
Number of Employees	5	40	86

These data only show if buildings are within the flood zone and do not show the elevation of the building relative to the flood zone elevation.

The flood hazard summary report for the town lists 67 properties within the FEMA-mapped Special Flood Hazard Area (SFHA), of which only 18 (27%) have flood insurance (Flood Ready Vermont, 2015). Four critical public facilities are located in the SFHA. The team’s mapping analysis also showed that only 6% of the 100-year flood zone is currently developed in the Town of Brandon. This is significant as undeveloped areas do not have structures or infrastructure that would be impacted and thus keeping development in these areas at a minimum helps eliminate the potential for impacts. These areas often help slow or sink flood water and reduce the risk to developed areas.

Many significant property and infrastructure concerns were also identified in the Neshobe River Corridor Plan (RCP) (Bear Creek Environmental, 2011) and during subsequent field visits and mapping exercises in 2014 and 2015 as part of our analysis. A summary of significant flood risks to business, residential and municipal property and infrastructure is provided below.

Business Property Risks

In downtown Brandon there are over two dozen business properties located within flood and erosion hazard areas. At least 26 businesses sustained damages during Tropical Storm Irene flooding in 2011 (see damage maps and table in Appendix B). During this storm, floodwaters spilled out of the Neshobe River’s banks and flowed through downtown along Center Street (US Route 7), causing extensive damage to businesses and forcing the closure of US Route 7 for several days (Figure 6). Three business locations were destroyed in downtown during this flood.



Figure 6: Flood recovery in downtown Brandon following Tropical Storm Irene (wingsovermont.com, 2011)

The Neshobe Golf Club, upstream from the downtown along Neshobe River, is located in the 100-year flood zone and the Town’s fluvial erosion hazard zone. This business has experienced \$100,000 in damages during recent floods. During Tropical Storm Irene, floodwaters were

approximately eight feet deep and two feet of sediment was deposited on the course close to the river.

Agricultural lands located along Town Farm Road and Newton Road are susceptible to flooding and bank erosion. Flooding and erosion risks are especially severe in the vicinity of the Town Farm Road Bridge, where floodwaters spilled out of the river’s banks during Tropical Storm Irene and caused extensive damage to crop fields.

In Forest Dale, two private businesses and a US Postal Service building are located in the 100-year flood zone. Both of these buildings were damaged by floodwaters and mud/debris during the 2011 flood.

The damages noted above impact the individual business, those working at those businesses, customers and the broader local and regional economy.

Municipal Property and Infrastructure Risks

The Brandon Wastewater Treatment Facility (WWTF) is adjacent to the Neshobe River at the intersection of Maple Street and Union Street, south of downtown. The facility was threatened by flooding and erosion and nearly lost a critical utility pole during Tropical Storm Irene. At the WWTF the river channel is severely undersized and confined. Barlow Road and associated residential properties to the north further confine the river and flood waters at this location, putting greater flood risk on the WWTF. River bank erosion along the south bank adjacent to the WWTF appears to have worsened since 2010 when the town installed stone armor (i.e., **riprap**) as a protection. In addition, WWTF infrastructure in the downtown area (e.g., Maple Street and Briggs Lane) is susceptible to flood damage, resulting in repetitive damage to these public utilities (DHCD, 2015 b). If this infrastructure is damaged during a flood, businesses may have to close for health and safety reasons even if their building is not damaged.

What is the Floodway?

The floodway is the area within and immediately adjacent to the channel that must remain open to allow floodwaters to pass.

What is the 100-year Floodplain?

The 100-year floodplain is also called the Special Flood Hazard Area, and is the base floodplain shown on FEMA maps.

A total of eight bridges along the Neshobe are too narrow to accommodate the predicted width of the spring flow (i.e., “bankfull width”) resulting in floodwaters going around and impacting surrounding landowners. An additional four bridges confine the river during large floods, but are appropriately sized to accommodate the bankfull width. Several of these structures are linked to known areas of repeat flooding. The concrete support piers under the Route 7 and 73 Bridges and under several buildings upstream of the bridge in downtown Brandon are known to be at-risk for the accumulation of large debris. Debris catching on these piers could temporarily block a portion of the river during a flood, exacerbating the rise of flood waters and potentially causing structural

failure of the piers. If it failed and a portion of a building fell into the river, major flooding damage could occur downstream (RRPC, 2011).

The town water main runs along Wheeler Road in an area susceptible to flooding and erosion hazards. A large landslide along Wheeler Road threatens both the road and the water main to the west. In addition, Wheeler Road has been damaged repeatedly by Neshobe River flooding (DHCD, 2015 b).

Residential Property Risks

Near downtown Brandon there are several residential properties located within flood and erosion hazard areas. There are approximately 10 homes along River Street east of downtown that are at-risk for flood damages. Two homes are within the 100-year flood zone near the intersection of Wheeler Road and Forest Dale Road (VT Route 73). One of these properties was badly flooded during Tropical Storm Irene, and was purchased by the town with state and federal disaster recovery funds.

In Forest Dale, approximately 35 homes are located in the 100-year flood zone or the town's fluvial erosion hazard zone. Along Furnace Road, 25 homes are located in the 100-year flood zone, and a berm protects additional homes upstream from flooding. Along Newton Road, approximately 10 homes are located within flood hazard zones. Several homes along Newton Road that are located outside of the 100-year flood zone had their basements flooded during Tropical Storm Irene.

Town Accomplishments

The Town of Brandon has been working over the past several years to reduce the risk of flooding to businesses, farms, residences and local infrastructure. As described below, these efforts have addressed both town-wide policies and site specific initiatives to reduce flood risks.

Town Wide Flood Policy

In conjunction with RRPC and ANR, the town has conducted several studies of the river (BCE, 2011; CLD, 2013) and worked to implement recommendations outlined in these studies, such as river corridor conservation easements in areas prone to flooding. In addition, following Tropical Storm Irene, the town took a critical step toward reducing flood risks and recovery costs by adopting bylaws that restrict development in flood prone areas. This will help keep new structures out of harm's way and protect existing development.

The Town of Brandon's land use ordinance includes flood hazard regulations for the purpose of avoiding and minimizing "the loss of life and property, the disruption of commerce, the impairment of the tax base, and the extraordinary public expenditures and demands on public services that result from flooding related inundation and erosion" (Brandon, 2012). Brandon is one of a handful of towns in Vermont that have adopted flood hazard regulations above and beyond the minimum **National Flood Insurance Program** (NFIP) requirements. Its ordinance restricts future development within the entire FEMA-mapped floodplain (including the floodway and the floodplain fringe) and the Fluvial Erosion Hazard zone.

As a result of its proactive regulations, Brandon qualifies for the highest level of federal and state reimbursement (75% federal and an additional 17.5% state) of federally-declared disasters through the **Emergency Relief Assistance Fund (ERAF)** (Flood Ready Vermont, 2015). In 2014, the State of Vermont established an ERAF to provide matching funding for federal assistance after federally-declared disasters. This program allows towns in Vermont to increase the amount of state aid money they can receive as a match to federal aid for post-disaster recovery. Because Brandon has taken steps to be prepared and resilient, the town is eligible for the highest match (17.5%). Table 3 outlines the steps Brandon has taken to qualify. Maps included in Appendix B show the locations of buildings within the different flood hazard zones.

Table 3: How Brandon Met its ERAF Match	
Steps to increase State aid to 12.5%	
Participate in the National Flood Insurance Program	Yes
Adopt 2013 State Road & Bridge Standards	Yes
Adopt Local Emergency Operations Plan	Yes
Adopt Local Hazard Mitigation Plan	Yes
Step to increase State aid to 17.5% (one needed to qualify)	
Adopt no new development in a River Corridor	Yes
Adopt no new development in Flood Hazard areas and participate in the Federal Community Rating System	No
ERAF Match	17.5%

Site Specific

The Neshobe RCP recommended the conservation of key floodplain areas along the Neshobe River to enhance their functionality and reduce downstream flooding. One of these critical areas, encompassing two properties to the northeast of the intersection of Newton Road and Town Farm Road was conserved in 2013 (Figure 7). This easement protected approximately 34 acres of river corridor from future channel and floodplain manipulation (e.g., gravel dredging, berming). This critical floodplain protection project will help protect downstream properties and infrastructure during future floods by allowing flood waters to slow and spread out over a large area.

The Town of Brandon is pursuing two projects in the lower watershed that will reduce flood risk. A bridge crossing over the Neshobe River on Wheeler Road is undersized and exacerbates flooding to nearby properties. Following the 2011 flooding, the town completed a buyout of a house adjacent to this bridge. This buyout will allow for more flexibility in the design of a properly sized bridge crossing. The town also recently approved matching funds for a VTrans structures grant to develop a design to increase the bridge span. For the downtown, Brandon received a FEMA Hazard Mitigation Grant to design an overflow box culvert to prevent or reduce flood damage to US Route 7 and downtown businesses.

In 2013-2014, with support from a Community Development Block Grant for disaster recovery (CDBG-DR), the DHCD hired a team of experts in community design and economic development and partnered with eight communities, including Brandon, to help speed recovery from Tropical Storm Irene. The Vermont-Downtown Action Team (V-DAT) visited Brandon on a number of occasions to gather input, develop projects and build consensus on the recommendations. The final report included short, mid and long-term recommendations to support local economic development efforts. Brandon's complete report and supporting documents are available at: http://accd.vermont.gov/strong_communities/opportunities/revitalization/vdat.



Figure 7: River corridor easement for parcels (shaded green) prone to flooding and erosion along the Neshobe River. Red arrows show the flow of water during extreme storms.

A one-page visual summary of the top recommendations is included in Appendix C. Several of the V-DAT recommendations have been completed in Brandon, including:

- Initiating the Community Branding and Marketing Package – including: updated town office sign, new town website, updated town letterhead/material and brand implemented on town vehicles.
- Receiving a \$500,000 CDBG-DR grant award to repair and rehabilitate the historic town office building which was severely damaged by Tropical Storm Irene.

Strategies and Projects to Protect Brandon

The team has developed a list of recommended strategies and projects to protect Brandon's businesses and infrastructure during future floods. Based on data collection and analysis, review of the town plan and bylaws, hazard mitigation plan, previous reports and community input, the team developed a list of flood **mitigation** objectives for the Neshobe River in Brandon to address town-specific flood damages. These objectives include:

1. Reduce flood risks in downtown Brandon and Forest Dale;
2. Keep major roadways (e.g., US Route 7 and US Route 73) open during floods;
3. Protect businesses and residences from flooding and erosion; and
4. Improve flood resiliency of town-owned infrastructure (e.g., WWTF, bridges) to better withstand flooding.

Using the objectives outlined above, the team developed a list of recommended flood mitigation strategies and projects for the Town of Brandon and the Neshobe River. To complement input from the community, maps were developed to guide the development of project ideas and highlight specific areas with elevated flood risk (see maps in Appendix B). These maps summarize:

1. Land development and buildings located in flood hazard areas; and
2. Business damage sustained during Tropical Storm Irene in 2011.

Strategies and projects for the Town of Brandon are summarized below, including municipal policy and program recommendations and site specific project recommendations.

Municipal Policy and Program Recommendations

Reducing the impacts of floods involves an ongoing process of evaluating and adjusting policies to minimize risks through protection, prevention and education. Accordingly, the VERI team first reviewed Brandon's Municipal Plan, Hazard Mitigation Plans and land use regulations to identify the policies they contain and those that are absent. The team also reviewed related plans for capital improvements, conservation, emergency and preparedness and continuity of operations. These documents were reviewed with the goal of identifying gaps and opportunities to improve the flood preparedness, safety and resilience of residents, visitors, businesses and local government.

The team then used the US Environmental Protection Agency's (EPA) flood resiliency checklist that was developed from a study in the Mad River Valley in Vermont (US EPA, 2014). This checklist includes overall strategies to improve flood resilience as well as specific strategies to conserve land and discourage development in river corridors; to protect people, businesses, and facilities in vulnerable settlements; to direct development to safer areas; and to implement and coordinate stormwater management practices throughout the whole watershed.

The checklist review found that Brandon currently employs 28 of 56 items on the checklist including buyouts for frequently flooded property, regulatory measures to limit development in flood prone areas, and utilizing steep slope development regulations (RRPC, Appendix D).

The results of both reviews identified 16 planning or policy opportunities that were then organized into four groups: Regulations, Community Planning, Emergency Planning, and Education and Outreach. The distribution of opportunities to improve policy and programs is shown in Table 4.

Table 4. Categories of Municipal Policies and Programs		
Category	Description	Policies or Programs
Land Use Regulations	Avoid and minimize land use conflicts around watershed resources that help lower the risk of flooding and/or erosion to properties.	4
Community Planning	Develop long term goals, recommendations and budgets to improve flood resilience.	4
Emergency Planning	Specific projects for supporting mitigation and recovery actions for flooding and other hazards.	5
Education and Outreach	Programs targeted at critical businesses and vulnerable populations to educate them about flood risk, mitigation and recovery.	3

The results of the plan and policy reviews were then combined and scored with either a one (ineffective), three (limited) or five (effective) using the following three objectives:

1. Reduces flood risk (proposed project lowers the flood level);
2. Reduces erosion risk (proposed project lessens the vulnerability to erosion); and
3. Protects businesses, infrastructure and property.

The three scores were added to provide a total score. Cost and ease of implementation, political realities and limitations as well as input from the community were also considered. To assist the town with implementation, potential partners and funding sources were identified. Each recommendation was further explained and next steps were identified. This information was compiled into easy to read charts found in Appendix E

The highest ranked regulatory changes included two to minimize river and land use conflicts and improve public safety. Recommended town plan updates included documenting damage to infrastructure and updating the capital and hazard mitigation plan to make these and other improvements were implemented to reduce threats to infrastructure over time. A lower cost recommendation included continuing efforts to conserve floodplain to protect downstream properties.

The top priority policy and program recommendations were presented at the community forum and local feedback was incorporated into the final prioritization, below.

- **Document road, sewer, and water infrastructure vulnerabilities in municipal and capital plans:** Specific areas that were damaged or have known vulnerabilities such as those identified in this report should be documented so the community can plan for their replacement in long-term budgets, easing the impact on taxpayers. While capital programs and budgets are not common in smaller towns, the town of Brandon has begun this process. With help from the RRPC and financial advisors, the town should develop a priority project list and process to allocate funds and make these improvements over time.
- **Identify areas for conservation:** The Neshobe RCP identifies potential riparian easement sites. The town can identify and work with willing landowners to establish conservation sites along the river to prevent future development in flood-prone locations.
- **Identify VERI project recommendations in Brandon's Hazard Mitigation Plan:** Once the community has chosen the top recommendations for further action, include these in Brandon's Hazard Mitigation Plan. This will help when applying for future Hazard Mitigation Grant Program funding.

Local stakeholders (residents, businesses, planning commission, Selectboard, etc.) are encouraged to review these recommendations and seek assistance from the identified partners and programs and take these steps to reduce flood risk over time.

Specific Project Recommendations

The Neshobe River Geomorphic Assessments and RCP (BCE, 2011) were instrumental in the development of site specific flood mitigation project ideas. In many cases project ideas conceived in the RCP prior to the 2011 flooding are still valid today. These RCP project locations were evaluated in the field during 2014 to determine if river conditions had changed significantly since the development of the plan in 2011, and whether or how the project concept should be adapted to account for these changes. Additional project ideas were developed through the course of discussions with stakeholders and additional data analysis and field visits. Projects identified to meet town-specific objectives were organized by the project types outlined in Table 5. A table summarizing projects to protect businesses and infrastructure from flooding is included in Appendix F. Maps depicting the location of each project site in Brandon, along with other relevant economic asset and flood hazard information, are also included in Appendix F.

Category	Description	Number of Projects
Building and Site Improvements	Lowers the risk of flooding and/or erosion to specific properties through improvements to the building and/or surroundings, e.g., sealing off buildings to prevent water infiltration.	2
Channel and Floodplain Management	Lowers the risk of flooding and/or erosion to properties along the river through the improvement of natural river and floodplain functions, e.g., tree plantings along unstable river banks.	4
Infrastructure Improvements	Lowers the risk of flooding and/or erosion to roadways and other municipal or state-owned infrastructure, e.g., increasing the size of bridges and culverts to pass more flood waters.	6
Public Safety Improvements	Lowers the risk of flooding and/or erosion to properties through the avoidance of future flood risks, e.g., FEMA buyouts of improved properties highly vulnerable to flooding.	1

To begin, the team screened and prioritized each project. Each project received a score of one (ineffective), three (limited) or five (effective) for the three objectives:

1. Reduces flood risk (proposed project lowers the flood level);
2. Reduces erosion risk (proposed project lessens the vulnerability to erosion); and
3. Protects businesses, infrastructure and property.

The three scores were added to provide a total score, which was then weighted based on the importance of the project in the region. Projects that would result in a regional economic boost and help keep businesses open were given the greatest weight, while projects that would offer minimal economic benefit to the business economy were assigned a lesser weight. Many of the high priority projects are from the Infrastructure Improvements category, as those at-risk areas potentially affect the greatest number of community members and businesses.

Project partners and stakeholders, including representatives from DHCD, ANR, RRPC, and the Town of Brandon, provided feedback on a draft list of mitigation strategies and their priorities in November 2014. The feedback was incorporated into the final prioritization of projects. Below are brief descriptions of the high priority projects from each of the project categories described in Table 5. A summary of efforts to develop conceptual designs for two of the high priority projects follows, with additional supporting information provided in Appendix G.

Building and Site Improvements

Floodproof Downtown Businesses: Multiple buildings in downtown Brandon were flooded during Tropical Storm Irene, and one was destroyed (Brandon House of Pizza). Flood risk may be lowered with the completion of the overflow culvert project; however some risk of flood damage will likely remain during extreme floods. While selection of a specific floodproofing strategy is building specific, several are widely applicable:

- **Elevate buildings and utilities:** For buildings prone to first floor flooding, raising the structure (by temporarily jacking it up and replacing it on top of an elevated foundation) can reduce flood damages. Utilities such as furnaces and electrical panels are also relocated to a higher floor, above the flood elevation, as part of the project.
- **Fill in Basements:** Filling basements with clean fill material, along with the relocation of utilities to higher floors above the flood elevation, can also reduce damages and save money.
- **Dry floodproofing:** When elevation is not possible or feasible walls can be made watertight. Openings are in-filled and the walls and floors covered with waterproof materials. Typically the foundation and walls must be strengthened to withstand pressure and energy of the water on the building. This approach likely has limited applicability due to the age and construction methods of many buildings in the floodplain. However, it may be suitable for heavy masonry buildings constructed of block, brick or reinforced concrete.
- **Wet floodproofing:** This option is used in situations where elevation and dry floodproofing are not viable. Floodwaters are allowed into the building with combination of flood vents/openings. Durable building materials that can withstand water, mud, and other pollutants are installed and cleaned up after the flood. This, along with the relocation of furnaces and electrical panels out of harm's way, can reduce losses and recovery costs.
- **Retrofitting flood vents in outbuildings:** Particularly in buildings with limited use, installing flood vents that allow water to readily enter and exit the structure can significantly reduce flood damages.

The method of floodproofing selected depends upon the structure, size, age and location of the building. Each building requires a site specific assessment by a structural engineer. In all cases, outdoor fuel tanks servicing buildings in special flood hazard areas should be anchored and elevated.

Floodproofing projects (e.g., sealing off buildings to prevent water infiltration) would protect nine businesses and the town offices with a total of 83 employees. In most cases these projects would be relatively straightforward to design and implement. Typical floodproofing costs are approximately \$10,000 per building.

Channel and Floodplain Management

Remove Berms Downstream of Route 53: Historic berms exist along the south bank of the Neshobe River downstream of VT Route 53 in Forest Dale. The berms restrict the river's access to a

forested floodplain in an area of major flood flow and sediment transport. Berm removal would allow the river to access an undeveloped floodplain upstream of an area along Newton Road where homes were flooded in Tropical Storm Irene. Removal of the berm would reduce flooding and erosion risks and help protect several homes and one business with five employees. Design and implementation of the project will be moderately challenging, likely requiring one to two years, and are estimated to cost between \$5,000 and \$10,000. A conceptual design was developed for this project and is summarized in the next section of the report.

Infrastructure Improvements

Install Downtown Brandon Overflow Culvert: The Town of Brandon has received a FEMA Hazard Mitigation Grant (Phase 1; \$250,000) to design an overflow box culvert in the downtown to prevent or reduce flood damage to Route 7 and downtown businesses. During Tropical Storm Irene, the river overflowed its banks in the downtown, causing extensive damage to businesses and closing US Route 7 for several days. This project will significantly reduce flood and erosion risks and will have a major local and regional impact due to increased protection of Route 7 during floods. Given the complexity of the project in the downtown area (e.g., utilities), the design and implementation of the overflow culvert will be challenging and take several years to carry out. Initial cost estimates for this project are approximately \$650,000 (CLD, 2013). Town officials and downtown businesses are concerned about coordination of this project with the VTrans Route 7, Segment 6 construction project, as both projects will result in significant disruptions to downtown traffic.

Stabilize Bank along Wheeler Road: An eroding bank adjacent to the river (i.e., mass failure) along the west bank of the Neshobe River was likely initiated by river erosion on the lower bank. Wheeler Road and a town water main are at-risk if the erosion continues. In order to stabilize the bank, the original source of the problem at the bottom of the slope will need to be addressed and the upper bank will also need to be stabilized. This project will reduce a major erosion risk and sediment source, and protect both transportation and utilities infrastructure used by over a dozen residences along Wheeler Road and Stone Mill Dam Road. Design and implementation of the project will be moderately challenging, likely requiring one to two years, and are estimated to cost in the ballpark of \$25,000. A conceptual design was developed for this project and is summarized below.

Replace Route 53 Bridge: The Route 53 Bridge over the Neshobe River in Forest Dale is undersized (56% of the bankfull channel width) and should be replaced with a larger span. Floodplain mapping and data from FEMA indicates that the bridge is undersized to accommodate the 100-year flood. The river characteristics in the area upstream and downstream of this bridge suggest that a span greater than the standard ANR recommended width may be appropriate for this site. This project will significantly reduce flood and erosion risks affecting two

Tip: Bridges and culverts should be at least the width of the “bankfull channel” to allow floodwaters, sediment, and woody debris to pass downstream without putting the structure at-risk.

businesses with nine employees, a state highway, and several private residences. Design and implementation of the project will be moderately challenging, likely requiring two to five years, and will cost in excess of \$200,000.

Replace Wheeler Road Bridge: The abutments for the Wheeler Road Bridge over the Neshobe River are in poor condition and the bridge is undersized, with a span 61% of the bankfull channel width. The Town of Brandon recently approved match for a VTtrans structures grant to move forward with a design to increase the bridge span and realign the roadway; the realignment is now possible following the buy-out of an adjacent property impacted by Tropical Storm Irene flooding. This project will significantly reduce flood and erosion risks along Wheeler Road and VT Route 73, helping to ensure this critical thoroughway is kept open during floods. Design and implementation of the bridge replacement will likely require two to three years and will cost greater than \$200,000.

Stabilize or Relocate Wastewater Treatment Facility: Flooding and erosion have negatively affected Brandon's Wastewater Treatment Facility (WWTF) for years. Brandon's businesses are highly dependent on a functioning WWTF. If the WWTF were severely damaged and temporarily closed during a flood, businesses downtown would also need to close even if they escaped direct flooding damage. The town installed riprap along the bank in 2010, but the area is still prone to erosion and a Green Mountain Power utility pole servicing the facility is also at-risk. The WWTF is aging and major upgrades will be required in the near future, at which point flood resilience should be considered. This could include the reconnection of adjacent floodplains to take the pressure off the existing WWTF location, or the planning of a new facility in a different location outside flood hazard zones. This will ensure that the WWTF remains up and running after an event ensuring businesses can remain open for employees and customers as this facility services over 1,000 residential and commercial connections. Design and implementation of stabilization measures would be moderately challenging, likely requiring one to two years and would cost between \$50,000 and \$100,000.

Conceptual Project Designs to Protect Brandon

Using input from the community and the team’s professional judgment of priority flood mitigation projects that would provide multiple benefits to the community, the team selected two projects to advance to a conceptual design stage. These projects include a floodplain reconnection through the removal of an old berm in Forest Dale, and the stabilization of a tall bank along Wheeler Road. Both project areas are representative of other sites in Brandon where site specific designs are recommended, and therefore can be used as a template for future work. The conceptual designs require additional design and engineering work to advance toward implementation. Should the community wish to advance the projects, the designs include sufficient detail for grant applications.

Remove Newton Road Berm

Overview and Objectives

This project is representative of countless floodplains across Vermont that have restricted access due to historic or recent berms, typically constructed following flood events. Many of these berms are ineffective and unnecessarily increase downstream flooding risks.

The Newton Road berm project area is located approximately 800 feet downstream of the North Street bridge (see map in Appendix G). This area represents a transition zone in the watershed where the slope decreases and the valley opens to wide



Figure 8: Newton Road berm looking upstream

floodplains. This transition leads to increased sediment deposition and lateral channel migration as described in the Neshobe RCP (BCE, 2011). The historic berm begins immediately downstream of the former Tubbs furniture manufacturing buildings (Figure 8). During Tropical Storm Irene, the river spilled over its banks where the channel is constricted by the old buildings and berms. Major overbank flow continued to the west along and over Newton Road, flooding both sides of the road and eventually rejoining the river approximately 1,200 feet downstream (see map in Appendix G). The river also overtopped the south bank farther downstream causing significant property damage and basement flooding to several homes along Newton Road.

A forested floodplain with several large **flood chutes** is located on the river bend between the old manufacturing buildings and the downstream houses along Newton Road. The river’s access to this floodplain is very limited due to the 220 foot long berm. The middle portion of the berm is four to

five feet tall and it gradually tapers upstream and downstream to approximately two to three feet tall. Based on sediment and debris left during Tropical Storm Irene, there is minimal access to this floodplain.

Data Analysis and Results

The team surveyed four cross-sections of the channel, berm, and the floodplain to the south of the river. These cross-sections were located between the AA and AB cross-sections included in the FEMA Flood Insurance Study data (see map in Appendix G). The team modeled the channel and floodplain responses to removing the berm using a steady flow one-dimensional Hydrologic Engineering Centers River Analysis System (HEC-RAS) hydraulic model (ACOE, 2010). Then, estimated the 100-year storm discharge (approximately 1,700 cubic feet squared) based on United States Geological Survey (USGS) Stream Statistics and an area-normalized flow based on the 100-year flood calculations in the Route 7 bridge hydraulics report for downtown Brandon (CLD, 2013). The team also estimated the Tropical Storm Irene flow (3,000 cubic feet squared) based on the elevation of flood deposits visible during the field survey and from aerial photos.

Both flows are completely contained within the channel under existing conditions with the berm in place. Removing the berm allows the river access to the forested floodplain during large floods, which will reduce floodwater velocity. The analysis shows that berm removal will lower the peak water surface elevation by approximately one and a half feet for the 100-year flood in this area. Floodwaters that spill on to this floodplain with reduced velocity will allow for greater sediment and debris deposition, and will likely decrease downstream flood peaks and reduce impacts to downstream homes and property along Newton Road.

The topography of the forested floodplain and the upper grassed floodplain would direct all overbank flow through the project area back towards the channel during a 100-year flood or larger event; berm removal is not expected to cause additional floodwaters to be redirected towards the downstream houses along Newton Road. In addition, removal of this berm will not likely affect overbank flow along Newton Road; however it would reduce the severity of downstream flooding by better distributing sediment deposition along this river segment.

Conceptual Design

The Newton Road berm removal project is relatively straightforward due to direct site access and the small scale of the project. An excavator and dump truck could access the berm area through the cleared lot immediately west of the former Tubbs manufacturing facility. Minimal tree and brush clearing would be necessary to access the forested floodplain along the berm. A medium sized excavator and dump truck would be required for one to two days to remove approximately 300 cubic yards of berm material. Several maple trees are growing on the berm and would need to be removed. (Some of these trees may be large enough to re-use at the Wheeler Road bank stabilization site.) The new top of bank would be reshaped to a stable slope (1V:2H --slope width: slope height) at the elevation of the forested floodplain. A layer of topsoil would be spread over the disturbed area and covered with straw matting following seeding. Conservation planting mix would be spread and

watered to help hold the disturbed soils. Additional tree plantings are recommended along the disturbed bank to stabilize the bank and floodplain and provide shading along the river edge. This project is estimated to cost between \$5,000 and \$10,000:

- Contractor labor, excavator, and trucking: \$5,000
- Conservation seed and erosion fabric: \$640
- Tree planting: \$2,400

Steps for Project Implementation

Landowner outreach would be the logical first step to move this project forward. Depending on landowner willingness, grant funding could be secured through the Vermont Department of Environmental Conservation (DEC) Ecosystem Restoration Program (ERP) and/or other funding sources. All necessary state and federal permits must be explored and/or secured. DEC and US Army Corps of Engineers may have jurisdiction given the proximity to the stream channel. In addition, amendments to the FEMA mapping (e.g., Letter of Map Amendment or LOMA) may be required due to changes in the floodwater and hydraulics with berm removal. The LOMA may help reduce insurance costs downstream.

Project Benefits

The implementation of this project would help reduce flood risks in Forest Dale. Specific benefits include:

- Increased floodplain access resulting in slower flowing flood waters, and settling of sediment and debris in an area upstream of residences along Newton Road.
- Reduced risk of flood damage to one business with five employees on upper Newton Road.
- Less build-up of sediment and debris in the Neshobe River along lower Newton Road, and therefore lower floodwaters with lower risk of basement flooding, and lower costs for channel dredging in this area.
- Reduced risk of Newton Road being washed out and closed during floods, allowing for greater public safety by keeping this important connector road open during emergencies.

Stabilize Bank at Wheeler Road

Overview and Objectives

This project represents common conflicts between slope failures and adjacent roads and buildings throughout Vermont. The challenging access at this site is also common. Slope failures contribute huge volumes of sediment to streams and rivers and can cause catastrophic infrastructure damage during large events, or slowly progress and over time undermine and damage infrastructure and utilities.

The Wheeler Road bank failure site is located along the east side of Wheeler Road approximately 800 feet south of the intersection with Stone Mill Dam Road (see map in Appendix G). The bank is failing along approximately 60 feet of the Neshobe River and extends up the valley wall to the edge of the road (Figure 9). A cluster of small elm trees is partially stabilizing the middle of the bank failure (Figure 10). The soil along the bank is a combination of erodible silty-sand (lower) and fine to coarse sand (upper). A 2011 report



Figure 9: Top of bank failure along Wheeler Road

recommended monitoring the slope for further failure, and evaluating the slope for a combination of standard slope stabilization techniques and measures to deflect the river away from the slope (BCE, 2011). No stabilization efforts have occurred since and the bank failure has moved approximately three feet closer to Wheeler Road. It will likely undermine the road in the near future.

The River has very low slope and access to a large floodplain along the left bank, however the site is located at a sharp bend in the channel and higher velocity flows are likely during storm events. A fallen tree across the channel immediately downstream of the mass failure may create a current that is exacerbating erosion along the toe of the slope.

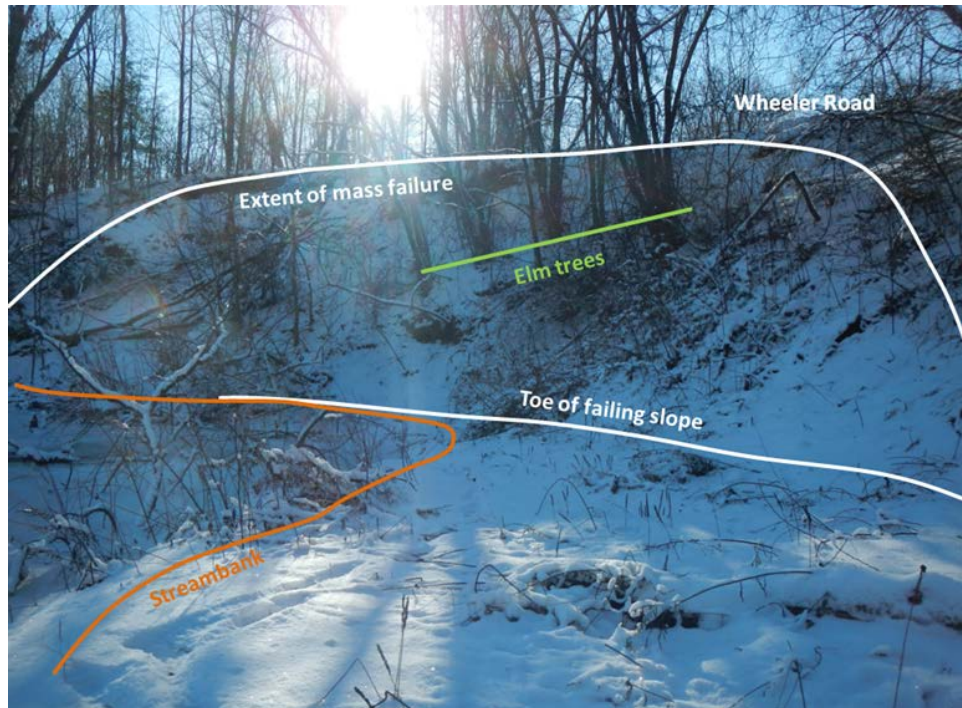


Figure 10: Bank failure site from the upstream right bank floodplain

The bank failure is located along the western edge of a 43 acre parcel owned by Rosemary Hunt. This

parcel was under consideration for purchase by the town or for purchase as a river corridor easement in 2011 (BCE, 2011), however these efforts are no longer ongoing. Due to the steep banks along Wheeler Road, direct equipment access will not be possible from the west. Access through the cornfield on the Hunt property is most direct, however it will require crossing the channel. Alternatively, an excavator could access from Stone Mill Dam Road, requiring disturbance of the floodplain and a significant wetland to the north. Truck access will be restricted to Wheeler Road. A partnership with Vermont Youth Conservation Corps (VYCC) or a similar group could provide the labor required to spread topsoil, install coir logs, and seed/plant the project area, as described further below.

Conceptual Design

The team recommends a combination of stabilization measures along the upper and lower slopes and the construction of natural armoring along the edge of the river. Rootwad revetments or an engineered log jam (ELJ) along the base of the slope are cost-effective erosion protection measures for this site. These structures maintain a more natural bank and improve in-stream habitat (VDCR, 2004). To build a rootwad revetment, a tree with an intact rootwad is placed on top of a footer log and trenched or pushed into the bank (Figure 11). Heavy boulders and soil are filled over the log to anchor it in place. Additional logs may be placed on top of this structure to link multiple rootwads together. An ELJ is a similar toe protection structure constructed out of a grid of logs and filled with native rock material (Figure 12).

The installation of approximately three to five rootwads or log jams would help center the thalweg (i.e., deepest, strongest part of river current) away from the bank and reduce erosional forces along the bank failure. At this site, the ELJ would be constructed below the current channel bed to reduce the risk of scour and will tie into the bank with stakes or earth anchors. Steel cabling or pins are used to hold the ELJ together and geotextile or erosion control fabric may line the ELJ to limit the washout of material from the middle of the structure. Above the stabilization structure, the bank would be graded and filled with a compost/topsoil mix to a more stable slope (see conceptual drawing in Appendix G). Erosion

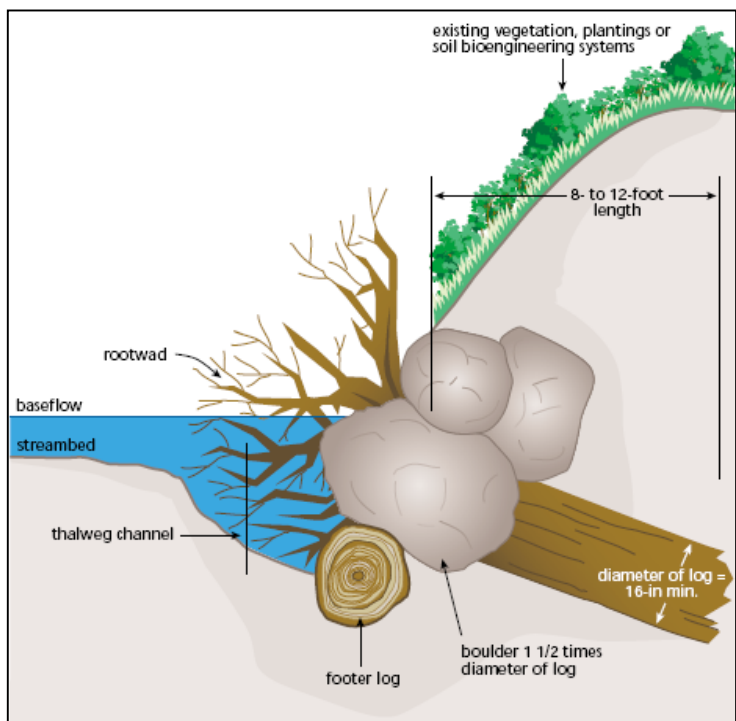


Figure 11: Rootwad installation diagram

control fabric would be draped and pinned over the filled slope. Coir logs would be installed along the slope approximately every four vertical feet to terrace the slope and reduce erosion along the planted slope. The slope would be planted with shrub plugs (e.g., dogwoods) or other native container plants and a conservation/slope seed mix. The existing trees on the middle of the slope would be stabilized using steel cables attached to earth anchors. The anchors will be driven in as deep as possible to tie into stable soil and protect the trees. An approximate budget for this project is estimated at \$25,000 (see details in Appendix G).

Steps for Project Implementation

Grants are available from DEC ERP (Ecosystem Restoration Program) and other funding sources. All necessary state and federal permits must be secured, potentially including additional assessment of disturbance to wetlands or the river channel to access the site. Stream alteration and wetlands permits from DEC and US Army Corps of Engineers are likely needed. Landowner permission through the Hunt property is required for site access and for project implementation. Appropriate materials for rootwad or ELJ structures will need to be gathered or purchased.

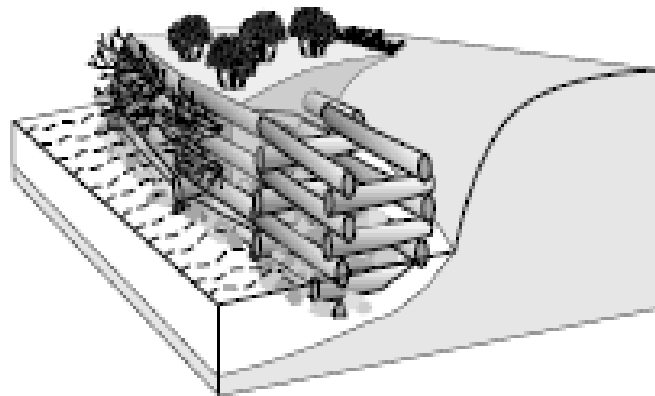


Figure 12: Log crib diagram (FISWRG, 2001)

Project Benefits

The implementation of this project is anticipated to provide benefits for reducing flood risks in Brandon. These benefits include:

- Reduced risk of Wheeler Road being washed out and closed during floods, allowing for greater public safety by keeping this connector road open during emergencies.
- Reduced risk of the water line being damaged and service lost to over a dozen residences along Wheeler Road.
- Reduced input of sediment and woody debris into the channel which exacerbates flooding at downstream road crossings.

Next Steps

On April 6, 2015 the team hosted the second community forum to share the list of policy and project recommendations to decrease flood risk for Brandon. At the forum, Community members asked questions, provided input and helped rank the proposed list of priority recommendations.

The team shared the list of policy and project recommendations to significantly decrease flood risk in Brandon. Community members were given the opportunity to ask questions, provide input and rank the proposed list of priority recommendations. The projects that the community most supported included the installation of an overflow culvert on US Route 7, the removal of a berm in Forest Dale and floodproofing downtown businesses.

The town is currently pursuing funding for design and engineering of the overflow culvert and hopes to coordinate it with the work to improve US Route 7. Participants noted successful floodplain conservation work to date and that continued efforts to protect undeveloped floodplain between Forest Dale and downtown area would help alleviate downstream flooding issues. It was also noted that floodproofing costs vary depending on the location and design of the building, but the approximate cost is \$10,000 per business. Business owners can find additional information on construction floodproofing techniques here

http://accd.vermont.gov/sites/accd/files/Flood_Mitigation_Case_Studies_Final.pdf

See Appendix H for the complete meeting notes from the first and second community forums.

The tables included in Appendices E and F provide a comprehensive list of recommended high priority projects for the Town of Brandon to further discuss, explore, and advance as resources permit. The conceptual designs summarized above and in Appendix G are intended to provide examples for how to advance high priority projects to the next level and acquire funding for final design and implementation. As part of the ongoing community discussion regarding the VERI effort, the team recommends the following steps to incorporate the community's input into the final prioritization and advance the projects over time:

- Solicit input from individuals and businesses at future community meetings regarding specific projects and overall project prioritization.
- Prioritize one to two projects to pursue each year with assistance from DEC and RRPC staff to identify appropriate funding sources and partners.
- Apply for one to two grants each year to advance project development and/or designs.
- Implement projects as funding allows.
- Monitor project success.

Implementing these projects and updating related flood policies will, over time, help Brandon become safer and more resilient to future floods and there are a number of organizations and programs that can help. For example, the RRPC can help gather and review sample bylaws, capital plans and hazard mitigation plans and help draft town specific language for review and local

adoption. DHCD's Municipal Planning Grants, http://accd.vermont.gov/strong_communities/opportunities/funding/overview/municipal_planning_grants , the Vermont Rivers Program <http://www.anr.state.vt.us/dec/waterq/rivers.htm> and www.floodready.vermont.gov can help support these efforts. The Vermont Land Trust <http://www.vlt.org/> can assist landowner's protection of critical floodplain with easements. The State's Hazard Mitigation Grant Program <http://vem.vermont.gov/mitigation> can help implement projects identified in Brandon's Hazard Mitigation Plan. The Vermont Small Business Development Center <http://www.vtsbdc.org/> has offered extensive disaster assistance to businesses as well as compiling a great guide for owners to navigate these programs. And several federal and state programs can assist in funding the recommendations outlined in the report. Working together we can reduce the risk and financial burden of future flooding events.

Education and Outreach

Vermont has a long tradition of managing its rivers to limit or prevent flood damage including armoring riverbanks with rocks, moving or straightening river channels and building dams and berms. Despite these efforts, flooding is the most common natural disaster in Vermont (ANR). Tropical Storm Irene showed Vermonters that rivers and streams are powerful and tend to make their own way during a flood. Because we cannot reliably control flooding, educating citizens, business and property owners about rivers and potential flood risks within their communities is critical.

"We all have short memories when it comes to flooding. It's just human nature to think it couldn't happen here again anytime soon."

Chris Company, Executive Director
Windham Regional Commission

Ongoing community education and outreach is an important part of any effort to promote flood safety and to protect local business and economies. Ultimately, the better informed everyone in the community is about the behavior of local rivers and streams, the more likely it is that they will make sound decisions.

Make Information Readily Available: Easy access to river and floodplain information is an essential way to help citizens and businesses incorporate flood risks into decisions they make. Most communities offer printed information at the town office or library as well as on town webpages.

Common Handouts or Webpage Information Includes:

- Maps of the local flood hazard areas and the permitting requirements in the floodplain.
- Information about flood insurance and floodproofing buildings.
- Information about how rivers, streams and watersheds work.
- Benefits of green infrastructure and conservation of existing floodplain.

Actively Engage: Many communities work to increase the understanding of rivers and risks via email or by posting information on their local Front Porch Forum. Communities often include

flood maps and permitting information in their town meeting reports and other municipal mailings like sewer and water bills. Others promote awareness of flood history and risk by placing high water lines on prominent buildings in the community.

However, education and outreach efforts should not be the sole responsibility of local governments, and community groups like chambers of commerce, downtown business associations, neighborhood groups, and watershed organizations are encouraged to partner with state, regional and local groups to offer local workshops and education sessions.

Potential Workshop Topics and Partners and Presenters:

- Flood Insurance and What You Need to Know (Department of Finance Regulation, Division of Emergency Management and Homeland Security, Vermont League of Cities and Towns)
- Developing a Continuity of Operations Plan (Small Business Development Centers, Regional Planning Commissions, Regional Development Corporations)
- Resilient Road Designs to Reduce Recurring Damage and Improve Water Quality (Agency of Natural Resources, Agency of Transportation)
- Planning for Resilience (Regional Planning Commissions)
- Flood Risk, Preparedness and Safety (Division of Emergency Management and Homeland Security, Regional Planning Commissions)
- Extreme Weather and Climate Change (Agency of Natural Resources, Vermont Natural Resources Council)
- How Rivers, Streams and Watersheds Work (Agency of Natural Resources, Vermont Natural Resources Council, Vermont Land Trust)
- Low Cost Techniques to Reduce Flooding and Improve Water Quality (Agency of Natural Resources, Vermont Natural Resources Council, Regional Planning Commissions, Vermont League of Cities and Towns)

Invest in Staff Training and Certification: In many of Vermont's cities and towns, floodplain management is just one of many responsibilities of the local planning office or zoning administrator. Yet, administration of a floodplain ordinance is quite complex and the consequences of limited staff time and understanding of the regulations can easily allow inappropriate development in dangerous areas. The consequences of granting improper variances and not enforcing against violations may preclude the community from participating in the federal flood insurance program. Therefore, local government officials are strongly encouraged to support staff training and certification in floodplain management.

What Can Individuals Do to Reduce their Risks?

Most of us remember to annually change the batteries in our smoke alarms to reduce the risk of fire, but few of us prepare for floods or disasters. Since 2000, Vermont has had more than one federally-declared disaster per year and floods have occurred nearly everywhere in the state (ANR, 2015).

Buildings located in a 100-year floodplain have 1% chance of being flooded every year. In other words, over a 30 year period (length of most home mortgages), there is a 26% chance of a 100-year flood (USGS, 2015).

The good news is that there are many steps that individuals can take to reduce the risks, loss, disruption and costs associated with flooding. Understanding what the risks of flooding are for your home and family will help you:

- Make sure that you have the right amount of insurance coverage.
- Protect your home and take steps to limit potential damage.
- Prepare plans detailing how your family will respond if flooding looks likely.
- Practice so family members know what actions to take in the event of a flood or upon receiving a flood warning.

Steps to Reduce Risks

- **Identify Flood Risk.** The first step is to identify your risk so you can plan appropriately. Floodplain maps are available at most town offices or click this link http://floodready.vermont.gov/assessment/vt_floodready_atlas to find out if your home or apartment is in an area where floods could potentially happen. Once you have assessed your flood risk, review your insurance coverage.
- **Review Insurance Policies.** Homeowners' or renters' insurance helps pay to repair or rebuild your home and replace personal property due to a covered loss, however it does not cover any damages caused by floods or your rent and living expenses while your home is rebuilt. All insurance policies have overall policy limits and specific limits for different types of coverage. Your insurance agent can help you determine what is covered and what is excluded and check to make sure your coverage is adequate for your needs. However, insurance is complicated and it's a good idea to have your lawyer review your policy, consider various scenarios and help you identify any gaps in your insurance coverage.
- **Fill Gaps in Your Insurance Coverage.** If your home is underinsured at the time of a loss, there is frequently a penalty or reduction in the amount the insurance company will pay for the loss. Property insurance also does not cover flood damages or your expenses if you cannot live in your home due to flood damages. All homeowners who live in flood-prone areas should carry flood insurance. Flood insurance is available for your home and personal property and can be obtained from your local agent.
- **Floodproof and Elevate Utilities.** The cost of flood insurance may be reduced with building modifications. Contact your planning and zoning office to learn more about building and construction techniques that can both reduce risks and save money. Examples of the various approaches to reduce flooding in buildings are available here http://accd.vermont.gov/sites/accd/files/Flood_Mitigation_Case_Studies_Final.pdf

- **Plan Ahead.** Draft an emergency response and communications plan (family phone numbers) for your home and family. Use the process as an opportunity to bring family members together to discuss the roles needed during an emergency and how best to assign responsibilities. Make sure you have a designated place to meet other family members in the event of an emergency. Also, don't forget to plan for individuals with special needs like prescription medication and for your pets as many public shelters or hotels do not allow animals.
 - Pack an emergency kit and make sure family members know where it is located.
 - Keep copies of your insurance policy, computer data and other important documents like tax returns and financial information safe from flooding on upper floors or stored offsite.
 - Document your home and possessions with photos or video to help simplify the insurance claims process. Generally, the more detailed documentation (receipts, serial numbers, etc.) you can supply during the claims process, the fewer problems you will experience.
- **Train and Practice.** Many of us participate in fire drills at work or school, but few of us practice at home for disasters. Training and practicing your emergency response and communications plan will help assure the plan is workable and family members understand their roles and responsibilities.
- **Pay Attention to Emergency Alerts.** Listen to local news and weather reports for any potential flood warnings in your area. If you know a storm is headed your way, fill up your gas tank in case you must evacuate. (If the power is out, it is not always easy to find an operating gas station.) If you must evacuate, try to contact your employer and let them know your plans. Having a plan and a few extra minutes to evacuate can make a difference.

FEMA <http://www.ready.gov/make-a-plan> and the Vermont Division of Emergency Management and Homeland Security <http://vem.vermont.gov/preparedness/hazards/floods> both provide more detailed information on how to prepare and protect your home and family from disasters and floods.

What Can Businesses Do to Reduce their Risks?

According to FEMA, nearly 40% of businesses do not reopen after a disaster and data from the US Small Business Administration indicates that over 90% of businesses fail within two years after being struck by a disaster.

It can take years to repair the damage to the building, furnishings, equipment and inventory. Disasters can also require businesses to relocate or cease operation temporarily, which may lead to canceled contracts and customers going elsewhere for goods or services. Even if the event does not impact the business directly, severe weather from snow or rain or even extended power outages can strand employees at home and complicate deliveries.

Identifying your risk can significantly reduce potential damages and business recovery costs. Understanding what the risks of flooding are for your business will help you:

- Make sure that you have the right insurance coverage for business interruption.
- Plan ahead and take steps like developing a continuity of operations plan to limit potential damage.
- Train employees so they know what actions to take in the event of a disaster or after receiving a flood warning.

Steps to Reduce Risks

- **Identify Flood Risk.** Since 2000, Vermont has had more than one federally-declared disaster per year and floods have occurred nearly everywhere in the state (ANR). Identifying your risk is a good place to start. Floodplain maps are available at most town offices or click here http://floodready.vermont.gov/assessment/vt_floodready_atlas to find out if your business is in an area where floods could potentially happen. Once you have assessed your flood risk, review your insurance coverage.
- **Review Insurance Policies.** Many types of disasters are not covered under normal insurance policies and funding or loans from government agencies is often too little and too late. All insurance policies have overall policy limits and specific limits for different types of coverage and any business located in a flood-prone area should carry flood insurance. Also check to make sure your insurance includes business interruption coverage and that it reimburses other unexpected costs (like service interruptions from lost power or Internet access, law suits and unemployment compensation claims filed by employees). Business interruption insurance compensates a business for lost income, expenses and profits if a disaster, such as a flood, closes your doors. Your insurance agent can help you determine what is covered and what is excluded and check to make sure your coverage is adequate for your needs. However, insurance is complicated and it's a good idea to have your lawyer review your policy, consider various scenarios and help you identify any gaps in your insurance coverage.
- **Floodproof and Elevate Utilities.** The cost of flood insurance may be reduced with building modifications. Contact your planning and zoning office to learn more about building and construction techniques that can both reduce risks and save money. Examples of the various approaches to reduce flooding in buildings are available here http://accd.vermont.gov/sites/accd/files/Flood_Mitigation_Case_Studies_Final.pdf
- **Plan Ahead.** There are also a number of low-cost steps you can take to reduce the impacts of a flood. At a minimum, regularly back up computer data and store important tax and financial records and information such as your insurance policy details in a flood safe place. Documenting your building, furnishings, equipment and inventory with photos or video can speed the insurance claims process.

All businesses should have a continuity of operations plan. A continuity of operations plan is a written document that outlines how your business will respond and recover from a flood or other disaster. At a minimum, your plan should include:

- A list of important contacts including your insurance company, key customers and vendors and evacuation contacts for staff.
- A map showing locations of important equipment to relocate (computers and servers) and where to shut off electricity, gas and other services.
- Procedures to protect your property and minimize business disruption – e.g. remote back up of computer files, a plan to relocate inventory or livestock.
- A back up location to conduct business while the building is being repaired.

Having a continuity of operations plan will help you identify and assign essential tasks that will help minimize the damage caused by flooding. Training and practice will help assure the plan is workable and employees are properly trained.

The Vermont Small Business Development Center <http://www.vtsbdc.org> and many of Vermont's Regional Development Corporations <http://accd.vermont.gov/business/partners/rdc> and Regional Planning Commissions <http://www.vapda.org> can also provide training and one-on-one assistance to help your business develop a continuity of operations plan.

CERF+ (Craft Emergency Relief Fund + Artists' Emergency Resources) offers tailored disaster guidance and recourses for artists (<http://studioprotector.org/OnlineGuide/DisasterPlanning/DisasterSpecificPlanningResources.aspx>).

- **Train and Practice.** Employees need to understand flood warnings and what to do when they get one. This includes understanding the dangers of flooding and how to evacuate the building safely. Train all staff on procedures to shut down the business and how to deploy loss reduction measures like relocating equipment and inventory to upper floors and deploying door and window dams reduce flooding. Finally, remember that flooding can also affect employees' ability to work, as their priority may be to protect their home and family first.
- **Pay Attention to Emergency Alerts.** Listen to local news and weather reports for any potential flood warnings in your area. Having a continuity of operations plan and a few extra minutes to evacuate can save lives and your business.

The US Small Business Administration <https://www.sba.gov/content/disaster-preparedness> offers more detailed information on how to prepare and protect your employees and business and from disasters and floods.

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Appendix A:

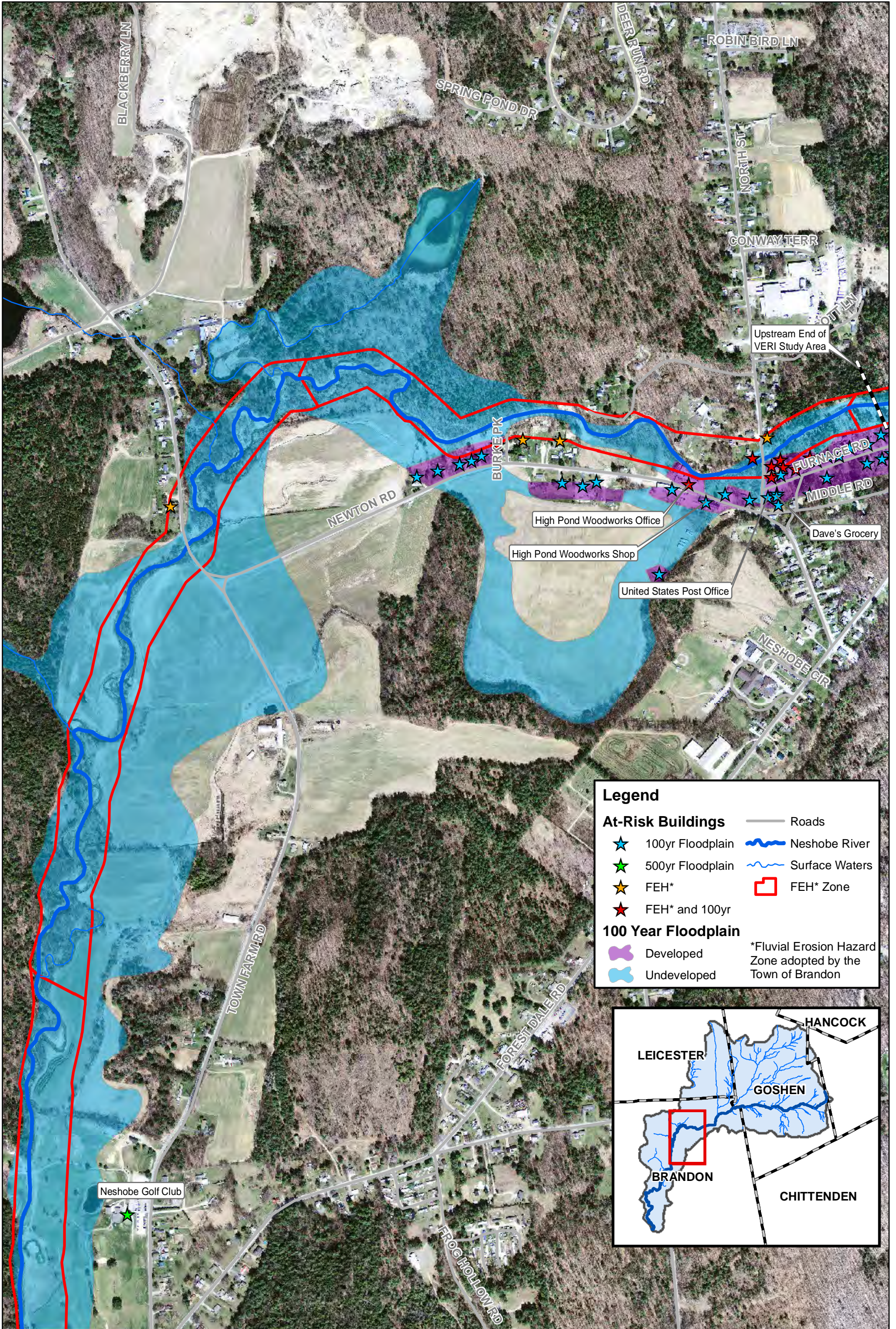
Town of Brandon and Neshobe River Data Sources

Town of Brandon and Neshobe River Data Sources

Name	Description	Source
Brandon Economic Assets and T.S. Irene Flood Damage	Critical town-owned infrastructure including water lines, sewer lines, stormwater lines, and public/private wells; T.S. Irene business flood damage data.	Rutland Regional Planning Commission (RRPC)
Brandon Hazard Mitigation Plan	All-hazards local mitigation strategy to make the community more disaster resistant and resilient.	RRPC
Brandon Land Use Ordinance	Land use regulations to encourage appropriate development of lands in Brandon, including those located in flood hazard areas.	Town of Brandon
Neshobe River Geomorphic Assessments and River Corridor Plan (RCP)	Data and maps of channel stability and aquatic habitat, and recommended actions to improve river stability and reduce flood hazards.	RRPC; Bear Creek Environmental (BCE)
Flood Hazard Areas	Mapping of 100 and 500-year flood zones and fluvial erosion hazard zones.	VTANR
Bridge and Culvert Data	Neshobe River crossing structure dimensions	VTrans; VTANR
Geospatial data for Rutland County	Aerial photography and GIS layers for contour lines, surface waters, wetlands, soils, roadways, and parcel boundaries.	VTANR; VCGI; RRPC
Flood Resiliency Projects	Information about completed and flood resiliency efforts initiated by the town	VTANR; Town of Brandon

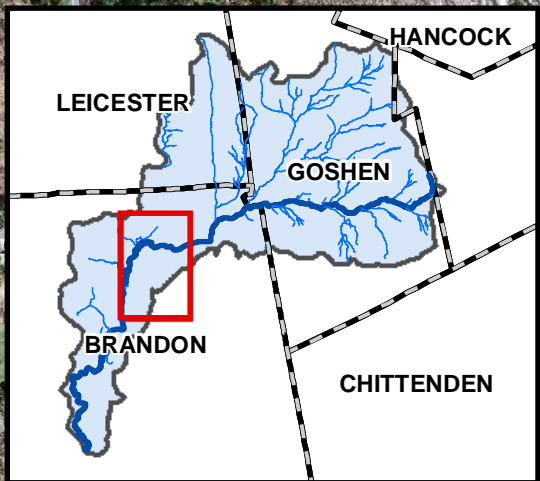
Appendix B:

Town of Brandon Flood Hazards and Flood Damage Maps and Table



Legend

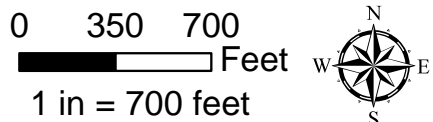
	100yr Floodplain		Roads
	500yr Floodplain		Neshobe River
	FEH*		Surface Waters
	FEH* and 100yr		FEH* Zone
	Developed	100 Year Floodplain	
	Undeveloped		*Fluvial Erosion Hazard Zone adopted by the Town of Brandon



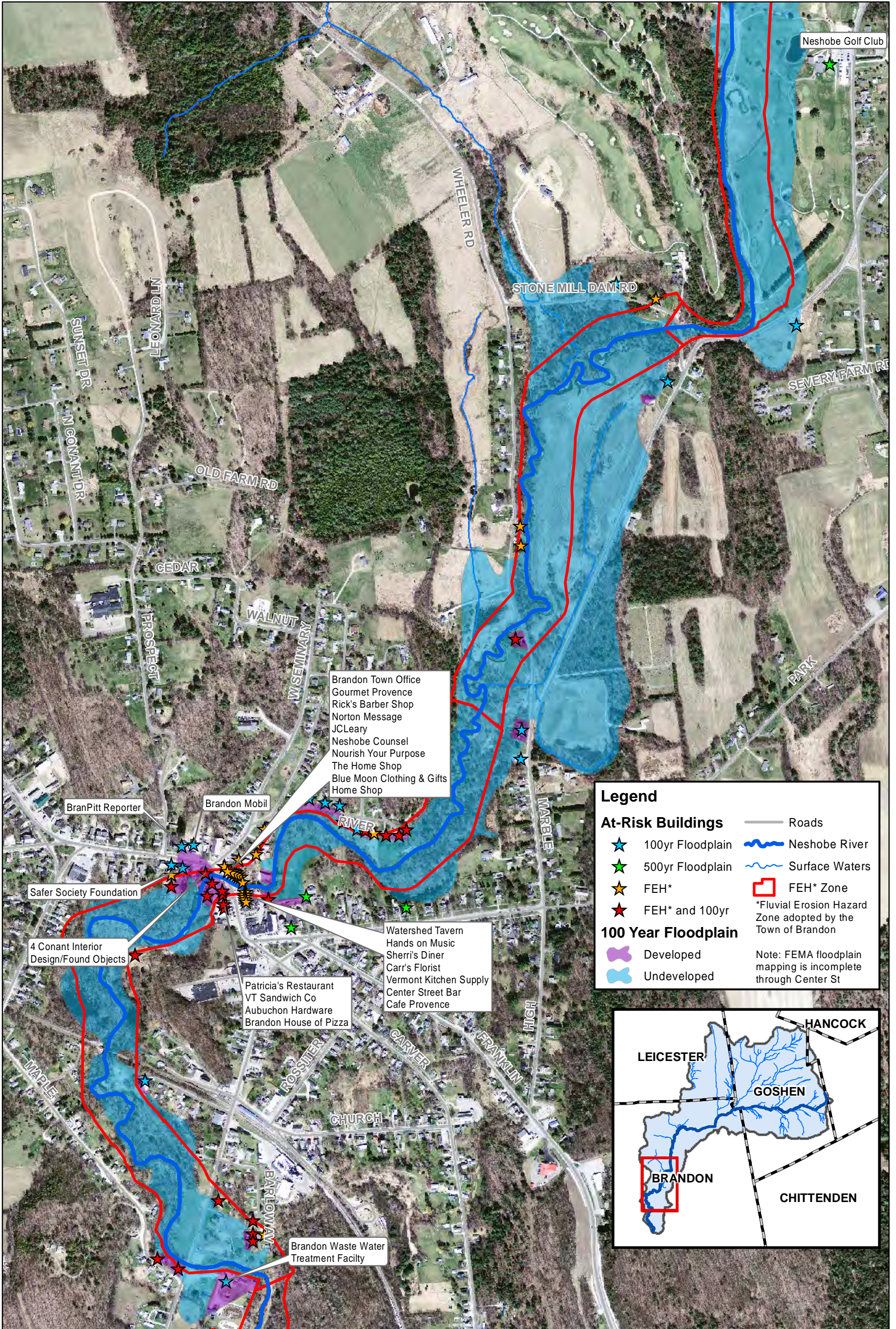
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**Flood Hazards and Floodplain Development
 Brandon, Vermont**

Vermont Economic Resiliency Initiative
 Agency of Commerce & Community Development



Map 1 of 2 Drawn: JHB & EPF
 Date: Feb 18, 2015



Brandon Town Office
 Gourmet Provence
 Rick's Barber Shop
 Norton Message
 JCLearly
 Neshobe Counsel
 Nourish Your Purpose
 The Home Shop
 Blue Moon Clothing & Gifts
 Home Shop

BranPitt Reporter

Brandon Mobil

Safer Society Foundation

4 Conant Interior
 Design/Found Objects

Watershed Tavern
 Hands on Music
 Sherri's Diner
 Carr's Florist
 Vermont Kitchen Supply
 Center Street Bar
 Cafe Provence

Patricia's Restaurant
 VT Sandwich Co
 Aubuchon Hardware
 Brandon House of Pizza

Brandon Waste Water
 Treatment Facility

Legend

At-Risk Buildings

- ★ 100yr Floodplain
- ★ 500yr Floodplain
- ★ FEH*
- ★ FEH* and 100yr

100 Year Floodplain

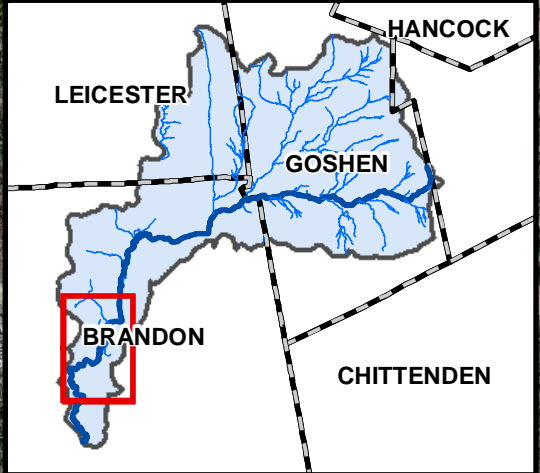
- Developed
- Undeveloped

Other Symbols:

- Roads
- Neshobe River
- Surface Waters
- FEH* Zone

*Fluvial Erosion Hazard Zone adopted by the Town of Brandon

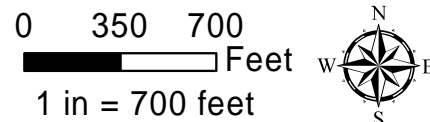
Note: FEMA floodplain mapping is incomplete through Center St



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**Flood Hazards and Floodplain Development
 Brandon, Vermont**

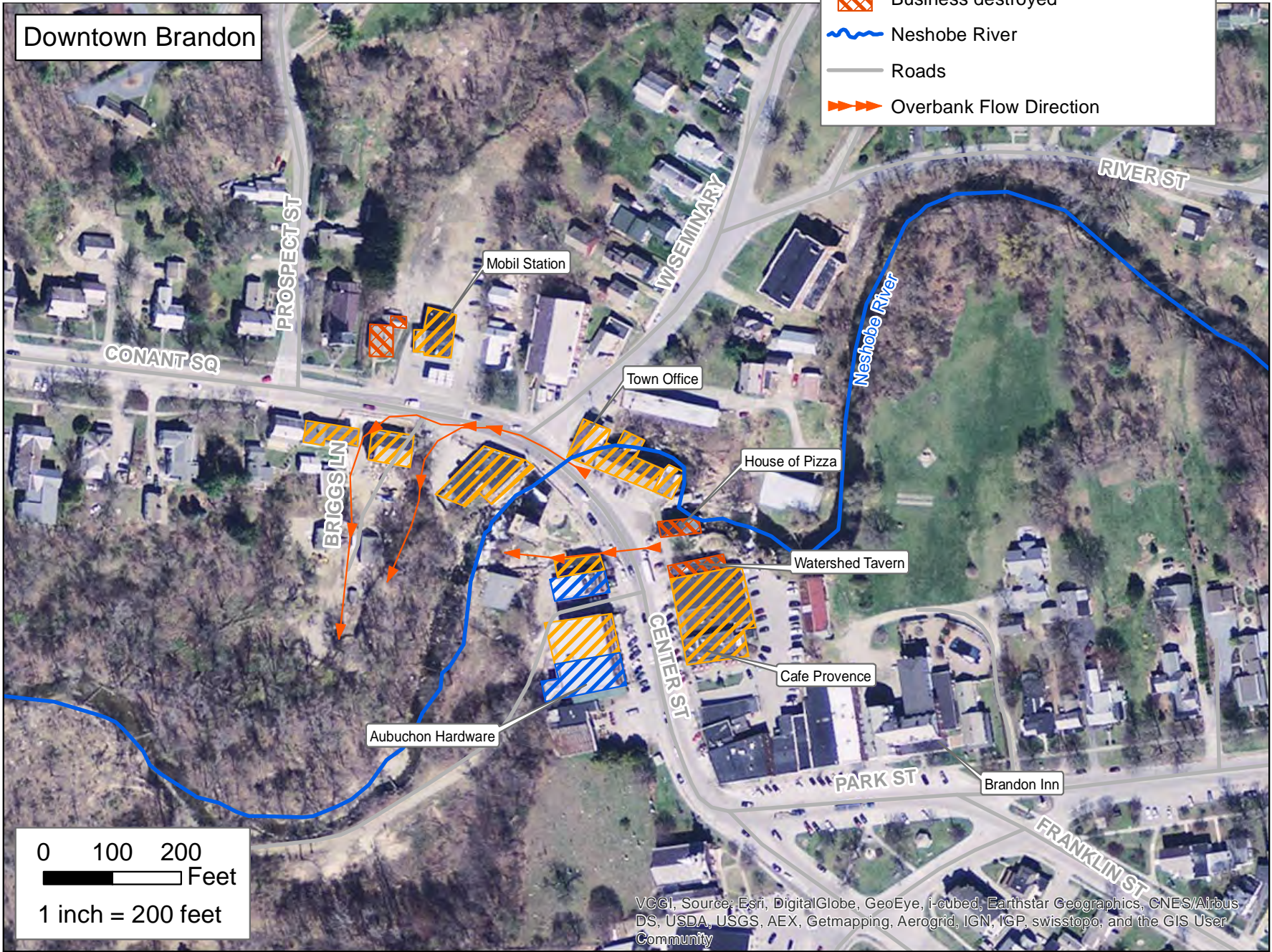
Vermont Economic Resiliency Initiative
 Agency of Commerce & Community Development



Map 2 of 2 Drawn: JHB & EPF
 Date: Feb 18, 2015

Business Name	E911 Business Address	Number of Employees	Brandon FEH	FEMA Floodway	FEMA 100yr Flood Zone	FEMA 500 Year Flood Zone	TSI Inundation Area
4 Conant Interior Design/Found Objects	4 Conant Sq	2			X		X
Apartment House	14 Conant Sq	--			X		X
Aubuchon Hardware	10 Center St	5					X
Blue Moon Clothing & Gifts	43 Center St	2	X	*	*	*	X
Brandon House of Pizza (New Location)	16 Center St	7			X		X
Brandon House of Pizza (Old Location)	33 Center St	7	X				X
Brandon Inn	20 Park St	15				X	
Brandon Mobil	9 Conant Sq	--			X		X
Brandon Town Office	49 Center St	37	X	*	*	*	X
Brandon Waste Water Treatment Facility	500 Union St	--		X	X	X	X
Cafe Provence	11 Center St	30		*	*	*	X
Carr's Florist & Gifts	21 Center St	5	X	*	*	*	X
Center Street Bar	15 Center St	--		*	*	*	X
Century 21	30 Marble St	7			X	X	
Dave's Grocery	15 Furnace Rd	4			X		X
Gourmet Provence	37 Center St	6	X	*	*	*	X
Hands On Music	27 Center St	--	X	*	*	*	X
High Pond Woodworks Office	107 Newton Rd	5	X	X	X		X
High Pond Woodworks Shop	106 Newton Rd	--					X
Home Shop	47 Center St	1	X	*	*	*	X
Neshobe Golf Club	224 Town Farm Rc	25				X	X
NortonMessage/JCleary/NeshobeCounsel/NourishYrPurp	39 Center St	7	X	*	*	*	X
Patricia's Restaurant (Sully's Place)	18 Center St	10	X		X		X
Rick's Barber Shop	35 Center St	--	X	*	*	*	X
Safer Society Foundation	8 Conant Sq	--			X		X
Sheri's Diner	25 Center St	6	X	*	*	*	X
The Watershed Tavern	31 Center St	--	X	*	*	*	X
United States Post Office	233 North St	5			X		X
Vacant	14 Center St	--			X		X
Vermont Kitchen Supply	17 Center St	2		*	*	*	X
VT Sandwich Co (New Location)	22 Center St	--	X		X		X
VT Sandwich Co (Old Location)/BranPitt Reporter	11 Conant Sq	--			X		X

* Denotes businesses that are located along Center St and Conant Square where FEMA floodplain mapping was not conducted



Damaged Buildings

- Basement flooded
- Building flooded, erosion and/or mud
- Business destroyed
- Neshobe River
- Roads
- Overbank Flow Direction




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Tropical Storm Irene Flood Damage Brandon, Vermont

Vermont Economic Resiliency Initiative
Agency of Commerce & Community Development

Drawn: JHB & EPF
Date: Feb 18, 2015



Building damage data provided by
Rutland Regional Planning Commission

Appendix C:

V-DAT One-Page Visual Summary of the Top Recommendations for Brandon



Conceptual Vision Plan for Our Community

Brandon, VT is an intimate, warm and walkable small town with a strong sense of place and significant community and historic assets, including a compact and full-service downtown. Brandon's downtown is unusual in that it still provides the essential goods and services that have moved to the outskirts of many Vermont towns. Brandon provides the local populace and residents of surrounding towns with opportunities for jobs, retail goods and services, and the social and civic benefits of an active and diverse community. The things that make Brandon special include its natural resources, historic streetscape and community character.

On August 28, 2011, Tropical Storm Irene brought over one foot of rain to Brandon, VT causing flooding and overflow of the Neshobe River that runs through downtown. When the rain and rising waters were over, one business was off its foundation and left in the middle of the street. Multiple other businesses were flooded and the question of the integrity of several buildings was an issue.

Brandon has a dedicated and highly skilled volunteer corps that has enabled the city to jump-start the recovery process. One of the key historic buildings whose back is on the river has been saved. An overflow system will be put in place during the section 6-highway work that should alleviate future flooding.

The Vermont Downtown Action Team (V-DAT) was selected by the State of Vermont, Department of Housing and Community Development, Vermont Downtown Program in May 2013 to conduct a community planning and economic development charrette in Wilmington. The V-DAT was comprised of experts in architecture, planning, landscape architecture, historic preservation, economic development, organizational structure, landscape architecture, engineering and community branding.

The V-DAT planning charrette operates on three key tenants: utilizing an asset based approach, addressing the community in a holistic manner, and conducting the exercise in a public forum.

The market study findings for Brandon show that there is room for additional retail and restaurant growth in the market. This information coupled with the excellent collection of buildings with strong architectural character point to a great opportunity for infill development.

The architectural stock of Brandon is remarkable. It is also a community where many of the key traditional uses remain in downtown alongside more specialty shops. Upper floor renovation for future uses, maintenance of existing buildings, and façade restoration opportunities will dramatically enhance Brandon's already charming appearance while encouraging economic health.



Telling Brandon's story: The community has cultivated a well-known identity as a place of innovation and creativity. This story should continue in innovative ways. The following brand statement provides insight into the tagline for the community: Unhurried, Unspoiled, Unforgettable.

Uncover the art of being Unhurried.
Ours is a place where the Vermont that everyone yearns for still exists. A place where our neighbors are our friends, and we treat visitors like neighbors. A place where the lunch hour can go a little longer, and morning coffee isn't standing in line for a paper cup. A place where our shopkeepers greet us with a smile, understand the value of true service, and the connection of being known by name. Come discover our town at your pace.

Uncover the beauty of life Unspoiled.
Ours is a place called Brandon. A place where you won't find flashing lights or strip malls. A place where 200 years of architectures frame a river that cascades through the heart of our downtown. A place where the majesty of our woods and fields, parks and trails is crowned by historic

church spires. A place where historic houses still make warm homes.

Uncover memories that are Unforgettable.
Ours is a place we call downtown. A place where memories are made around every turn. It's the heaping scoop of ice cream. It's marching to the beat of your own drum. It's the fine art and the art of fine cuisine. It's family time. It's finding exactly what you need. It's being surrounded by friends. It's saying I do.

We are Brandon, Vermont. Unhurried, Unspoiled, Unforgettable..



Enhance the Heart

Brandon can capitalize on the historic crossing where the Town Hall, the former Town Offices, and Marble Bridge intersect with Seminary Street to create a vibrant civic core of the community. This could include enhanced streetscape, improved crosswalks, a restored Marble Bridge and reuse of the former Town Office once it is restored.



MAIN STREET DOWNTOWN BRANDON, VT



Connecting the Core

The reconfiguration of Route 7 creates an opportunity for Brandon to create improvements to Central Park by enhancing pedestrian connections, creating a more logical traffic pattern through the area, and calming traffic so that it does not speed through the heart of town. Brandon can continue to foster its connections to the Neshobe River as the river creates a remarkable attraction in downtown Brandon. Flood remediation efforts should combine with amenities and attractions to bring people to the river.



Project Funding and Support
This project was supported by funding from the U.S. Department of Housing and Urban Development (HUD) Community Development Block Grant - Disaster Recovery. The plan was prepared as a cooperative effort of the State of Vermont Department of Housing and Community Development, the Division of Community Planning and Revitalization and the Town of Wilmington. The contents of this document do not necessarily reflect the official views or policy of HUD or the State of Vermont. For more information on the Vermont Downtown Action Team (V-DAT) program and links to the detailed presentation and report for Wilmington please visit http://accd.vermont.gov/strong_communities or call (802) 828-5229.



Appendix D:

Results of EPA's Flood Resilience Checklist for Brandon

Flood Resilience Checklist

Is your community prepared for a possible flood? Completing this flood resilience checklist can help you begin to answer that question. This checklist was developed as part of the U.S. Environmental Protection Agency's Smart Growth Implementation Assistance project in the state of Vermont. More information about the project can be found by reading the full report, *Planning for Flood Recovery and Long-Term Resilience in Vermont*, found online at www.epa.gov/smartgrowth/sgia_communities.htm#rec1.

What is the Flood Resilience Checklist?

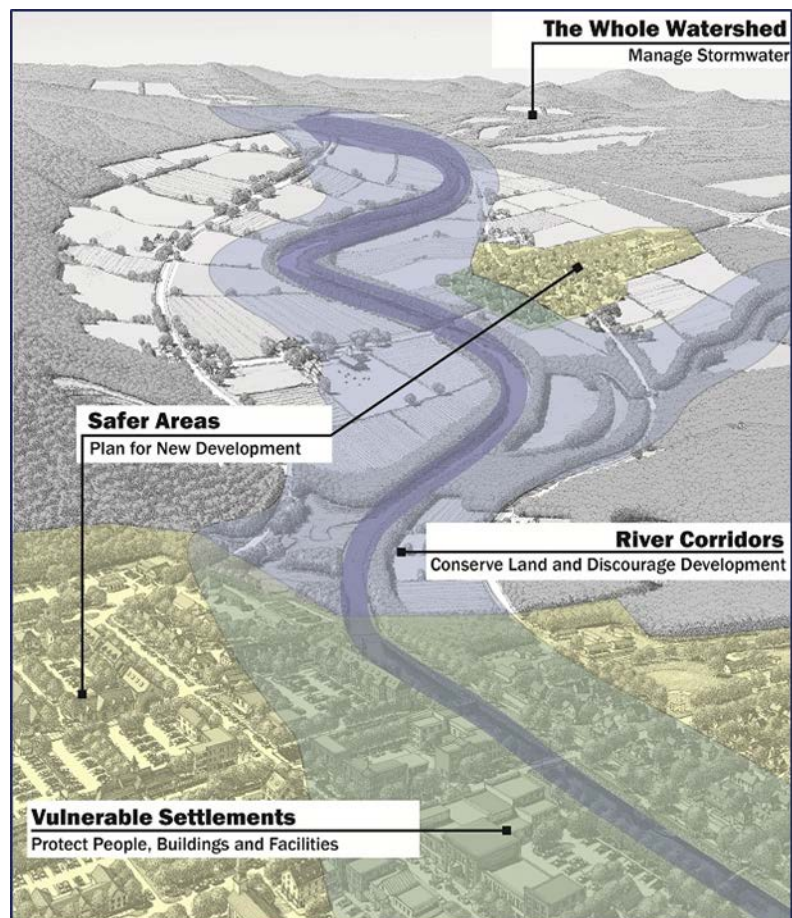
This checklist includes overall strategies to improve flood resilience as well as specific strategies to conserve land and discourage development in river corridors; to protect people, businesses, and facilities in vulnerable settlements; to direct development to safer areas; and to implement and coordinate stormwater management practices throughout the whole watershed.

Who should use it?

This checklist can help communities identify opportunities to improve their resilience to future floods through policy and regulatory tools, including comprehensive plans, Hazard Mitigation Plans, local land use codes and regulations, and non-regulatory programs implemented at the local level. Local government departments such as community planning, public works, and emergency services; elected and appointed local officials; and other community organizations and nonprofits can use the checklist to assess their community's readiness to prepare for, deal with, and recover from floods.

Why is it important?

Completing this checklist is the first step in assessing how well a community is positioned to avoid and/or reduce flood damage and to recover from floods. If a community is not yet using some of the strategies listed in the checklist and would like to, the policy options and resources listed in the [Planning for Flood Recovery and Long-Term Resilience in Vermont](#) report can provide ideas for how to begin implementing these approaches.



This graphic illustrates the four categories of approaches to enhance resilience to future floods. Credit: Vermont Agency of Commerce and Community Development.

BRANDON FLOOD RESILIENCE CHECKLIST

Overall Strategies to Enhance Flood Resilience

(Learn more in Section 2, pp. 9-11 of

[Planning for Flood Recovery and Long-Term Resilience in Vermont](#))

1. Does the community's comprehensive plan have a hazard element or flood planning section?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
a. Does the comprehensive plan cross-reference the local Hazard Mitigation Plan and any disaster recovery plans?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
b. Does the comprehensive plan identify flood- and erosion-prone areas, including river corridor and fluvial erosion hazard areas, if applicable?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
c. Did the local government emergency response personnel, flood plain manager, and department of public works participate in developing/updating the comprehensive plan?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
2. Does the community have a local Hazard Mitigation Plan approved by the Federal Emergency Management Agency (FEMA) and the state emergency management agency?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
a. Does the Hazard Mitigation Plan cross-reference the local comprehensive plan?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
b. Was the local government planner or zoning administrator involved in developing/updating the Hazard Mitigation Plan?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
c. Were groups such as local businesses, schools, hospitals/medical facilities, agricultural landowners, and others who could be affected by floods involved in the Hazard Mitigation Plan drafting process?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
d. Were other local governments in the watershed involved to coordinate responses and strategies?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
e. Does the Hazard Mitigation Plan emphasize non-structural pre-disaster mitigation measures such as acquiring flood-prone lands and adopting No Adverse Impact flood plain regulations?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
f. Does the Hazard Mitigation Plan encourage using green infrastructure techniques to help prevent flooding?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
g. Does the Hazard Mitigation Plan identify projects that could be included in pre-disaster grant applications and does it expedite the application process for post-disaster Hazard Mitigation Grant Program acquisitions?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
3. Do other community plans (e.g., open space or parks plans) require or encourage green infrastructure techniques?	<input type="checkbox"/> Yes	<input type="checkbox"/> No

BRANDON FLOOD RESILIENCE CHECKLIST

4. Do all community plans consider possible impacts of climate change on areas that are likely to be flooded?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
5. Are structural flood mitigation approaches (such as repairing bridges, culverts, and levees) and non-structural approaches (such as green infrastructure) that require significant investment of resources coordinated with local capital improvement plans and prioritized in the budget?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
6. Does the community participate in the National Flood Insurance Program Community Rating System?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Conserve Land and Discourage Development in River Corridors (Learn more in Section 3.A, pp. 14-19 of Planning for Flood Recovery and Long-Term Resilience in Vermont)		
1. Has the community implemented non-regulatory strategies to conserve land in river corridors, such as:		
a. Acquisition of land (or conservation easements on land) to allow for stormwater absorption, river channel adjustment, or other flood resilience benefits?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
b. Buyouts of properties that are frequently flooded?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
c. Transfer of development rights program that targets flood-prone areas as sending areas and safer areas as receiving areas?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
d. Tax incentives for conserving vulnerable land?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
e. Incentives for restoring riparian and wetland vegetation in areas subject to erosion and flooding?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
2. Has the community encouraged agricultural and other landowners to implement pre-disaster mitigation measures, such as:		
a. Storing hay bales and equipment in areas less likely to be flooded?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
b. Installing ponds or swales to capture stormwater?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
c. Planting vegetation that can tolerate inundation?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
d. Using land management practices to improve the capability of the soil on their lands to retain water?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
3. Has the community adopted flood plain development limits that go beyond FEMA's minimum standards for Special Flood Hazard Areas and also prohibit or reduce any new encroachment and fill in river corridors and Fluvial Erosion Hazard areas?	<input type="checkbox"/> Yes	<input type="checkbox"/> No

BRANDON FLOOD RESILIENCE CHECKLIST

BRANDON FLOOD RESILIENCE CHECKLIST		
4. Has the community implemented development regulations that incorporate approaches and standards to protect land in vulnerable areas, including:		
a. Fluvial erosion hazard zoning?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
b. Agricultural or open space zoning?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
c. Conservation or cluster subdivision ordinances, where appropriate?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
d. Other zoning or regulatory tools that limit development in areas subject to flooding, including river corridors and Special Flood Hazard Areas?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Protect People, Buildings, and Facilities in Vulnerable Settlements (Learn more in Section 3.B, pp. 19-26 of Planning for Flood Recovery and Long-Term Resilience in Vermont)		
1. Do the local comprehensive plan and Hazard Mitigation Plan identify developed areas that have been or are likely to be flooded?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
a. If so, does the comprehensive plan discourage development in those areas or require strategies to reduce damage to buildings during floods (such as elevating heating, ventilation, and air conditioning (HVAC) systems and flood-proofing basements)?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
b. Does the Hazard Mitigation Plan identify critical facilities and infrastructure that are located in vulnerable areas and should be protected, repaired, or relocated (e.g., town facilities, bridges, roads, and wastewater facilities)?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
2. Do land development regulations and building codes promote safer building and rebuilding in flood-prone areas? Specifically:		
a. Do zoning or flood plain regulations require elevation of two or more feet above base flood elevation?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
b. Does the community have the ability to establish a temporary post-disaster building moratorium on all new development?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
c. Have non-conforming use and structure standards been revised to encourage safer rebuilding in flood-prone areas?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
d. Has the community adopted the International Building Code or American Society of Civil Engineers (ASCE) standards that promote flood-resistant building?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
e. Does the community plan for costs associated with follow-up inspection and enforcement of land development regulations and building codes?	<input type="checkbox"/> Yes	<input type="checkbox"/> No

BRANDON FLOOD RESILIENCE CHECKLIST

3. Does the community require developers who are rebuilding in flood-prone locations to add additional flood storage capacity in any new redevelopment projects such as adding new parks and open space and allowing space along the river’s edge for the river to move during high-water events?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
4. Is the community planning for development (e.g., parks, river-based recreation) along the river’s edge that will help connect people to the river AND accommodate water during floods?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
5. Does the comprehensive plan or Hazard Mitigation Plan discuss strategies to determine whether to relocate structures that have been repeatedly flooded, including identifying an equitable approach for community involvement in relocation decisions and potential funding sources (e.g., funds from FEMA, stormwater utility, or special assessment district)?	<input type="checkbox"/> Yes	<input type="checkbox"/> No

Plan for and Encourage New Development in Safer Areas

(Learn more in Section 3.C, pp. 26-27 of

[Planning for Flood Recovery and Long-Term Resilience in Vermont](#))

1. Does the local comprehensive plan or Hazard Mitigation Plan clearly identify safer growth areas in the community?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
2. Has the community adopted policies to encourage development in these areas?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
3. Has the community planned for new development in safer areas to ensure that it is compact, walkable, and has a variety of uses?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
4. Has the community changed their land use codes and regulations to allow for this type of development?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
5. Have land development regulations been audited to ensure that development in safer areas meets the community’s needs for off-street parking requirements, building height and density, front-yard setbacks and that these regulations do not unintentionally inhibit development in these areas?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
6. Do capital improvement plans and budgets support development in preferred safer growth areas (e.g., through investment in wastewater treatment facilities and roads)?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
7. Have building codes been upgraded to promote more flood-resistant building in safer locations?	<input type="checkbox"/> Yes	<input type="checkbox"/> No

BRANDON FLOOD RESILIENCE CHECKLIST

Implement Stormwater Management Techniques throughout the Whole Watershed

(Learn more in Section 3.D, pp. 27-31 of

[Planning for Flood Recovery and Long-Term Resilience in Vermont](#))

1. Has the community coordinated with neighboring jurisdictions to explore a watershed-wide approach to stormwater management?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
2. Has the community developed a stormwater utility to serve as a funding source for stormwater management activities?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
3. Has the community implemented strategies to reduce stormwater runoff from roads, driveways, and parking lots?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
4. Do stormwater management regulations apply to areas beyond those that are regulated by federal or state stormwater regulations?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
5. Do stormwater management regulations encourage the use of green infrastructure techniques?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
6. Has the community adopted tree protection measures?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
7. Has the community adopted steep slope development regulations?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
8. Has the community adopted riparian and wetland buffer requirements?	<input type="checkbox"/> Yes	<input type="checkbox"/> No













Appendix E:










Table of Municipal Policy and Program Recommendations

Brandon
Town-wide Policy and Program Options
Vermont Economic Resiliency Initiative

Legend		
	Effective	
	Limited	
	Ineffective	

* Priority rating based on degree of community benefit

Recommendation	Priority*	OBJECTIVES			FEASIBILITY		Potential Partners	Potential Grants	Explanation	Next Steps
		Reduces Flood Risk	Reduces Erosion Risk	Protects Businesses, Infrastructure, and Property	Ease of Implementation	Cost Range				
Land Use Regulations										
Require repaired and rebuilt structures to be built higher above base flood elevation.	Medium				Moderate	< \$10K	RPC, VLCT, Consultant	MPG	Owners rebuilding should raise the lowest floor 2 to 3 feet higher than the most recently recorded flood elevation in high-risk areas. These requirements can be added to the development standards portion of the flood hazard section of the town zoning bylaw.	Work with Planning Commission.
Update policies to prevent fill and require conditional use review for other activities in the special flood hazard area.	High				Moderate	< \$10K	DEC River Management Program, RPC, VLCT, Consultant	MPG	Allowing landowners to fill low lying areas may help protect an individual property, but it can reduce the land's ability to slow and store extra flood waters and increase flood hazards downstream. Other activities in flood hazard areas such as improvements to existing structures should be required to undergo conditional use review. These policies can be added to the development standards portion of the flood hazard section of the town and zoning bylaw.	Work with Planning Commission.
Remove the special flood hazard area from developable land calculations.	Medium				Moderate	< \$10K	RPC, VLCT, Consultant	MPG	Removing the special flood hazard area from developable land calculations reduces the potential for too many structures to be built near hazardous areas.	Work with Planning Commission.
Create benchmarks for rebuilding after a disaster.	High				Moderate	< \$10K	DEMHS, VLCT, FEMA		People want to return to normal as quickly as possible after a disaster but local officials need to monitor rebuilding work and create benchmarks to ensure that rebuilding does not violate town and federal regulations. Without close monitoring, improper rebuilding may result in future federal disaster funding being unavailable for the town and its residences and businesses.	Work with Zoning Administrator.

Town Plan										
Document damages from flood events.	High				Easy	< \$10K	RPC, VLCT, Consultant	MPG	Disasters are easily forgotten over time and damages from the 2011 floods as well as other smaller recent rain and flood events should be documented. This will help the community consider the implications of new investments in areas damaged by floods including businesses along the Neshobe River, mobile homes, and municipal infrastructure. Town officials such as the emergency management director, zoning administrator, and public works should be involved in this work.	Incorporate into current Planning Commission work on Town Plan update.
Document road, sewer, and water infrastructure vulnerabilities in municipal and capital plans.	High				Moderate	< \$10K	RPC, VLCT, Consultant	MPG	Specific areas that were damaged or have known vulnerabilities should be documented so the community can plan for their replacement in their long-term budgets, easing the impact on taxpayers. Capital programs and budgets are not common in smaller towns but the local Selectboard may start this process with a list and a capital reserve fund.	Continue Planning Commission work on capital improvement planning.
Encourage agricultural uses in flood hazard areas.	Medium				Easy	< \$10K	RPC, VLCT, Consultant	MPG	Farming that is done according to best management practices and in consideration of the river should be encouraged in flood hazard areas. By encouraging agricultural uses, other risky activities such as building improvements will be further discouraged.	Incorporate into current Planning Commission work on Town Plan update.

¹Reduces Flood Risk - The proposed project/ strategy lowers the flood level.

²Reduces Erosion Risk - The proposed project/ strategy lessens the vulnerability of a location to erosion.

Legend			
● Effective	◐ Limited	○ Ineffective	

* Priority rating based on degree of community benefit

Recommendation	Priority*	OBJECTIVES			FEASIBILITY		Potential Partners	Potential Grants	Explanation	Next Steps
		Reduces Flood Risk	Reduces Erosion Risk	Protects Businesses, Infrastructure, and Property	Ease of Implementation	Cost Range				
Identify areas for conservation.	High	●	●	●	Moderate	??	VT River Conservancy, DEC River Management Program, VT Land Trust		The Neshobe River Corridor Plan identifies potential riparian easement sites. The town can identify and work with willing landowners to establish conservation sites along the river to prevent future development in flood-prone locations.	Identify high priority land for conservation.

Emergency Planning										
Recommendation	Priority*	Reduces Flood Risk	Reduces Erosion Risk	Protects Businesses, Infrastructure, and Property	Ease of Implementation	Cost Range	Potential Partners	Potential Grants	Explanation	Next Steps
Develop a local recovery fund.	Medium	○	○	●	Difficult	??	VLCT, DEMHS		Towns will recover much more quickly after a disaster if they create a local fund to address urgent needs. Federal and state money will come, but these funds are slow to arrive. Establishing a local household and business small grant or loan fund is proven to speed recovery efforts.	Work with Selectboard.
Develop a local building retrofit fund.	Medium	○	○	●	Difficult	??	VLCT, DEMHS		Again state and federal grants take time and may not be available for small projects. As part of the recovery or pre-disaster mitigation plan and fund, towns could offer mini grants for retrofits such as backflow preventers (that keep stormwater and sewage from flooding buildings via the drainage system), elevation of exterior utilities, and flood barriers for doors.	Work with Selectboard.
Develop evacuation plans.	High	○	○	●	Easy	< \$10K	RPC,D EMHS		Municipal facilities and schools as well as private facilities such as mobile home parks, senior centers, nursing homes and workplaces should all have evacuation plans.	Work with Emergency Management Director.
Educate people about the causes, risks and warning signs of floods.	Medium	○	○	●	Moderate	< \$10K	RPC, DEMHS, DEC River Management Program, FEMA		Schools can include flood awareness and preparedness in spring and fall science and history programs. Schools and towns and other local groups can publicize flood risk areas, warning signs and evacuation plans. Working with the state and the RPCs, these groups can distribute flood hazard maps so that people know where there is a risk of flooding.	Reach out to schools and community groups.
Identify VERI project recommendations in Brandon's Hazard Mitigation Plan.	High	○	○	●	Easy	< \$10K	RPC, Consultant	HMGP	Once the community has chosen the top recommendations for further implementation, include these in the town's Hazard Mitigation Plan. This will help when applying for future Hazard Mitigation Grant Program (HMGP) funding.	Work with town Emergency Management Director.

Education and Outreach										
Recommendation	Priority*	Reduces Flood Risk	Reduces Erosion Risk	Protects Businesses, Infrastructure, and Property	Ease of Implementation	Cost Range	Potential Partners	Potential Grants	Explanation	Next Steps
Promote and educate property owners on the value of flood insurance.	Medium	○	○	●	Easy	< \$10K	RPC, DEMHS, FEMA		Homeowners' insurance does not pay for any flood related damage. Only flood insurance through the National Flood Insurance Program does. In Brandon, only 27% of buildings in the flood hazard area have flood insurance.	Gather NFIP informational materials for distribution, and reach out to real estate agents.
Help businesses plan for disasters.	Medium	○	○	●	Moderate	< \$10K	SBDC, FEMA, RPC		If a home is damaged or washed away, occupants can go stay in a hotel, with friend or family, or find a rental. When a business is flooded, it is much harder or impossible to relocate. Continuity of operations plans outlines the steps business can take during and after a disaster to reduce disruption and losses.	Offer continuity of operations planning training for businesses.

¹Reduces Flood Risk - The proposed project/ strategy lowers the flood level.

²Reduces Erosion Risk - The proposed project/ strategy lessens the vulnerability of a location to erosion.

Brandon
Town-wide Policy and Program Options
Vermont Economic Resiliency Initiative

Legend			
●	Effective	◐	Limited
○	Ineffective		

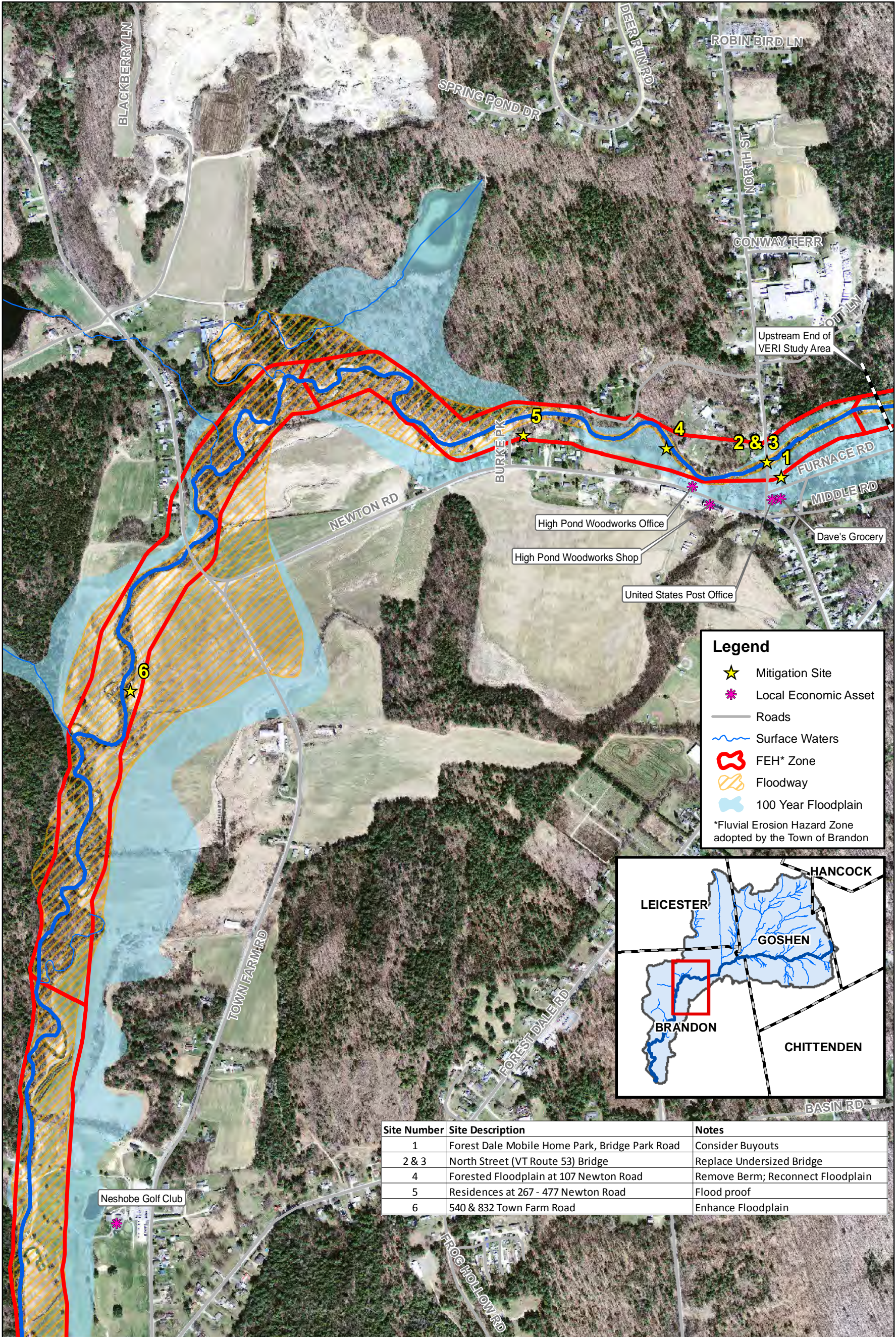
* Priority rating based on degree of community benefit

Recommendation	Priority*	OBJECTIVES			FEASIBILITY		Potential Partners	Potential Grants	Explanation	Next Steps
		Reduces Flood Risk	Reduces Erosion Risk	Protects Businesses, Infrastructure, and Property	Ease of Implementation	Cost Range				
Educate landlords and contractors about local regulations.	Medium	○	○	●	Moderate	< \$10K			Many landlords and contractors may not understand the requirements for rebuilding after a flood. Specific standards must be met to maintain eligibility for flood insurance and other federal grants.	Reach out to landlords and contractors.

¹Reduces Flood Risk - The proposed project/ strategy lowers the flood level. ²Reduces Erosion Risk - The proposed project/ strategy lessens the vulnerability of a location to erosion.

Appendix F:

Maps and Tables of Projects to Protect Brandon



Legend

- ★ Mitigation Site
- ★ Local Economic Asset
- Roads
- Surface Waters
- FEH* Zone
- Floodway
- 100 Year Floodplain

*Fluvial Erosion Hazard Zone adopted by the Town of Brandon

Site Number	Site Description	Notes
1	Forest Dale Mobile Home Park, Bridge Park Road	Consider Buyouts
2 & 3	North Street (VT Route 53) Bridge	Replace Undersized Bridge
4	Forested Floodplain at 107 Newton Road	Remove Berm; Reconnect Floodplain
5	Residences at 267 - 477 Newton Road	Flood proof
6	540 & 832 Town Farm Road	Enhance Floodplain

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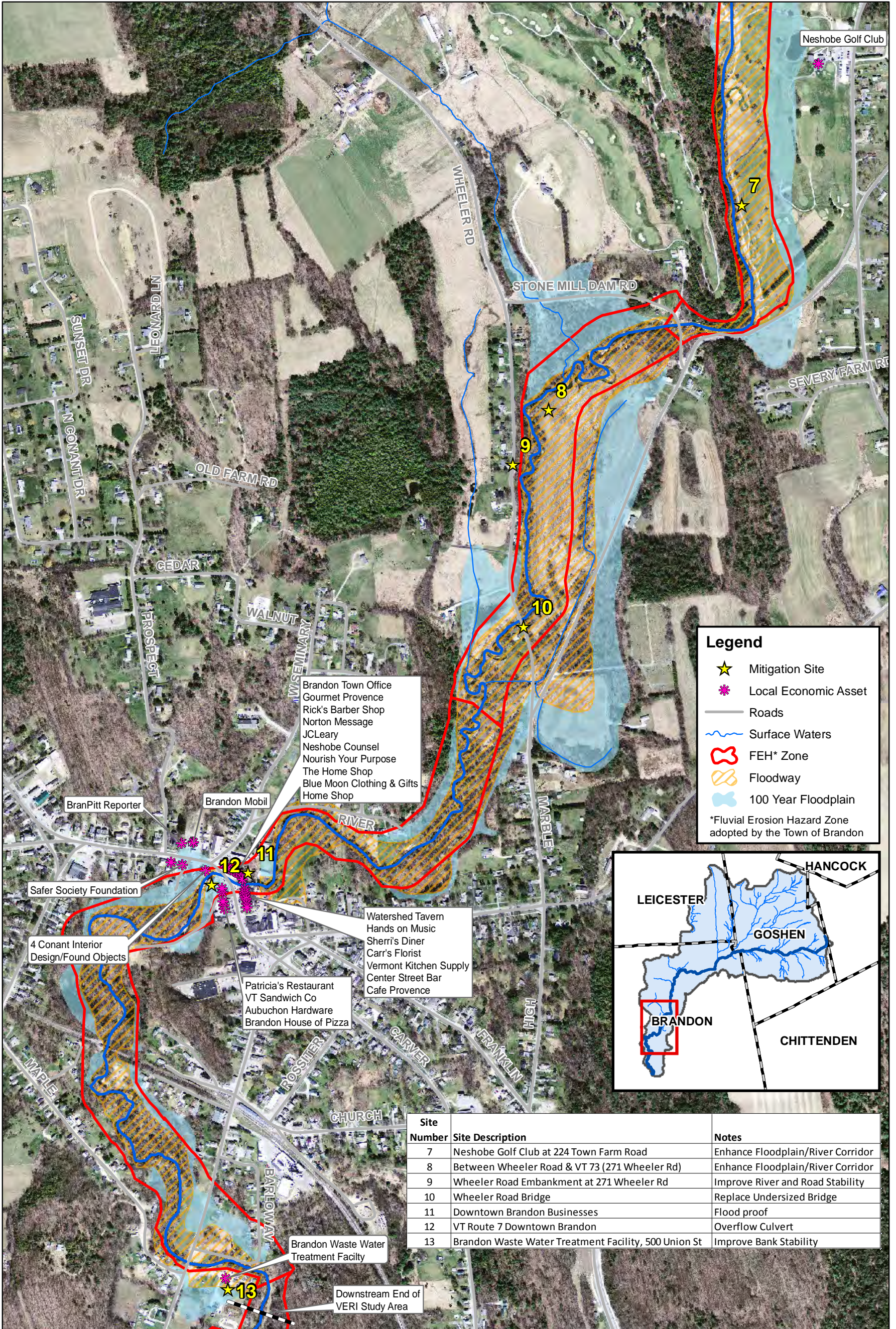
**Projects to Protect Businesses and Infrastructure
 Brandon, Vermont**

**Vermont Economic Resiliency Initiative
 Agency of Commerce & Community Development**

0 350 700 Feet
 1 in = 700 feet

Map 1 of 2 Drawn: JHB & EPF
 Date: Feb 18, 2015

Please see project detail table for more information about project sites



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Projects to Protect Businesses and Infrastructure
Brandon, Vermont



Vermont Economic Resiliency Initiative
Agency of Commerce & Community Development

0 350 700 Feet
 1 in = 700 feet



















Map 2 of 2 Drawn: JHB & EPF
 Date: Feb 18, 2015
 Please see project detail table for more information about project sites

Brandon

**Recommended Projects to Protect Businesses and Infrastructure
Vermont Economic Resiliency Initiative (VERI)
July 26, 2015**

Legend		
 Effective	 Limited	 Ineffective

* Priority rating based on objectives and potential business impact (refer to Section X of report for explanation)




Project	What is At Risk?	Potential Business Impacts	Priority*	OBJECTIVES			FEASIBILITY			Comments
				Reduces Flood Risk ¹	Reduces Erosion Risk ²	Protects Businesses, Infrastructure, and Property	Ease of Implementation	Cost Range	Estimated Time for Implementation	
Building and Site Improvements										
Flood proof businesses in Downtown Brandon (see site 11 on map 2)	Businesses	9 businesses and Town Offices with a total of 83 employees	High				Moderate	\$10K per building	1-2 years	Multiple buildings were flooded and one was destroyed (Brandon House of Pizza) during Tropical Storm Irene. Flood risk may be lowered with future overflow culvert project, but risk of flood damage will likely remain during large floods.
Flood proof homes along Newton Road (see site 5 on map 1)	Residences	Residential	Low				Moderate	\$10K per building	1-2 years	Approximately 10 homes to the north of Newton Road are vulnerable to flooding. Flooding did not reach the first floor on most homes, but many basements were flooded during Tropical Storm Irene. Since homes are not likely eligible for buyouts, floodproofing is an option to prevent basement damage.
Channel and Floodplain Management										
Remove berms downstream of VT Route 53 to store floodwaters and sediments in floodplain (see site 4 on map 1)	Town Road; Residences; 1 Business	1 business with 5 employees	High				Moderate	\$20K-\$50K	1-2 years	Old berms exist along the south (left) bank downstream of VT Route 53. Berms restrict the river's access to floodplains in an area of major flood flow and sediment movement. Berm removal would allow access to undeveloped, forested floodplains upstream of an area where homes were flooded along Newton Road.
Neshobe Golf Club Floodplain/Corridor Improvements (see site 7 on map 2)	Golf Course	1 business with 25 employees	Medium				Easy	\$100-\$200K	>5 years	Neshobe Golf Club has experienced \$100,000 in damages during recent floods. During Tropical Storm Irene, floodwaters were approximately 10 feet deep and 2 feet of sediment was deposited on the course close to river. Could the golf course consider relocating some holes to allow the river to migrate and deposit sediment in the channel (versus floodplain) and reduce damage over the long-term?
Revegetate floodplain and river corridor between Wheeler Road and VT Route 73; Consider conservation easements for long-term, permanent protection (see site 8 on map 2)	Town Road; Residences; Farm fields	Residential and Agricultural lands	Medium				Moderate	\$10K-\$50K	2-5 years	Upper end of river reach M03 has good floodplain access and large wetlands in the floodplain. The floodplain and river corridor are protected from development by town zoning. Consider enhancement of floodplain and wetlands with buffer tree plantings (e.g., NRCS CREP program) to slow floodwaters and store sediment and debris during large floods. Permanent protection of river from dredging (an accepted agricultural practice) would require purchase of channel management rights through an easement.
Revegetate floodplain and river corridor west of Town Farm Road; Consider conservation easements for long-term, permanent protection (see site 6 on map 1)	Farm fields; Golf Course	Agricultural lands and downstream Golf Course	Medium				Moderate	\$10K-\$50K	2-5 years	Extensive floodplains exist from the Neshobe Golf Course up to conserved Nop property east of Town Farm Road. This area of the floodplain has major flood flow during large events (floodway width nearly = floodplain width). Consider enhancement of floodplain and wetlands with buffer tree plantings (e.g., NRCS CREP program) to slow floodwaters and store sediment and debris during large floods, and reduce long-term bank erosion along farm fields. Permanent protection of river from dredging (an accepted agricultural practice) would require purchase of channel management rights through an easement.

¹Reduces Flood Risk - The proposed project/strategy lowers the flood level.






















²Reduces Erosion Risk - The proposed project/strategy lessens the vulnerability of a location to erosion.

Brandon

**Recommended Projects to Protect Businesses and Infrastructure
Vermont Economic Resiliency Initiative (VERI)
July 26, 2015**

Legend		
 Effective	 Limited	 Ineffective

* Priority rating based on objectives and potential business impact (refer to Section X of report for explanation)

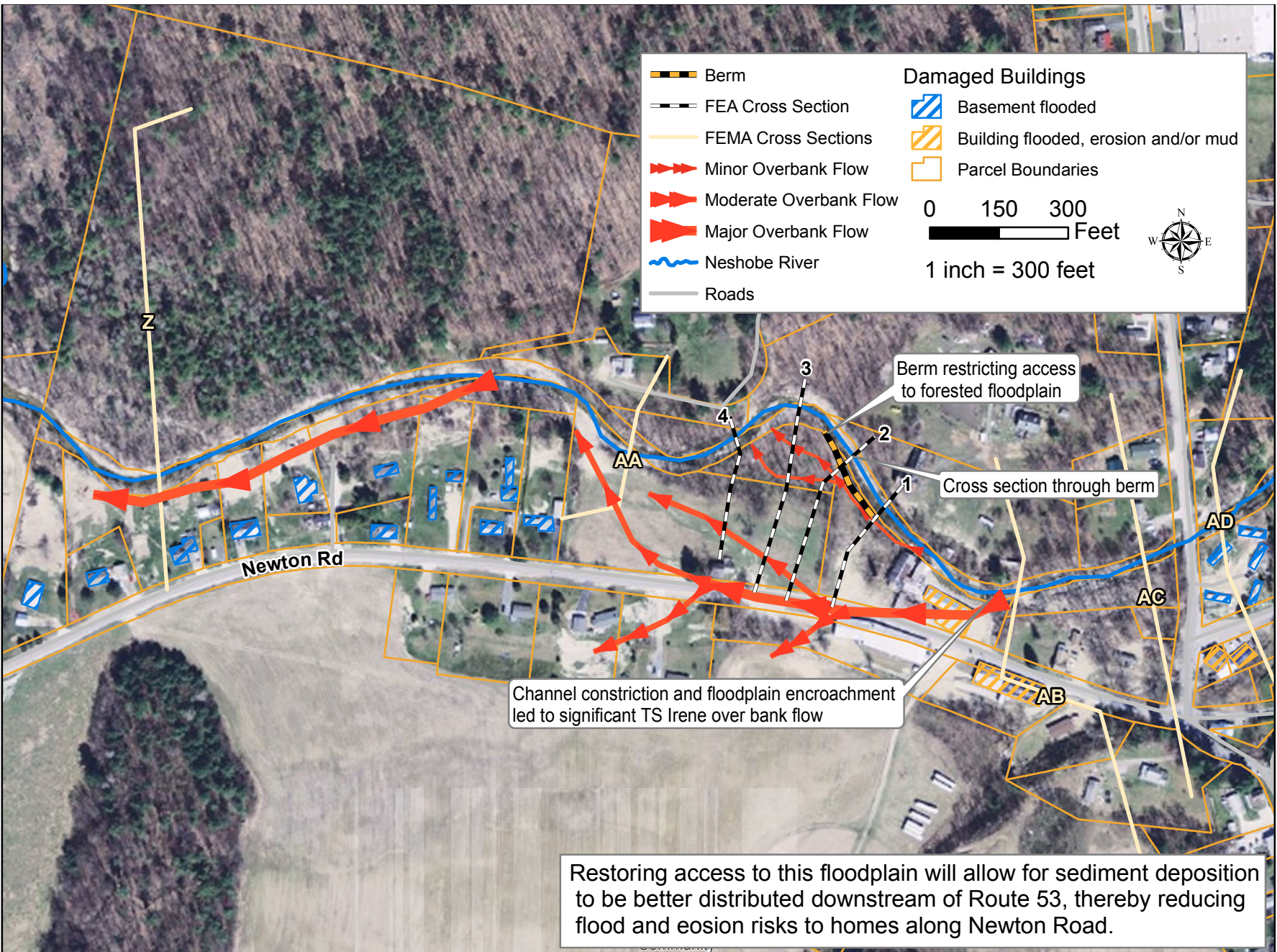
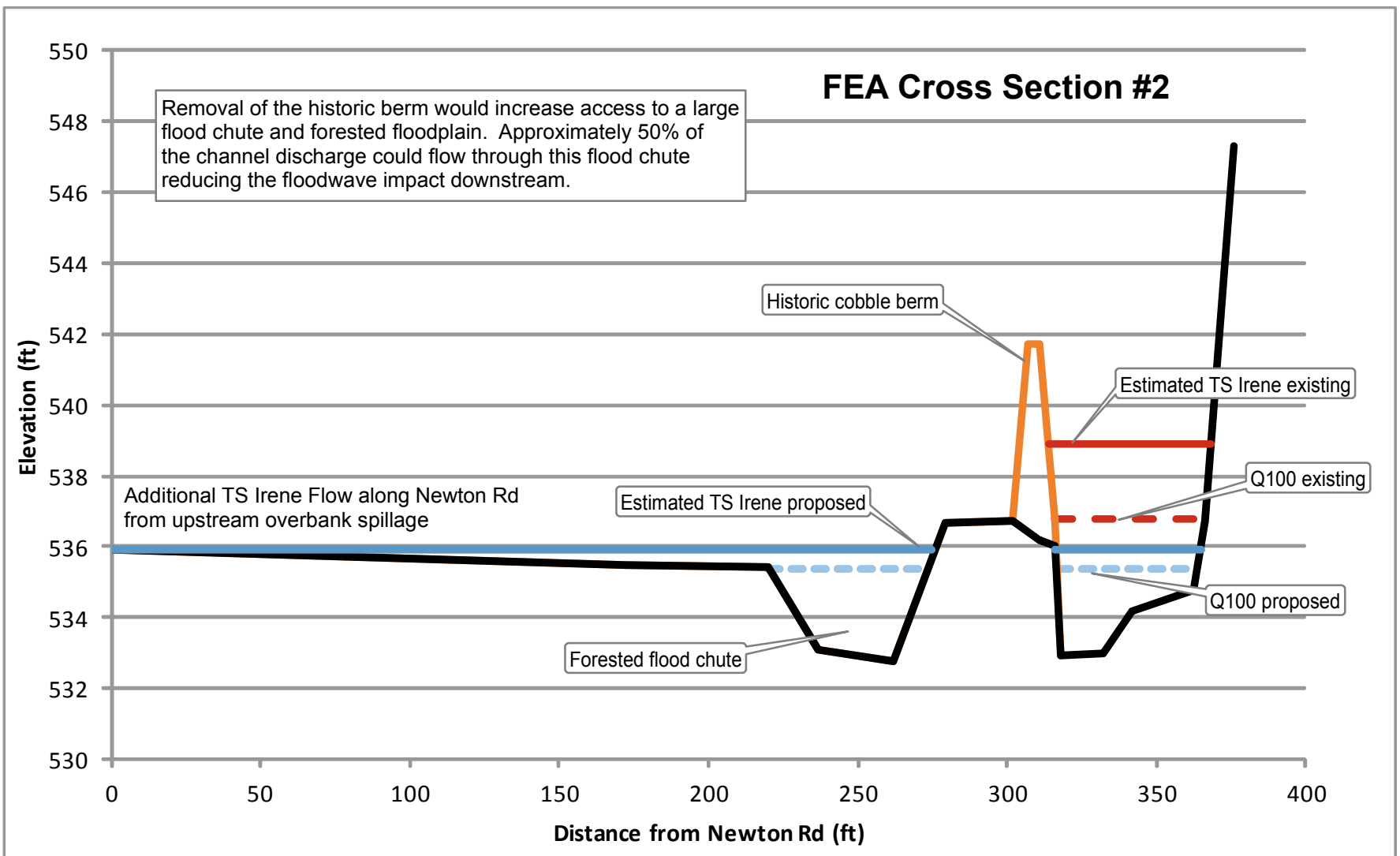
Project	What is At Risk?	Potential Business Impacts	Priority*	OBJECTIVES			FEASIBILITY			Comments
				Reduces Flood Risk ¹	Reduces Erosion Risk ²	Protects Businesses, Infrastructure, and Property	Ease of Implementation	Cost Range	Estimated Time for Implementation	
Infrastructure Improvements										
Overflow culvert in Downtown Brandon to prevent/reduce flood flows out of river channel and along Route 7 (see site 12 on map 2)	Downtown Brandon businesses and residences; Federal Highway	Local: >25 business and 200 employees; Significant regional impact	High				Difficult	>\$200K	2-5 years	Town of Brandon has received a FEMA Hazard Mitigation Grant (Phase 1; \$250K) to design an overflow box culvert in the Village to prevent or reduce flood damage to Route 7 and downtown businesses. Town and businesses are concerned about coordination of this project with VTrans Route 7 Segment 6 construction project.
Stabilize embankment along Wheeler Road approx. 800 ft south of Stone Mill Dam Road (see site 9 on map 2)	Town Road and Water Main	>25 business and 200 employees	High				Moderate	\$20K-\$50K	1-2 years	A mass failure (i.e., eroded valley wall) along the west bank of the river was caused by river erosion on the lower bank. Wheeler Road and a Town water main are at risk. Recommend treating the source of the problem at the bottom of the slope (i.e., rock protection) and stabilizing the upper bank with soil, natural fabrics, and vegetation.
Replace VT Route 53 bridge with larger span (see site 2 on map 1)	State Highway; Businesses; Residences	2 businesses with a total of 9 employees	High				Moderate	>\$200K	2-5 years	The bridge is undersized (56% of channel width) and should be replaced with a larger span. Floodplain mapping and profiles suggest that the bridge is hydraulically undersized for the 100-year flood. River characteristics suggest a span greater than the standard VTDEC-recommended width may be needed.
Replace Wheeler Road Bridge with a larger span (see site 10 on map 2)	Town Road; Residences	Residential	High				Moderate	>\$200K	2-5 years	The abutments are in poor condition and the span is 61% of the channel width. The Town of Brandon recently approved match for a VTrans structures grant to move forward with a design to increase span and realign roadway now that an adjacent property was bought out following Tropical Storm Irene flooding.
Long-term stabilization and/or relocation of Waste Water Treatment Facility (WWTF) on Union Street, South of Village (see site 13 on map 2)	Town WWTF	>25 business and 200 employees	High				Moderate	\$50K-\$100K	1-2 years	Flooding and erosion have been a problem at the WWTF. The Town installed rock armor (i.e., rip rap) on the bank in 2010, but the area is still prone to erosion and there is a Green Mountain Power utility pole at risk. The WWTF is aging and major upgrades will be needed in the near future, at which point flood resiliency should be considered. Evaluation of objectives and feasibility reflects the intermediate step of addressing current erosion risks.
Retain overflow structure next to VT Route 53 bridge (see site 3 on map 1)	State Highway; Residences	Residential	Low				Easy	<\$10K	1-2 years	A historic overflow culvert was uncovered following Tropical Storm Irene south of the bridge. This structure conveyed floodwaters during the flood and took pressure off the bridge, but was filled by the mobile home park owners following the flood.
Public Safety Improvements										
Consider buyouts for at-risk properties in flood and erosion hazard area (see site 1 on map 1)	Forest Dale Mobile Home Park	Residential	Medium				Difficult	\$100-\$200K	>5 years	Five mobile homes are located in the 100-year floodplain and Fluvial Erosion Hazard (FEH) zone and were flooded during Tropical Storm Irene. Buyouts would reduce future risk of losses.

¹Reduces Flood Risk - The proposed project/strategy lowers the flood level.

²Reduces Erosion Risk - The proposed project/strategy lessens the vulnerability of a location to erosion.

Appendix G:

Conceptual Project Designs to Protect Brandon




Fitzgerald Environmental Associates, LLC
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Newton Rd Berm Removal Analysis Brandon, Vermont

Vermont Economic Resiliency Initiative
 Agency of Commerce & Community Development

Drawn: JHB & EPF
 Date: Feb 18, 2015

Post-Irene background imagery from VCGI

HEC-RAS model results for the simulated 100-year flood in Forest Dale. Removal of the historic berm increases floodplain access, lowering flood elevation and velocity.

Cross-section	Bed Elevation (ft)	Q100 Elevation (ft)		Top Width (ft)		Total Velocity (ft/sec)	
		Existing	Berm Removed	Existing	Berm Removed	Existing	Berm Removed
FEMA AB	544.00	549.78	549.78	38.27	38.27	11.27	11.27
FEA 1	536.29	540.67	540.67	48.56	48.56	10.39	10.39
FEA 2	532.91	536.82	535.41	50.22	100.21	11.99	9.96
FEA 3	531.01	533.99	533.10	130.20	264.69	7.12	5.82
FEA 4	526.07	529.99	529.99	141.54	141.54	4.79	4.79
FEMA AA	522.40	527.33	527.33	94.28	94.28	8.01	8.01

HEC-RAS model results for an estimated Tropical Storm Irene sized event. Removal of the historic berm increases floodplain access, lowering flood elevation and velocity.

Cross-section	Bed Elevation (ft)	TSI Elevation (ft)		Top Width (ft)		Total Velocity (ft/sec)	
		Existing	Berm Removed	Existing	Berm Removed	Existing	Berm Removed
FEMA AB	544.00	551.74	551.74	44.13	44.13	12.99	12.99
FEA 1	536.29	541.93	541.06	360.35	325.21	3.65	5.74
FEA 2	532.91	538.85	535.94	54.16	324.08	12.15	10.32
FEA 3	531.01	534.12	533.70	131.46	378.58	11.77	6.22
FEA 4	526.07	531.11	531.11	259.93	259.93	5.17	5.17
FEMA AA	522.40	529.06	529.06	203.70	203.70	6.86	6.86

A budget of approximately \$8,000 was estimated to cover the materials and excavator time to remove the Newton Road berm.

Item	Cost/Unit	Quantity	Estimated Total Cost
Contractor	---	2 - 3 days	\$5,000
Erosion Control Fabric	\$0.99/yd	400 yd	\$400
BioStakes	\$70/box	2	\$140
Conservation Seed Mix	---	60lb	\$100
Tree Planting	\$60/tree	40	\$2,400

Approximate Total Cost: \$8,040

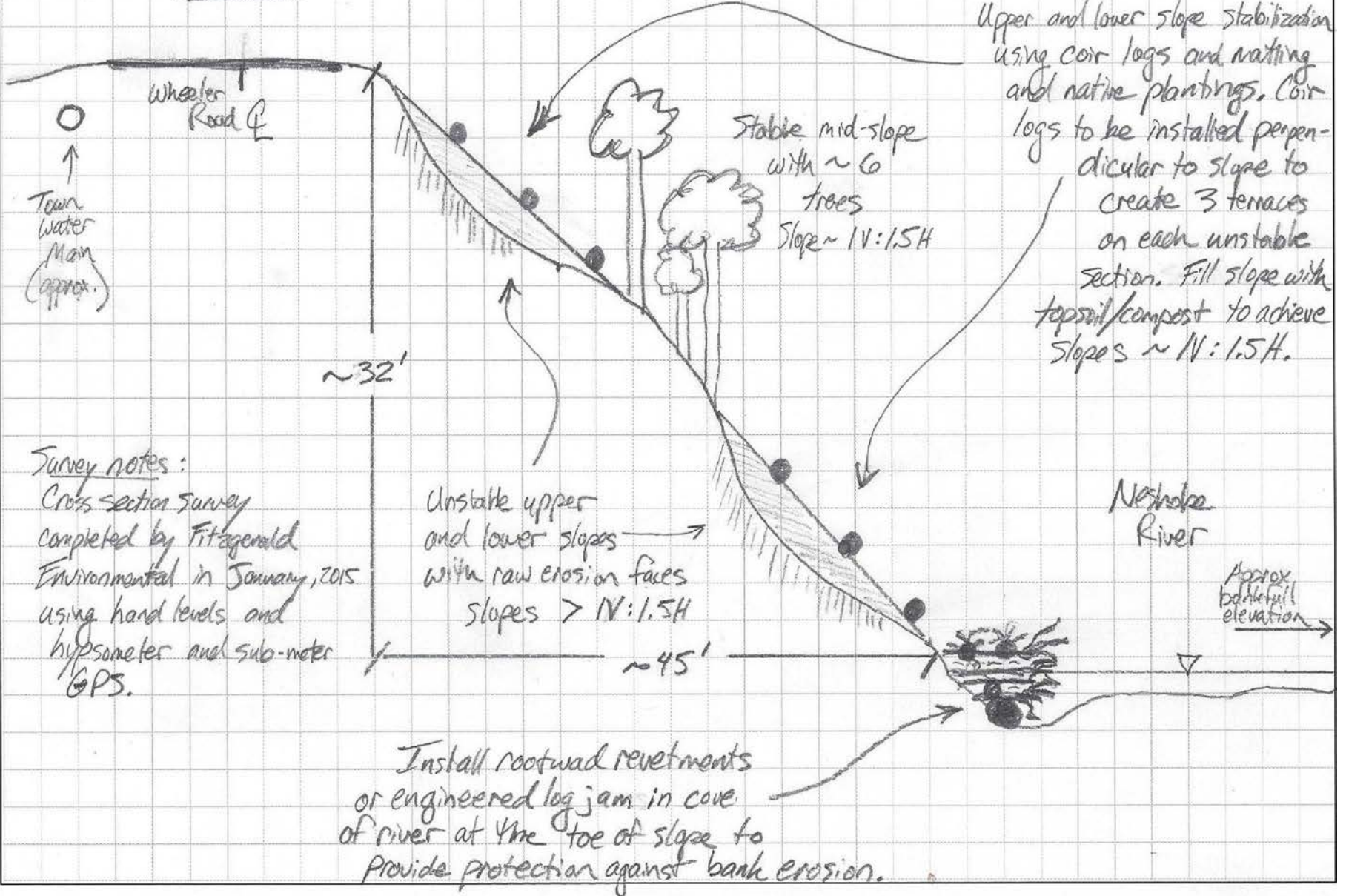


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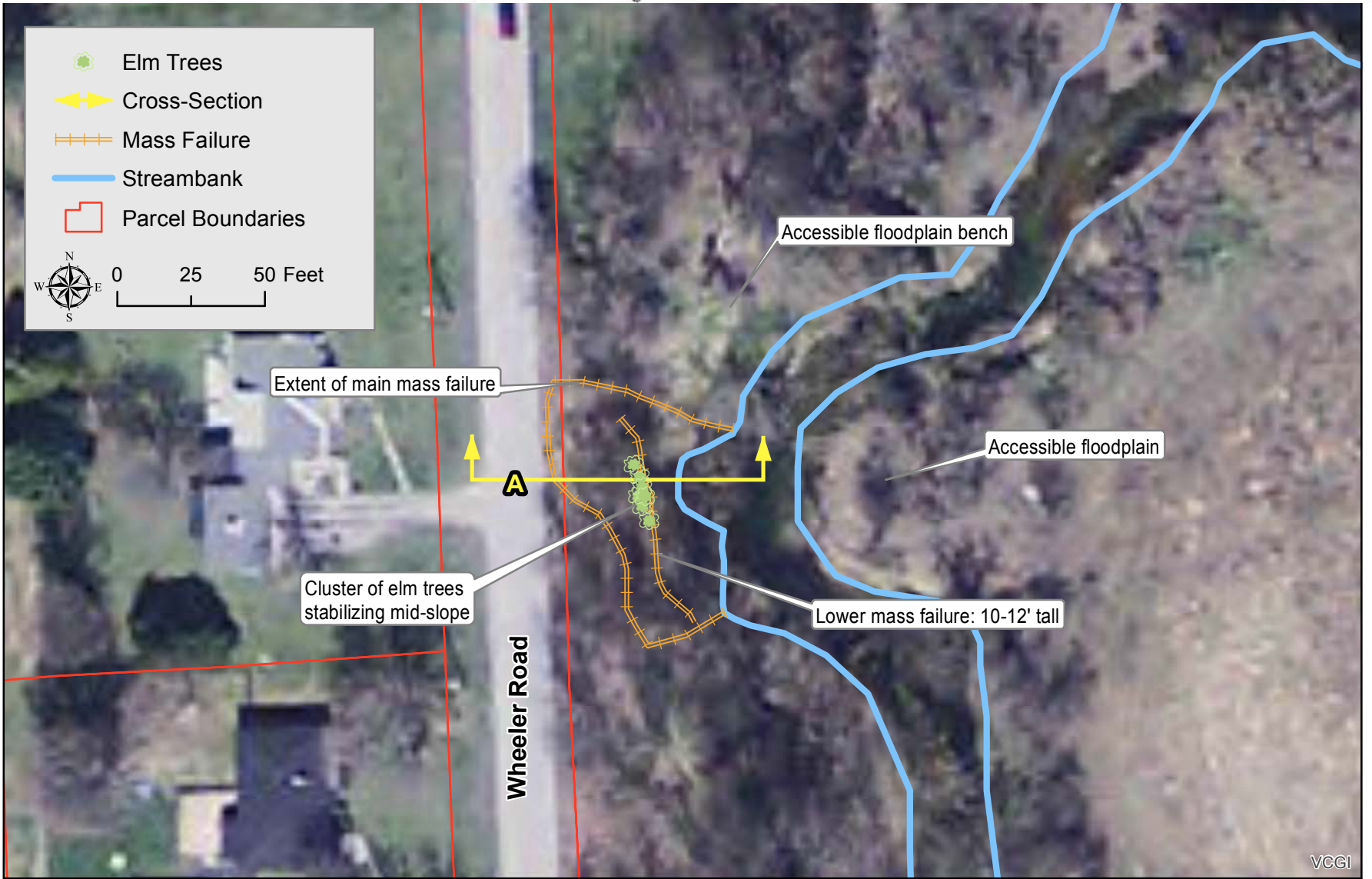
Job: VERI - Neshobe River, Wheeler Road Slope Stabilization
 Sheet No. 1 of 1
 Date: 2/16/2015
 Vertical Scale: 1" = 8'
 Drawn by: EPF
 Horizontal Scale: 1" = 12'

Scale
 2' / 3'

Section A



Survey notes:
 Cross section survey completed by Fitzgerald Environmental in January, 2015 using hand levels and hypsometer and sub-meter GPS.



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**Wheeler Road Bank Failure
 Brandon, Vermont**
 Vermont Economic Resiliency Initiative
 Agency of Commerce & Community Development

Drawn: JHB & EPF
 Date: Feb 27, 2015
 Post-Irene background imagery from VCGI

A budget of approximately \$23,000 was estimated to cover the materials, excavator time, and VYCC crew time to stabilize the eroding bank along Wheeler Road.

Item	Cost/Unit	Quantity	Estimated Total Cost
Contractor	---	2 to 3 days	\$6,000
Topsoil/Compost	\$35/yard	130 yards	\$4,550
Erosion Control Fabric	\$0.99/yd	300 yd	\$300
BioStakes	\$70/box	2	\$140
Conservation Seed Mix	\$25/pound	4 pounds	\$100
Shrub plantings	\$2.00/plug	500	\$1,000
Coir logs	\$7.50/ft	500ft	\$3,750
Earth anchors	\$50/per	10	\$500
VYCC crew	\$7,000/week	1	\$7,000

Approximate Total Cost: \$23,340



Pre stabilization



Post stabilization

Bioengineering approach to bank stabilization using toe armor with coir mat and dense native plantings. Photographs provided by Bear Creek Environmental for a Vermont Agency of Transportation project along VT Route 102 and the Connecticut River in Maidstone, VT.



Mass failure before restoration



Mass failure after restoration

Bioengineering approach to bank stabilization using coir logs and mat and dense native plantings. Photographs provided by Fitzgerald Environmental for a project along the Crosby Brook in Brattleboro, VT.

Appendix H:

Community Forum Meeting Notes

Vermont Economic Resiliency Initiative (VERI)

Community Forum - Village of Brandon

MEETING NOTES

October 16, 2014 – 7:00 – 9:00 PM

Project Overview

With funding from the [US Economic Development Administration](#) (EDA), the Vermont Department of Housing and Community Development, working with the Agencies of Natural Resources and Transportation and the Regional Planning Commissions, launched the Vermont Economic Resiliency Initiative (VERI) to help ensure Vermont remains open for business when disaster strikes.

VERI will help the state and local communities by evaluating local flood risk to business and infrastructure, and identify the steps communities and the state can take to minimize rebuilding and recovery costs and ensure businesses stay open – saving jobs and maintaining our economy.

For More Information

http://accd.vermont.gov/strong_communities/opportunities/planning/resiliency/VERI

Summary

17 community members, business owners, and homeowners from the Neshobe River catchment area in Brandon attended the Vermont Economic Resiliency Community Forum. The community identified three major flood hazard risks in Brandon – inadequate water drainage along Newton Road, Furnace Road, Pearl Street, and Route 7, infrastructure needing improvements along Briggs Lane and east of the railroad near Maple Street, and placement of the town hall and the Forest Dale Mobile Home Park in the floodway. Successful mitigation projects in Brandon have included restoring riparian buffers, minimizing development in the flood plain, and adopting fluvial erosion hazard zone and NFIP standards. Further analysis and technical assistance needs of the community emphasized adapting the golf course to be an intentional flood catchment area, relocation of electrical utilities near the wastewater treatment plant, resizing the Wheeler Road box culvert and bridge, and risk management in the mobile home park.

Present

- Residents and Business Owners: Line Barral (Café and Gourmet Provence), Bernie Carr (Brandon Area Chamber of Commerce), William Tracy Carris, Anissa DeLauri, Jim Emerson, Karen Emerson, George Matthew, Gary Meffe, Steven Zorn (Found Objects Store), Steve Paddock (VT Small Business Development Center), Jeff Stewart (Downtown Organization), Paul Gladding (Holden Insurance)
- Technical Assistance: Evan Fitzgerald (Fitzgerald Environmental Associates)
- Town of Brandon: Richard Baker, Bill Moore, Ethan Swift, Devon Fuller, Linda Stewart
- Regional Planning Commission: Barbara Pulling, Steve Schild, Laura Keir and Kitt Shaw (Rutland Regional Planning Commission)
- State of Vermont: Noelle MacKay (DHCD), Steve Carr (Vermont House of Representatives), Josh Carvajal (ANR), Peg Flory, Eldred French and Kevin Mullin (VT State Senate)

Introduction

Bernie Carr, Brandon Area Chamber of Commerce, convened the Vermont Economic Resiliency Initiative (VERI) Community Forum in Brandon and he introduced Commissioner Mackay from the Vermont Department of Housing and Community Development. Commissioner MacKay welcomed everyone and thanked people for participating in a first round of community forums presently being held in five Vermont communities state-wide. The Commissioner explained that the community forums are examining ways to improve economic resiliency for natural disaster impacted communities in the aftermath of Tropical Storm Irene. Through the Vermont Economic Resiliency Initiative, the State will analyze risks to public infrastructure, alongside economic activity, river corridor and flood data, to better mitigate future flood hazards and to ensure businesses rebound quickly. The Commissioner provided the audience with a VERI project overview and the findings of the first two phases of the project. After her introductory remarks, the Commissioner explained that the purpose of the meeting was to collect information about risks to infrastructure and economic activity observed during Irene, subsequent risk reduction, and suggested improvements for long-term resiliency.

Overview of the Riverine Study Area

The State has contracted with a team of river scientist and engineers to review the geomorphology, flood hazard risks, sediment deposition potential, and impacts to the built environment of select rivers and tributaries within each targeted VERI community. The scientists presented an overview of their

work and initial observations in the river corridors at each of the community forums and provided technical assistance to the respective community throughout the meeting.

Notes

- Evan Fitzgerald provided a brief overview of the Neshobe River corridor analysis to date. He noted that the river has good access to long stretches of well-connected flood plains closer to downtown, and it is a very different river in Forest Dale where the river roars out of the mountains.

For more information on past river studies

This area has had a river study completed in the past and the consultants are incorporating this past work in to the VERI project. Those studies can be found here:

<https://anrnode.anr.state.vt.us/SGA/finalReports.aspx>. (River Corridor Plan, 2011 and Phase 1 Stream Geomorphic Assessment (SGA) for the Neshobe River, 2004).

Public Input

The DHCD Commissioner solicited input from forum participants with regard to flood risk and mitigation opportunities in Woodstock. The questions posed were:

- 1) What are the hazards and risk areas in the town?
- 2) What worked structurally and what has already been done since Irene to protect infrastructure and to reduce risk to businesses?
- 3) What still needs to be addressed in the interests of long-term security and sustainability?
- 4) What information should the final report include and how should this information be presented?

Identified hazards and risks will be further analyzed in Phases 3 and 4 of VERI.

Identified Natural Disaster Hazards and Business Risks

What are the hazards and risk areas in the town?

Notes

- **Stone Mill corner** flooded the golf course in 2006, 2008, 2011 resulting in \$100,000 in damages collectively. During TS Irene, golf course flooding helped to protect the downtown, absorbing twelve feet of water here.
- 4 or 5 homes on **Newton Road** and homes along the North side of **Furnace Road** had their basements, not first floors, filled with water during Irene. Flooding on Newton Road is affected by old concrete mill in the river; water went right round it. There is a Hazard Mitigation Grant Program (HMGP) application under review to remove this structure.
- Downtown the river makes 90 degree turns, flowing under the **town office**. Irene damage looks the same as 1938 flood photos did. Town has applied to FEMA for an overflow structure, have yet to hear from FEMA.
- Town does have a couple of roads that can be used to get around problem areas. After TS Irene, **Route 7** was closed for only one week, affecting trucking (Omya) and local businesses.
- A trouble spot exists at the railroad intersection where houses on **Pearl Street** are slightly elevated and end up holding standing water. One concern with this is the mosquito control, it has never been sprayed in previous years. What could be done here? Dredging? Is silt a problem too causing higher river levels? Is there a way to tell how old silt is? Evan said yes, but it would be rather expensive to do. There are several severe bends in the river near here and that leads to flooding and several trees and other vegetation are dying due to the standing water.
- Comments read from Stephen Cijka (not in attendance, emailed comments), wastewater treatment plant operator: To properly guard the downtown against further flooding some type of gigantic culvert would have to be built under **Route 7** from Kennedy Park next to Watershed Tavern across to Green Park next to Vermont Sandwich Shop. The cost is very expensive but may be the only logical solution. Other concern is some type of **warning system** for flooding as the next flood may occur at night or during business hours. Last concern is having a backup generator to run the **town office** in case of an extended power outage.
- Sandbags, emergency planning, trained volunteers, planning exercises, home emergency plans, etc. are part of local emergency response

- Issues with **water or wastewater pipes** near the falls where a water main broke and had to be shut off. And a couple sanitary sewer lines broke by **Briggs Lane**, repaired it as it was before, it still needs repairs now.
- A sanitary sewer line 30 feet east of the railroad (near Maple Street?) that goes under the river is in danger of breaking. A manhole was overflowing there.
- Cornfield in rear part of Newton Road (away from Forest Dale) was damaged significantly when river flooded.
- **Mobile home parks** on Route 53 and Route 73 in Forest Dale are problem areas.
- Culvert under the road may become obstructed which may compromise the integrity of the **railroad embankment**.

Effective Hazard Mitigation and Risk Reduction

What worked structurally and what has already been done since Irene to protect infrastructure and to reduce risk to businesses?

Notes

- Need to **stabilize the river bank** to prevent more corn field damage (upstream from the golf course). **Tree plantings** have recently been done in that area for that purpose and that there is a **conservation easement** and some current use program work done as well.
- The town has adopted a fluvial erosion hazard (FEH) zone and is enrolled in the National Flood Insurance Program (NFIP). Ethan Swift from the Town will sit down with Rutland Regional Planning Commission (RRPC) and map damaged areas.
- Land **behind Park Street**/Brandon Inn acted as a floodplain during TS Irene. A question arose about development of the floodplain, it is usually discouraged to develop in the floodplain. Josh Carvajal of Agency of Natural Resources shared that the town allows development in the floodplain, but it could go beyond the state's minimum standards.

Resiliency and Sustainability Planning

What still needs to be addressed in the interests of long-term security and sustainability?

Notes

- Something should be done so the golf course doesn't have to be rebuilt after each flood event. Maybe use the **driving range as a catch basin** by berming both ends?
- What are we really trying to protect? The town core?

- Information has to be available very quickly in an emergency situation.
- How did Dot's Restaurant in Wilmington come back so fast after TS Irene? Thought maybe there was some public monies used. The answer from Commissioner Mackay was that they had insurance and help with engineering from the Preservation Trust and a state historic tax credit program.
- **Could Green Mountain Power help move a power source/pole at the wastewater treatment plant that is very close to the river bank?** Moving it would be good, and the bank has been armored there. By the wastewater plant there is lots of erosion, need to continue to stabilize the bank.
- On North Street, TS Irene uncovered an unknown box culvert next to the bridge giving the idea that more capacity is needed here to handle water coming out of the mountains. The trailer park owners there filled it back in, the **mobile home park is in a bad spot**. They are now rebuilding a trailer there about one foot higher than before. Is there suitable land where the mobile home park could be relocated?
- Wheeler Road bridge, funds are needed to do a study for a **bigger bridge**.
 - Wheeler Road floods on a regular basis. Would have to raise the road, don't remember Wheeler Road flooding in the past the way it does now.
 - May be due to more development and impervious surfaces.
 - Historically the river was dredged along Wheeler Road, have found a couple of agricultural drainage ditches no longer in use.

Information Sharing and Dissemination

What information should the final report include and how should this information be presented?

Notes

- **Proactive projects that the town has already completed** need to be organized and shown in the report when the town is applying for competitive grants. This will also help showcase the work done by the community.
- The Planning Commission could look into **restricting development in the floodplain** using ANR model regulation language as a guide.
- Why is it that businesses can reopen but not the town office? The response from commissioner MacKay was that the town had a lot of responsibility after TS Irene that businesses didn't have to address.
- There are **mitigation techniques for historical buildings** including floodproofing.

- New office should be designed with flood mitigation in mind, want to apply for Community Development Block Grant.
 - An emergency plan helps the town more than the businesses.
 - The town continues to update its Local Emergency Operations Plan as required.
- **Lessons learned/advice regarding emergency operations** (not just for flooding but other types of disasters too).

Vermont Economic Resiliency Initiative (VERI)

Community Forum - Village of Brandon

MEETING NOTES

April 6, 2015 – 7:00 – 9:00 PM

VERI Project Overview

With funding from the [US Economic Development Administration](#) (EDA), the Vermont Department of Housing and Community Development, working with the Agencies of Natural Resources and Transportation and the Regional Planning Commissions, launched the Vermont Economic Resiliency Initiative (VERI) to help ensure Vermont remains open for business when disaster strikes. VERI will help the state and local communities by evaluating local flood risk to business and infrastructure, and identify the steps communities and the state can take to minimize rebuilding and recovery costs and ensure businesses stay open – saving jobs and maintaining our economy.

For More Information

http://accd.vermont.gov/strong_communities/opportunities/planning/resiliency/VERI/Brandon

Summary

15 community members, business owners, and town officials from the Neshobe River watershed attended the second VERI community forum in Brandon. The forum showcased 13 high priority projects which could significantly decrease flood risk for Brandon, if implemented. Community members were given the opportunity to ask questions, provide input, and rank the proposed projects. The projects which the community most supported included: the installation of an overflow culvert on Route 7, the removal of a berm in Forest Dale, and floodproofing downtown businesses. Integrating these projects into the town bylaws, policies, and plans will help Brandon to be safer and more resilient to future floods.

Welcome and Overview

[Noelle MacKay, Commissioner of the Department of Housing and Community Development]

Noelle MacKay provided background information on the VERI project and talked about a successful project in [Bennington](#) that led to this project. She also explained the process for selecting the five towns included – each town demonstrated an intersection between flood risk, economic activity and at-risk infrastructure. Brandon was selected as a VERI pilot community because it has an active

downtown, a major commercial core, it already has done a lot as a community flood resiliency planning, and it has existing river corridor maps. Noelle went over the agenda for the evening and emphasized the importance of community input on the proposed flood reduction projects. The Agency of Commerce and Community Development will work with partners to help identify funding sources once priority projects are chosen. It was noted that Brandon is also currently working on town plan and zoning code updates, so we hope the town will consider some of the municipal plan and policy recommendations in the update.

Overview of Municipal Policies and Programs to Reduce Future Floods

[Ed Bove, Executive Director of the Rutland Regional Planning Commission]

Ed Bove spoke about the town's current efforts to help businesses recover more quickly from disaster. Brandon is one of three towns in the Rutland Region that qualifies for the highest reimbursement available by the State Emergency Relief and Assistance Fund (ERAF) at 17.5%.

Ed described the physical location of the study area. He spoke about the Brandon town plan and the ways it addresses flood hazard areas, including the newly required flood resilience element. Ed suggested that lands such as floodplains, upland forests, and steep slopes should be identified for conservation in the town plan.

Recommendations for the town's land use bylaws included: prohibiting fill in the floodplain, requiring improvements to structures to undergo conditional use review, and not including high slopes, wetlands, etc. in density calculations for new development. Ed also discussed improvements to the town's hazard mitigation plan, including the importance of noting past disaster damages to facilitate reimbursement in the event of another disaster.

Overview of Project Recommendations and Conceptual Designs

[Evan Fitzgerald, Principal Watershed Scientist at Fitzgerald Environmental Associates, LLC]

Evan Fitzgerald gave a brief overview the Neshobe River assessment to date, and he spoke about how he relied on local knowledge, feedback from state agencies, and past river studies to enhance his findings.

Evan explained each of the 13 site specific-project recommendations for Brandon. The site-specific projects were divided into four categories: Building and Site Improvements, Channel and Floodplain Management, Infrastructure Improvements, and Public Safety Improvements. Two projects, the

Forest Dale berm removal and Wheeler Road embankment failure were looked in depth and conceptual plans were developed for each.

Channel and Floodplain Improvements: These are projects that lower the risk of flooding and erosion to properties along the river through the improvement of natural river and floodplain functions. High priority recommendations in this category include:

- The removal of an old berm along the river in Forest Dale. Removal would allow greater access to the floodplain, decreasing the speed of water and debris entering the downtown.

Notes and Responses from the Public: The river is very different in Forest Dale than in downtown Brandon. In Forest Dale, the river is much more confined and has a steep gradient as it comes out of the mountains. Protecting undeveloped floodplain between Forest Dale and the downtown is crucial to help alleviate downstream flooding issues.

Infrastructure Improvements: These are projects that lower the risk of flooding and erosion to utilities, roadways and other municipal or state-owned infrastructure. High priority recommendations in this category include:

- Installation of an overflow box culvert in downtown Brandon was the highest priority recommendation.

Notes and Responses from the Public: When the river reaches a certain level, it begins to divert into the overflow pipe lessening what would flow under the town and through the double bridge on Route 7. The town has been pursuing funding for design and engineering of the overflow culvert and would like to coordinate it with the work on Route 7, segment 6.

- Upsizing the North Street Bridge and the Wheeler Road Bridge. Both of these structures are outdated and undersized compared to the average width of the river channel. The small mobile home park near the North Street Bridge should also be considered for relocation.

Notes and Responses from the Public: People were concerned that the debris could build-up near these bridges and destroy the downtown. They have more of a localized effect, however, and would not create a buildup of water that could potentially be released at once and head towards the downtown.

- Bank stabilization for failure encroaching upon Wheeler Road - erosion is right up to the road and the road embankment is 35 feet tall. The conceptual design for the bank includes terracing with coir logs and leaving in place existing vegetation and woody debris.

Notes and Responses from the Public: Bank failure would shift the erosion downstream and perhaps cause more issues. If it does, the river downstream bends away from the road and potential impacts on infrastructure would be much less, if at all.

- Relocation of the Waste Water Treatment Facility (WWTF)

Notes and Responses from the Public: The WWTF is located in the floodway. It has extensive rock armoring already in place to protect the roadway, but it is on a sharp bend in the river, has a crucial utility pole in the floodway, and the bridge in front of the facility is undersized. It has sustained repetitive damage throughout the years (built in 1960) and a plan for long term stabilization or relocation needs to be set in place. The State Revolving Loan Fund might be able to be used to fund this work.

Building and Site Improvements: These are projects which lower the risk of flooding and/or erosion to specific properties through improvements to the building and/or surroundings. High priority recommendations in this category include:

- Floodproof downtown buildings and businesses

Notes and Responses from the Public: The approximate cost to floodproof is \$10,000 per business. More resources for floodproofing will be made available on the VERI project web page and at the upcoming Downtown Conference in Burlington on June 6, 2015.

Public Safety Improvements: These projects lower the risk of flooding and erosion to properties through the avoidance of future flood risks (e.g., FEMA buyouts of properties highly vulnerable to flooding). High priority recommendations in this category include:

- There were no high priority projects in the public safety improvement category for Brandon

Project Prioritization

Sticky dots were handed out for people to place on the charts to prioritize project recommendations in Brandon. The town's ranking of the high priority projects can act as a road map for the town to follow moving ahead. The results of the project prioritization are below, in order of popularity - with number of sticky dots received in parenthesis.

1. Overflow culvert in downtown Brandon to prevent/reduce flood flows out of river channel and along Route 7. (16)
2. Remove berms downstream of VT Route 53 to store floodwaters and sediments in floodplain. (11)
3. Flood proof businesses in downtown. (10)
4. Stabilize embankment along Wheeler Road 800 feet south of Stone Mill Dam Road. (6)
5. Replace VT Route 53 Bridge with a larger span. (6)
6. Long term stabilization and/or relocation of the Waste Water Treatment Facility (WWTF) on Union Street, south of the village. (6)
7. Neshobe Golf Club Floodplain/Corridor Improvements. (5)
8. Consider buy outs for at-risk properties in flood and erosion hazard area. (5)
9. Replant floodplain and river corridor between Wheeler Road and VT Route 73; Consider conservation easements for long-term, permanent protection. (4)
10. Replace Wheeler Road Bridge with a larger span. (4)
11. Flood proof homes along Newton Road. (2)
12. Retain overflow structure next to VT Route 53 Bridge. (2)
13. Replant floodplain and river corridor west of Town Farm Road, Consider conservation easements for long term, permanent protection. (1)

Next Steps and Where to Get Help

The town of Brandon has already taken steps to make the town safer, and continuing with this effort is in everyone's best interest. The Brandon community can become more flood resilient by understanding the risks and developing bylaws, policies, plans, and projects which address those risks. Community members can help the town to:

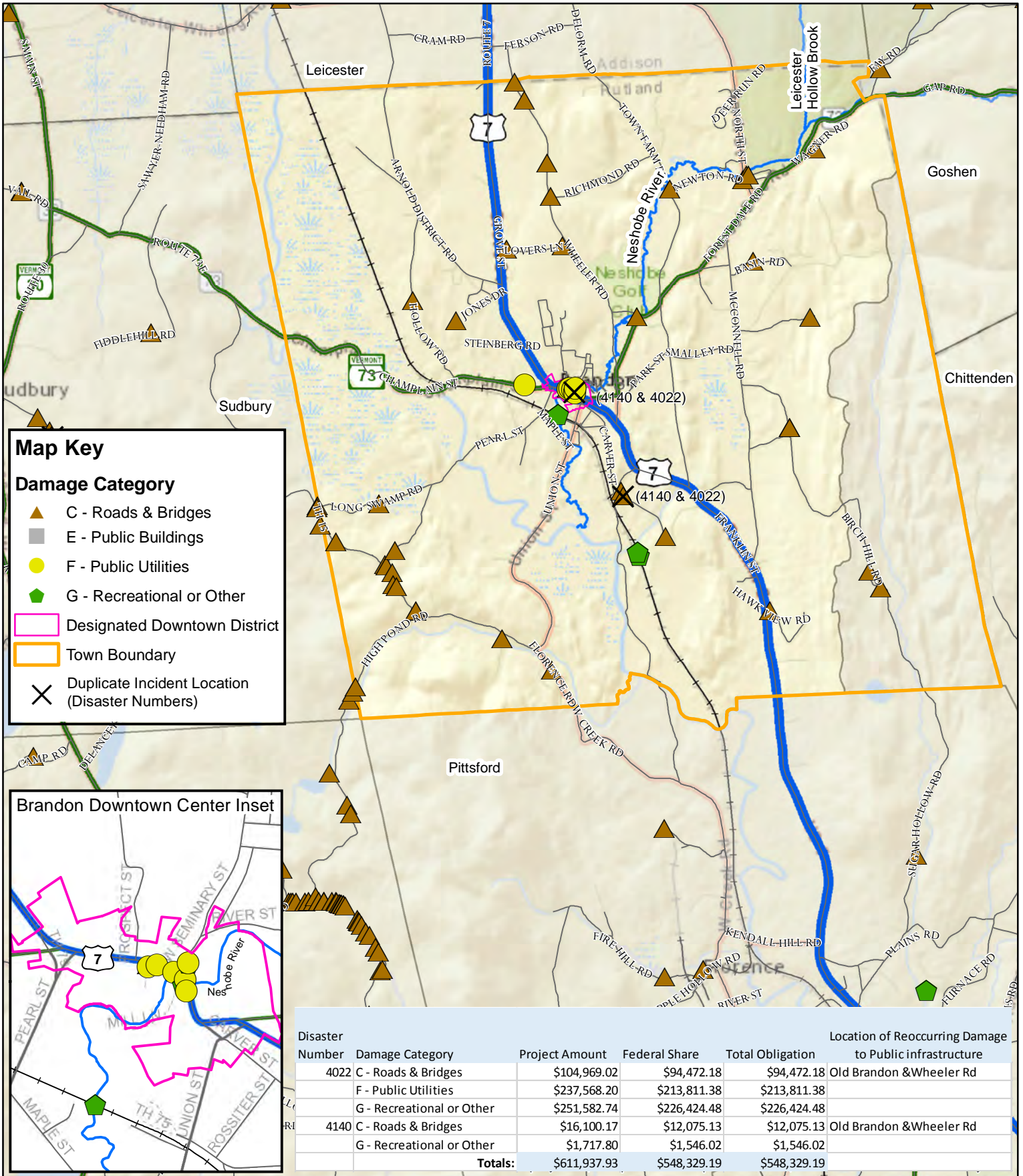
- Prioritize projects to better secure funding.
- Try to do a couple of projects per year, not all at once, to better identify resources and to build momentum.
- Know who owns your town's work plan- Select Board, Planning Commission, Fire Department or others.

Any comments or suggestions on the draft report can still be sent to Wendy Rice via the VERI website. The final report will be ready for distribution in late May.

Appendix I:

Maps of Repetitive Damage to Brandon

Neshobe River, Brandon, VT



Vermont Economic Resiliency Initiative [VERI]

Consultant Team



Fitzgerald Environmental Associates, LLC.
Applied Watershed Science & Ecology



MILONE & MACBROOM

*Engineering, Planning,
Landscape Architecture
and Environmental Science*



VERMONT

**AGENCY OF COMMERCE & COMMUNITY DEVELOPMENT
DEPARTMENT OF HOUSING & COMMUNITY DEVELOPMENT**