

# Rebuilding with Resilience

Lessons Learned  
After Tropical Storm Irene



Noelle MacKay

Commissioner  
Department of Housing &  
Community Development





# IMPACTS

Fatalities: 6

FEMA Registrations: 7,252

Rental Assistance: 1,350

Households < \$10K Damage: 1,050

Mobile Homes Damaged: > 450

FEMA Grants: \$22.7million

Financial Damage to Farms: > \$20 M

State Roads Closed: 146

State Bridges Closed: 34

Local Roads Damaged: 2,260

Local Roads Closed: 175

Local Bridges Closed: 90

Covered Bridges Damaged 12

Historic Buildings Damaged > 700











# RECOVERY & RESILIENCE



# ASK FOR GUIDANCE AND INPUT



Community Recovery Partnership

EPA Smart Growth Implementation Assistance



You have a voice in your town's flood recovery and this is your chance to share your ideas and help set local and state priorities.

**WHO:** Anyone who lives or works in the Towns of Grafton or Rockingham

**WHERE:** Phelps Barn at the Grafton Inn

**WHEN:** Tuesday | 12.06.11 | 6 – 8 PM

QUESTIONS? Contact the Windham Regional Commission — 257.4547 [wrc@sover.net](mailto:wrc@sover.net) or the Department of Economic, Housing & Community Development — 828.3211

**COMMUNITY RECOVERY PARTNERSHIP**

The State of Vermont's Community Recovery Partnership is a series of local conversations to help communities define what needs to be done in the near and long term to ensure the state successfully recovers and emerges from Tropical Storm Irene stronger and better than before.



What worked well?

What needs improvement?

What do you need for recovery efforts?



# Lessons Learned

1. Don't make assumptions
2. Preparation makes a difference
3. Communication is key
4. Partnerships are critical



# EPA SGIA: STATE POLICY REVIEW

## Vermont State Agency Policy Options Options Disaster Recovery and Long-Term Resilience Planning in Vermont

44 recommendations covering  
both interagency and agency-  
specific policy options

**Vermont State Agency Policy Options**  
Smart Growth Implementation Assistance Program:  
Disaster Recovery and Long-Term Resilience Planning in  
Vermont





# EPA SGIA: LOCAL POLICY REVIEW

## Overall strategies to enhance flood resilience:

1. Conserve land and discourage development in river corridors
2. Protect people, buildings, and facilities in vulnerable settlements
3. Plan for and encourage new development in safer areas



EPA 231-R-14-003  
July 2014  
[www.epa.gov/smartgrowth](http://www.epa.gov/smartgrowth)

## PLANNING FOR FLOOD RECOVERY AND LONG-TERM RESILIENCE IN VERMONT:

Smart Growth Approaches for Disaster-Resilient Communities



Office of Sustainable Communities  
Smart Growth Program



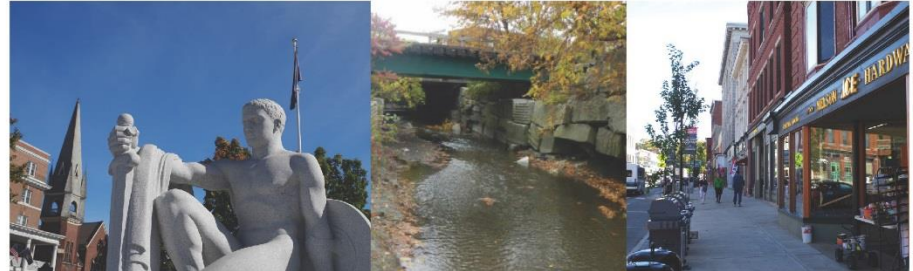
# JUST DO IT

Vermont Economic Resiliency Initiative (VERI)  
State Policy and Program Updates



# VERI

Investigating where risk, economic activity and associated infrastructure intersect and identifying ways to avoid, mitigate and reduce the risk.



## Vermont Economic Resiliency Initiative

Barre  
Community Forum

**Monday, October 27, 2014 - 6:00pm to 8:00pm**

Aldrich Public Library – Light Refreshments Provided

### How will Barre business bounce back Gunners Brook Flooding?

The Vermont Department of Housing and Community Development and its partners needs your help identifying the risks to businesses and infrastructure due to flooding from Gunners Brook and your ideas for solutions.

**Why:** To minimize rebuilding and recovery cost and ensure our businesses stay open

**Who:** Anyone who lives, works or owns a business in Barre City or Barre Town

**When:** Monday, October 27, 2014 from 6 pm to 8 pm, moderated by DHCD Commissioner Noelle MacKay

**RSVP:** October 22, Dan Currier: [currier@cvregion.com](mailto:currier@cvregion.com) or (802) 229-0389

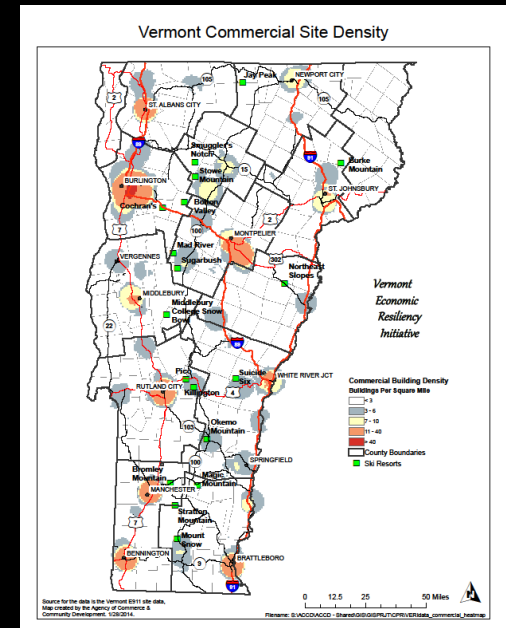
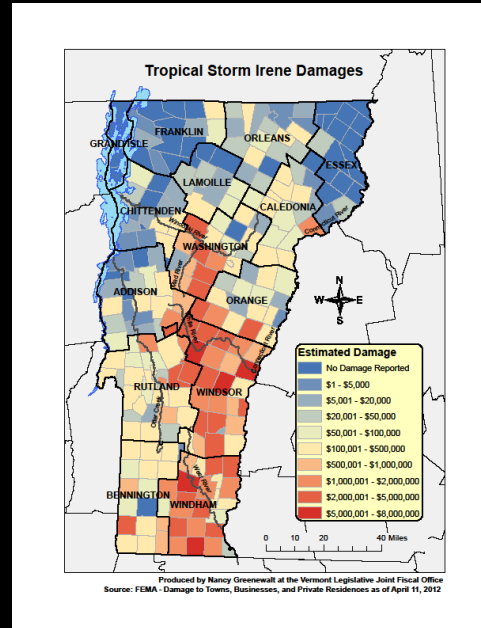
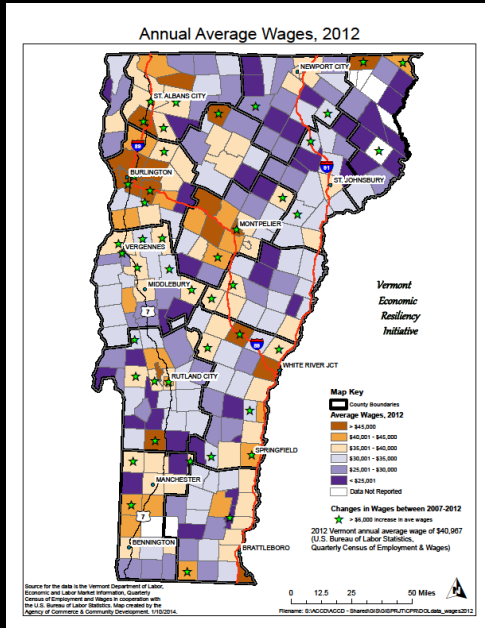
**To learn more:** [accd.vermont.gov/strong\\_communities/opportunities/planning/resiliency/VERI](http://accd.vermont.gov/strong_communities/opportunities/planning/resiliency/VERI)

**Questions:** Contact [Chris.Cochran@state.vt.us](mailto:Chris.Cochran@state.vt.us) or (802) 828-5212





# VERI



**STEP 1: Identify Risk Statewide**

**STEP 2: Identify Areas of Economic Activity and Associated Infrastructure Statewide**

**STEP 3: Identify 5 Communities**

# STEP 1: Field Investigation





# STEP 2: Local plan and policy review



## 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](http://www.epa.gov/smartgrowth/sgia_communities.htm#rec1).

### What is the Flood Resilience Checklist?

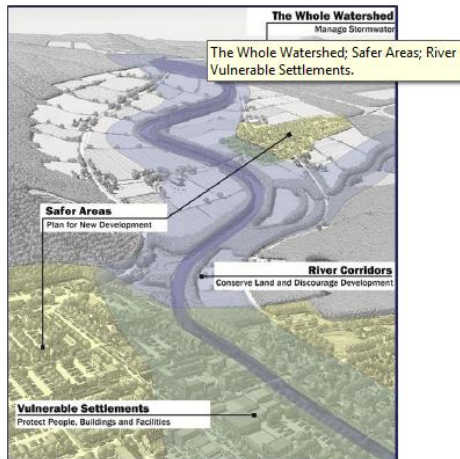
This checklist includes overall strategies to improve flood resilience as well as specific strategies to conserve land and discourage development in river corridors; to protect people, businesses, and facilities in vulnerable settlements; to direct development to safer areas; and to implement and coordinate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

## 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](#))

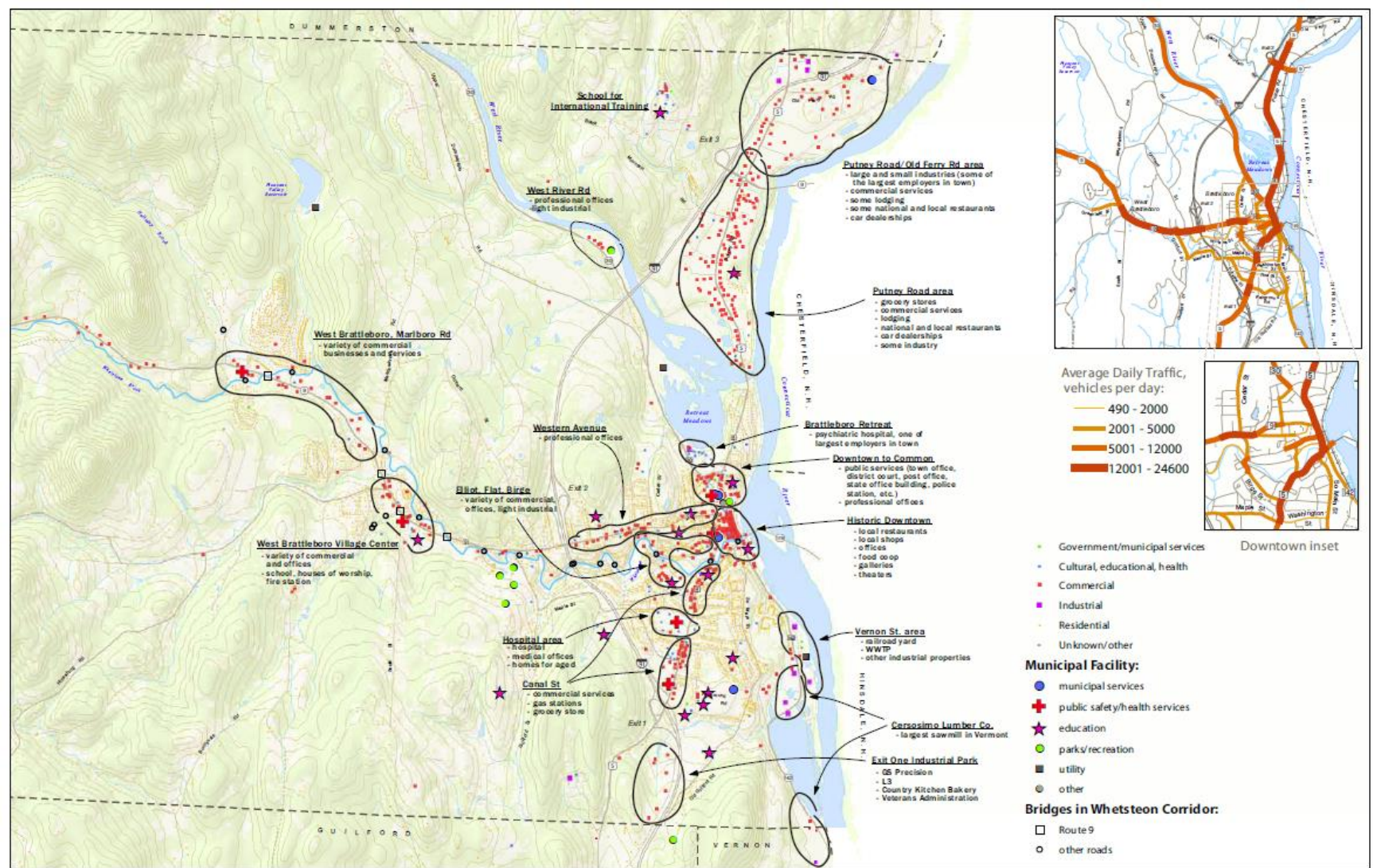
1. Does the community's comprehensive plan have a hazard element or flood planning section?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
a. Does the comprehensive plan cross-reference the local Hazard Mitigation Plan and any disaster recovery plans?	<input type="checkbox"/> Yes	<input checked="" 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 checked="" 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 checked="" 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 checked="" type="checkbox"/> No
a. Does the Hazard Mitigation Plan cross-reference the local comprehensive plan?	<input checked="" 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 checked="" 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 checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
d. Were other local governments in the watershed involved to coordinate responses and strategies?	<input checked="" 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 checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
f. Does the Hazard Mitigation Plan encourage using green infrastructure techniques to help prevent flooding?	<input checked="" 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 checked="" 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 checked="" type="checkbox"/> No

# STEP 3: Gather Community Input



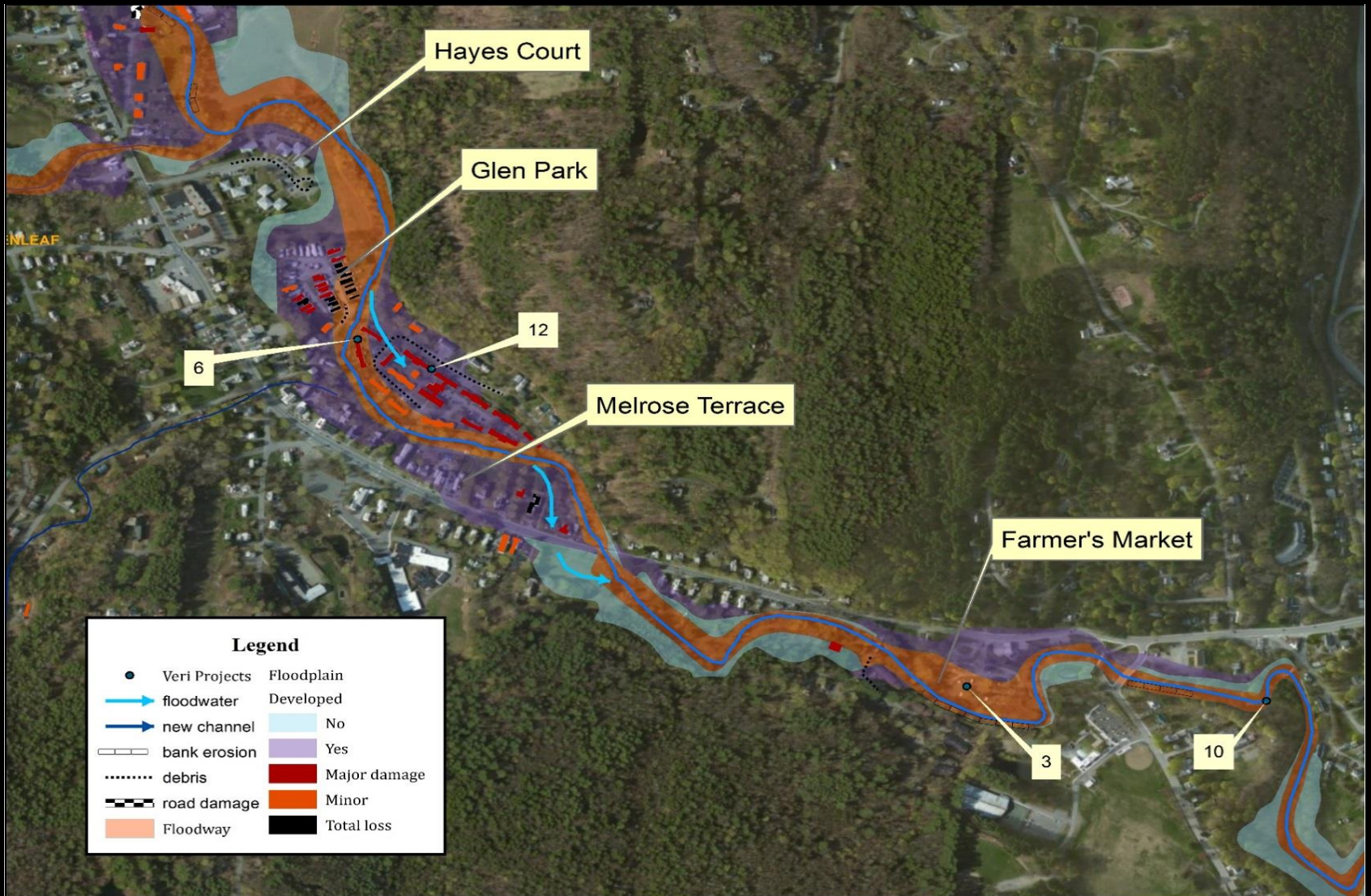


# STEP 4: Map Local Economic Activity






# STEP 4: Overlay Hazard Areas


























# STEP 5: List Recommendations

**Brattleboro Preliminary Hazard Mitigation Strategies**  
 Vermont Economic Resiliency Initiative (VERI)  
 Agency of Commerce and Community Development  
 December 26, 2014

Legend					
	Effective		Limited		Ineffective

\* Priority rating based on objectives and potential business impact

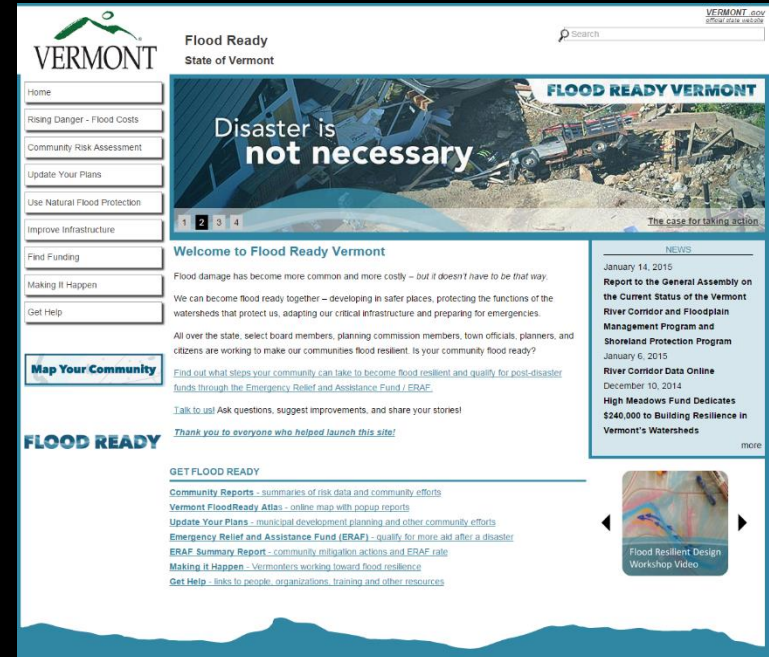
Project	What is At Risk?	Potential Business Impacts	Priority*	OBJECTIVES			Feasibility			Comments
				Reduces Flood Risk <sup>1</sup>	Reduces Erosion Risk <sup>2</sup>	Protects Businesses, Infrastructure, and Property	Ease of Implementation	Cost Range	Estimated Time for Implementation	
<b>Flood Resilient Transportation and Utilities</b>										
Remove channel blocking sediment upstream of the downstream Williams Street Bridge (see site 15)	Town bridge and road; secondary transportation network	>25 businesses and 100 employees	High				Easy	<\$10K	1-2 years	103' span can adequately pass bankfull+ events (67') if right channel is cleared out. The bridge was closed for a couple of weeks after scour from TS Irene undermined the east abutment. VTRANS bridge inspection on 6/19/14 also recommends removing the gravel and doing other maintenance. Bridge pier and alignment need adjustment to improve sediment transport.
Realign Route 9 bridge or realign the river (see site 5)	State highway and bridge	>25 businesses and 100 employees	High				Moderate	\$100K-\$200K	2-5 years	This bridge is 50% of the bankfull channel width and is misaligned. The left bank is eroding and required repair after Tropical Storm Irene.
Stabilize utility poles along river corridor (see site 14)	Power and communications	>25 businesses and 100 employees	Medium				Easy	\$50K-\$100K	2-5 years	Utility pole in stream channel east of I91 crossing where the road was damaged and the sewer line broke during TS Irene.
Remove sewer and water lines within the river channel at locations throughout the project area (see site 13)	Businesses and residents of Brattleboro	>25 businesses and 100 employees	High				Difficult	>\$25 million	>5 years	Public health and risks to businesses require responsible location of the sanitary sewer and water lines.
<b>Improve Public Safety</b>										
Seek buyout of mobile home units from the floodway; remove berm (see site 4)	Mountain Home Mobile Home Park	Affordable housing	High				Difficult	>\$400K	>5 years	Maintaining affordable housing units in the floodway and floodplain puts the most vulnerable in harms way.
Seek buyout of all 14 structures located entirely in the floodway; remove berms (see site 10)	Glen Park Mobile Home Park	Affordable housing	High				Difficult	>\$200K	>5 years	Maintaining affordable housing units in the floodway and floodplain puts the most vulnerable in harms way. This was priority project #5 in the corridor plan.
Seek buyout of 9 mobile homes and 2 accessory buildings from the floodway (see site 6)	Mountain Home Mobile Home Park	Affordable housing	High				Difficult	\$100K-\$200K	>5 years	Maintaining affordable housing units in the floodway and floodplain puts the most vulnerable in harms way. This was priority project #4 in the corridor plan.

<sup>1</sup>Reduces Flood Risk - The proposed mitigation strategy lowers the flood level.

<sup>2</sup>Reduces Erosion Risk - The proposed mitigation strategy lessens the vulnerability of a location to erosion.

# WHAT VERMONT IS DOING...

1. Rivers to Roads training program
2. State floodplain rule in Development
3. Rule to regulate stream alteration and emergency stream work implemented
4. Statewide River Corridor map layer in development
5. Towns required to have resiliency element in plans
6. ERAF incentives in place
7. New Flood Ready website





*“At meeting after meeting I was moved by the strength of those who had lost their homes, livelihoods and, in some cases, entire communities. And at how grateful they were that we were there to listen and, yet reluctant to ask for help. It made me realize the importance of looking past that strength to see the true urgency of what survivors need. The state must be prepared to help, whenever they are ready to ask for it.”*

- Jennifer Hollar, DHCD

# THANK YOU

Noelle MacKay

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