Chapter 3

Screening Process: 251 to 5

Chapter 3

Overview

Once the data sets were collected and maps developed to illustrate flood risk and economic activity, the project team developed a screening process to select five communities for further analysis. The next step was to conduct a more detailed, on-the-ground analysis and the development of specific recommendations to protect economic activity and associated infrastructure in those communities. This chapter provides an overview of the screening process, along with the reasoning and alternatives considered to help other states and regions focus on areas with the greatest need and impact. See Figure 3.3 for a step-by-step summary of the screening process.

Step #1: Economic Activity Screen

As discussed in the previous chapter, along with secondary information, the primary data sets used to evaluate state-wide economic activity included:

- ***Number of Establishments,*** 2012 (VT DOL data). The number of work sites (e.g., farms, factories, or stores) per town that produce goods or provide services through one type of economic activity.

- ***Annual Average Employment***, 2012 (VT DOL data). The number of jobs in each town. The annual average of the monthly employment figures in each town, as reported by covered employers. These data exclude self-employed people, most farms, some non-profits, churches, rail workers, elected officials, student workers, and officers and family members of sole proprietorships or partnerships.

- ***Total Wages***, 2012, (VT DOL data). The total of all wages paid by reporting establishments in each town.

- ***Rooms Sales Tax***, 2012, (VT DOT data). This was used as a proxy for the tourism sector of the economy.

The project team identified three options for an economic activity screening methodology for the towns in Vermont. The three options were as follows:

- *Create a linear index:* Assign a town score for each of the primary economic measures on a scale of 1 to 10 and then add together the scores for each town, resulting in a score between 1 and 40.

- *Assign a dollar value to each town's economic activity:* Take the total wages per town (which would incorporate measures 1 through 3 above), add the dollar value of sales & use taxes and meals & rooms taxes, and use the combined dollar amount to rank-order each town from high to low.

- *Use a hybrid method:* Utilize a combination of the above options.

To determine the pros and cons of each approach, the project team consulted with Susan Mesner, an economist and the Vermont Deputy State Auditor, and Jeff Carr, the Vermont State Economist, and incorporated their comments into the ranking methodology. In their expert opinions, both agreed that the linear index methodology would work best and meet the needs of this project. The screen was then used to rank the relative economic activity level for the towns in Vermont.

Methodology: Linear Index for Economic Activity

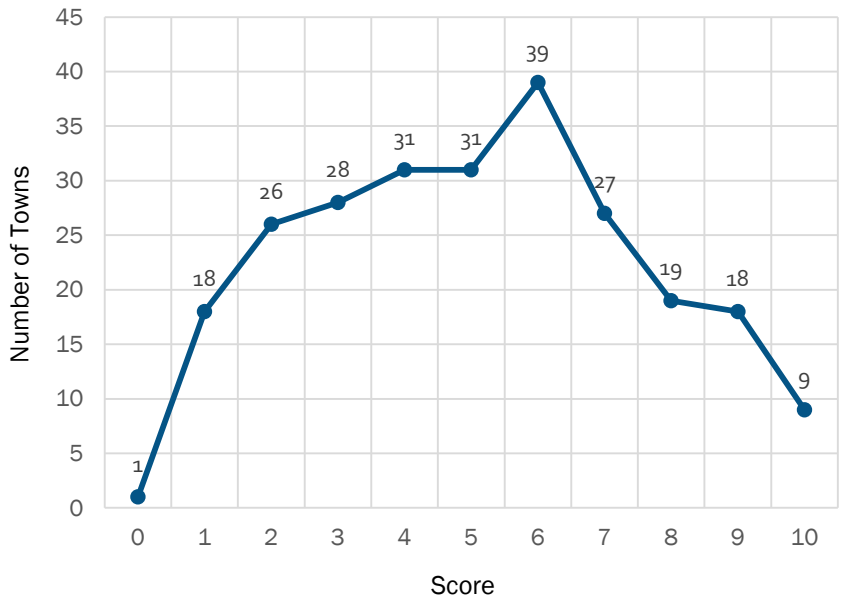
For each of the four data sets, towns were grouped into 'bell shaped' tranches to review the distribution and simplify the next steps. A score between 0 and 10 was assigned to each range.

Table 3.1: 2012 Annual Average Number of Establishments

Range	Score	Number of Towns with Rank
600-1,519	10	9
200-599	9	18
125-199	8	19
80-124	7	27
40-79	6	39
28-39	5	31
21-27	4	31
13-20	3	28
6-12	2	26
1-5	1	18
0	0	1

The table and associated graph for the annual average establishments is illustrated in Table 3.1 and Figure 3.1 and the corresponding tables and graphs for the other three economic data sets can be found in Appendix 3.1.

Figure 3.1: 2012 Annual Average Number of Establishments



Each town was then assigned a score in each of the economic measures on a scale of 0 to 10 depending on where they were in the range. Table 3.2 illustrates the results for the first eight towns in alphabetical order. Then the four scores were added together for a score of between 1 and 40 for each town. The team developed a list of the top 82 towns (as shown in Appendix 3.2).

Table 3.2: Total Economic Scores and Rank for Vermont Municipalities

Town	Establishment Score	Employment Score	Total Wages Score	Rooms Sales Score	Total Score	Ranking
Addison	6	5	5	2	18	99
Albany	3	3	2	0	8	192
Alburgh	6	5	5	4	20	82
Andover	3	2	2	0	7	198
Arlington	7	7	7	6	27	31
Athens	1	0	0	0	1	238
Averill	1	1	1	0	3	232
Bakersfield	2	3	2	0	7	199

Step #2: Infrastructure Vulnerability Screen

To identify towns that have the most infrastructure that is vulnerable to hazards, the VERI project team combined river corridor data with the following four transportation infrastructure data sets discussed in Chapter 2:

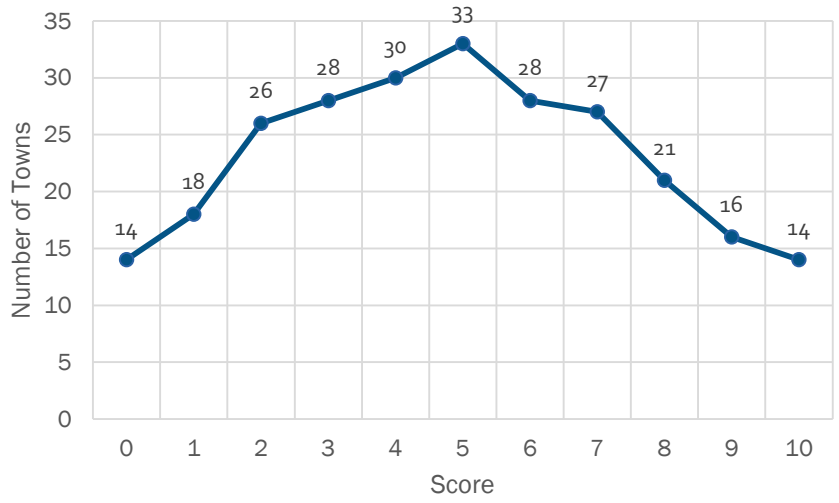
- Number of bridges having spans of less than bankfull width. These data show bridges that are too narrow to pass the flow of water from an annual or semi-annual flood event.
- Number of federal aid road miles (federal roads, state Class 1 roads and many state Class 2 roads) in river corridors. Federal aid roads are those that are most likely to be used to transport goods and services.
- Number of federal aid road miles in high river erosion areas. High erosion and deposition areas are more likely to experience flooding that destroys a road, rather than temporarily making it impassable.
- Number of federal aid road miles in high river deposition areas.

As with the economic activity rankings, the project team assigned a town score for each of the four infrastructure vulnerability data sets on a scale of 0 to 10. The table and figure (Table 3.3 and Figure 3.2) show results for number of federal aid road miles in river corridors and the other three can be found in Appendix 3.3. To do this, the values in each data set were sorted from high to low, and sub-groups were created based on a bell curve distribution as with the economic activity data sets.

Table 3.3: Miles of Federal Aid Roads in River Corridors

Range	Score	Number of Towns Having This Rank
34-88	10	14
26-33	9	16
21-25	8	21
10-20	7	27
5-9	6	28
3-4	5	33
1.75-2	4	30
.75-1.74	3	28
.4-.74	2	26
.01-.3	1	18
0	0	14

Figure 3.2 Miles of Federal Aid Roads in River Corridors



Scores for each town were then added together for each town, resulting in a total score between 1 and 40, with 1 representing towns will the least vulnerable infrastructure, 40 with the most vulnerable infrastructure. From this, a list of the top 75 towns with the most vulnerable infrastructure was developed and can be found in Appendix 3.4. Table 3.4 shows the first eight towns on that list.

Table 3.4: Total Infrastructure Vulnerability Scores and Rank for Vermont Municipalities

Town	Federal Aid Roads in River Corridor Score	Bridges with Spans Less Than Bankfull Width Score	Highway in High Erosion Score	Highway in High Deposition Score	Total Score	Rank
Bethel	10	10	10	9	39	1
Barnet	9	10	9	9	37	2
Barton	10	10	8	9	37	3
Bennington	7	10	9	9	35	4
Bradford	9	8	9	9	35	5
Brattleboro	10	8	9	8	35	6
Hartford	10	10	10	5	35	7
Arlington	7	8	9	10	34	8

Step #3: Commercial Building Vulnerability Screen

The project team also wanted to evaluate a direct risk to businesses and used the number of non-residential buildings in river corridors, based on E-911 site data as an indicator of this risk.

Eighty-five towns were found to have 10 or more non-residential buildings located in the river corridor. Montpelier has the most with 300, followed by Barre City with 169 and Springfield with 154. The top ten can be found in Table 3.5, with a complete list of all 85 towns and a map of commercial site density found in Appendix 3.5.

Table 3.5: Top 10 Vermont Municipalities for At-risk Businesses

Town	Number of Non-Residential Buildings in the River Corridor
Montpelier	300
Barre City	169
Springfield	154
Woodstock	140
St. Johnsbury	126
Ludlow	84
Bennington	80
Brattleboro	73
Manchester	69
Wilmington	69

Step #4: Combining Economic, Infrastructure and Building Screens

Based on the above screening, the project team had three lists for the top municipalities in Vermont ranked from highest to lowest for:

- Economic Activity
- Infrastructure At-risk
- Non-residential Buildings At-risk

Reviewing each list, it was determined that 34 Vermont towns appeared on all three list. They were centers of economic activity that had infrastructure and non-residential buildings vulnerable to flood hazards. Next, the list of 34 communities needed to be reduced to five.

Two towns were eliminated - Bennington and Waterbury - as they had or were in the process of conducting a similar analysis, resulting in flood hazard mitigation activities that are planned or completed. This reduced duplication of efforts and allowed more towns in Vermont to benefit. A table of the 32 towns that were candidates for VERI's Priority Area Designation is included in Appendix 3.6.

The project team applied secondary criteria to determine the final list. The following criteria were noted in the review table:

- ***The size of the community*:** to ensure communities of different (small, medium and large) sizes based on population were represented in the five priority communities.

- ***Geographic distribution*:** to ensure various areas of the state were represented.

- ***The key economic activity:*** in Vermont, tourism and agriculture are key areas of economic activity and it was important to include communities representing these sectors.

- ***Home to a key employer (i.e. hospital, higher education, large plant, etc.):*** based on the information received from the RDCs.

- ***Presence of a state designated downtown or village center:*** Vermont has established a framework of state "designations" to provide incentives to encourage communities to maintain Vermont's historic settlement pattern of compact centers surrounded by working lands. These programs are also designed to help align our environmental, housing, and transportation policies, programs, regulations, and public investments to maintain and enhance the landscape cherished by Vermonters and visitors alike. Designated communities receive priority funding consideration for various grants and implementation programs. These communities were noted as they have greater likelihood of receiving funding for implementation.

- ***Location of other critical infrastructure at risk*:** If the information was available, it was noted if the community had critical infrastructure (wastewater treatment plant or pipes, water treatment facility or pipes, high hazard dams, electric utility infrastructure, etc.) in river corridors or other hazard areas.

- ***Towns with digital parcel maps*:** This information could help with subsequent analysis for the community phase of the project and was noted if available.

- ***Towns where we have Phase 2 Stream Geomorphic Assessment (SGA) data or LiDAR data*:** As above, this information could help with the local watershed analysis and was noted in communities where available.

Table 3.6 captures the review process conducted for 10 communities. To review all 32, see Appendix 3.6.

Table 3.6: VERI Project Team Review For Identification of 32 Priority Communities

Town	Economic Activity Ranking	County	2011 Pop. Estimate	Infra-structure Vulnera-bility Ranking	Number of Vulnerable Commer-cial Buildings Ranking	Designated Downtown or Village Center	Critical Employer	Critical System Risk	SGA	Parcel Map	LiDAR	Other
Barre City	14	Washington	9,066	12	169	Downtown			Yes	2007	Yes	
Brattleboro	4	Windham	11,978	6	73	Downtown	Yes	Yes	Yes	2014	Yes	
Cambridge	20	Lamoille	3,695	26	35	Village			Yes	2006	No	Tourism
Enosburg	57	Franklin	2,800	65	10	Village			Yes	2014	Yes	Ag.
Hardwick	65	Caledonia	3,003	22	55	Village			Yes	2000	No	Ag.
Hartford	10	Windsor	9,952	7	45	Downtown			Yes	2014	Yes	
Ludlow	16	Windsor	1,963	43	84	Village			Yes	2014	No	Tourism
Montpelier	7	Washington	7,868	11	300	Downtown	Yes		Yes	2014	Yes	
Morristown	33	Lamoille	5,277	51	46	Downtown	Yes		Yes	2012	No	
Woodstock	19	Windsor	3,047	24	140	Village		Yes	Yes	2010	Yes	Tourism

Finally, the project team reviewed the list to identify communities that would be 'interested and enthusiastic' partners in this initiative. The team's thinking on this criteria was centered on its past experience with the community – would there be community buy-in, was there past support for flood resilience, and what was the history of success in implementing projects? These were all important considerations for the final five communities chosen. The team also relied on VT ANR's knowledge of the river reaches, flood history and any potential concerns or opportunities.

Project team members next reached out to the top five communities to explain the project, provide an overview of the expected deliverables, the time commitment and resources required from the community and invite them to participate.

Figure 3.3: Summary of VERI Screening Process

Step One: Create a linear index for economic activity

- For each economic data source, sort each town from high to low and break into ranges based on a bell curve. For Vermont, the project team broke it into ten ranges, each with an assigned score from 1 to 10.
- Assign each town a score of 1 to 10 for each of the data measured used. For Vermont, there were four (number of annual average establishments; average annual employment; total town wages; and room taxes).
- Add up the scores for each town.

Step Two: Create an index for transportation vulnerability

- For each transportation vulnerability data source, sort each town from high to low and break into ranges based on a bell curve. For Vermont, the project team broke it into ten ranges, each with an assigned score from 1 to 10.
- Assign each town a score of 1 to 10 for each of the data measured used. For Vermont, there were four (number of bridges having spans of less than bankfull width; number of federal aid road miles in river corridors; number of federal aid road miles in high erosion areas; number of federal aid road miles in high river deposition areas)
- Add up the scores for each town.

Step Three: Determine number of vulnerable non-residential buildings

- Determine the number of non-residential buildings at risk based on E-911 data of these buildings overlaid with ANR's river corridor map.
- Rank from highest to lowest

Step Four: Identify the communities on all three lists.

Step Five: Eliminate any communities that have completed or have funding for similar projects.

Step Six: Screen the list for other factors.

- The screen included size of the community; home of key employer; presence of a community center; other infrastructure such as sewer, water or power at risk; parcel mapping, and LiDAR. Also considered was if the community would be interested partners and had a track record of implementing projects.

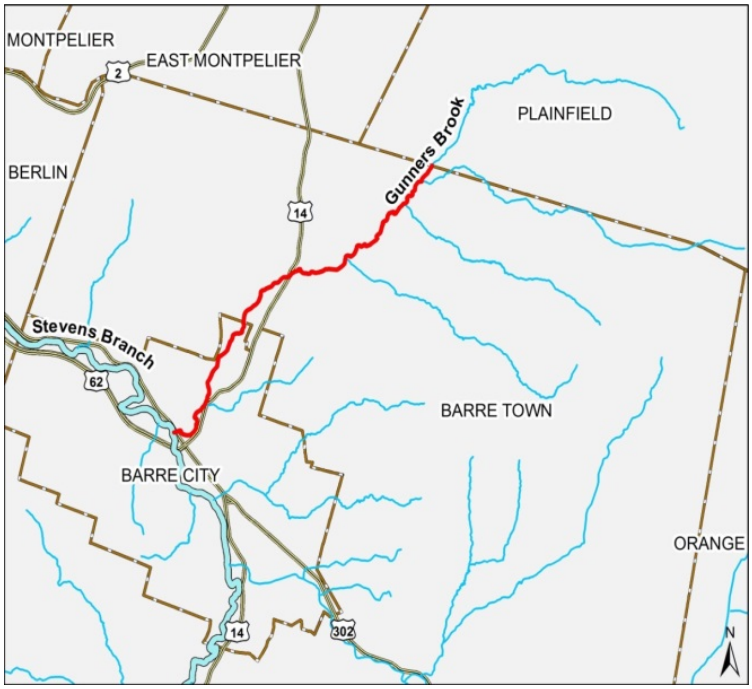
Step Seven: Pick top communities to study.

The Final Five Regions Chosen:

Based on the scoring, in depth review and discussion of secondary factors, the following five areas within seven municipalities were chosen:

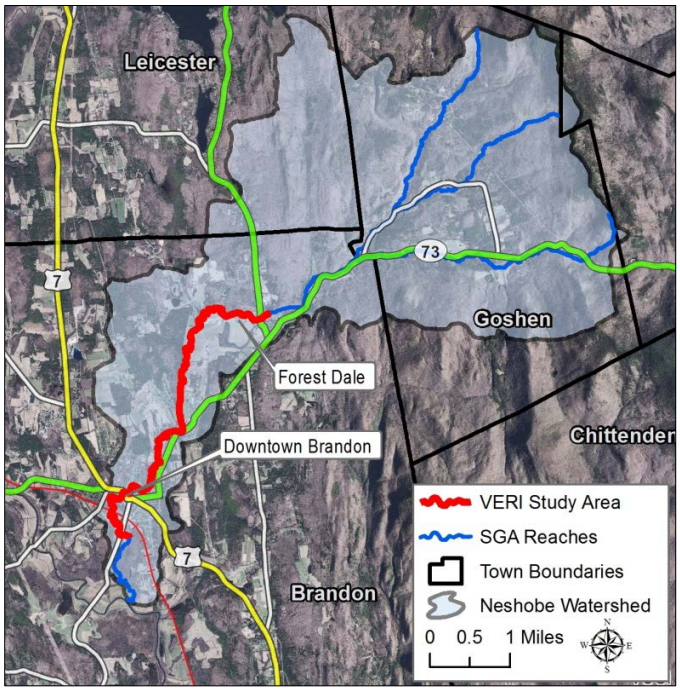
Gunners Brook in Barre City and Barre Town: Approximately 3.0 river miles of Gunners Brook from the Barre town line to Stevens Branch in Barre City. This area was selected because it is a designated downtown, has an unusually high level of development adjacent to the channel, significant economic activity, and history of repeated flooding and flood damages. The communities have worked to identify and manage flood risks through adoption of floodplain regulations and hazard mitigation plans.

Figure 3.4: Map of Barre Study Area



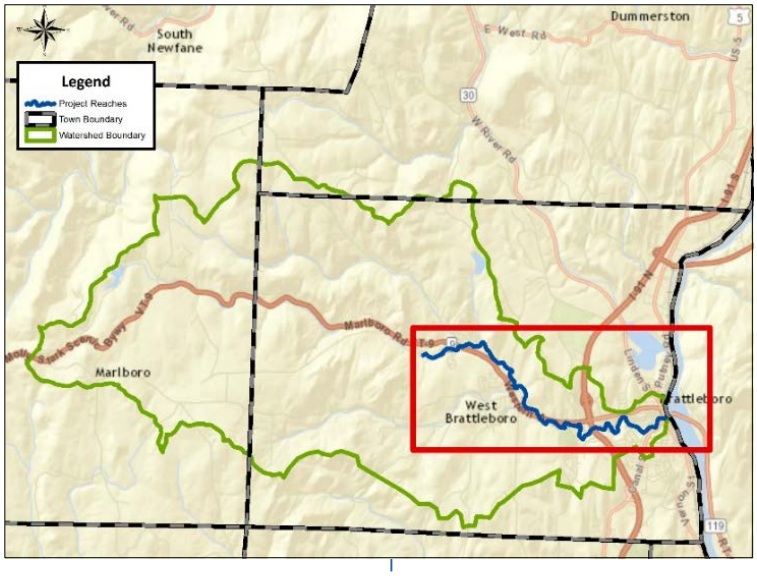
The Neshobe River in Brandon: Approximately 5.0 river miles from the confluence of Leicester Hollow Brook through Brandon Village. Brandon was selected because it has a densely developed designated downtown area with significant economic activity and critical transportation infrastructure and commercial 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.

Figure 3.5: Map of Brandon Study Area



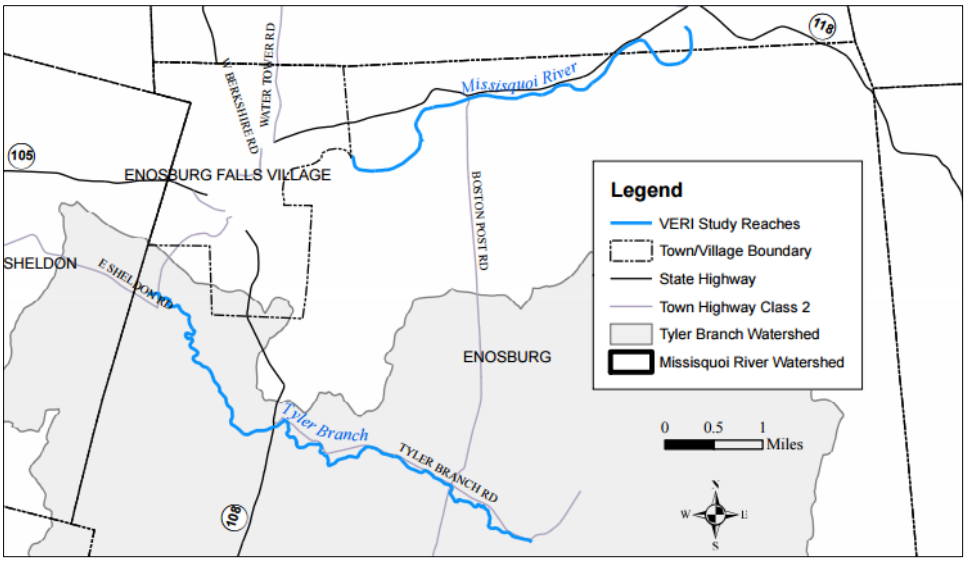
The Whetstone Brook in Brattleboro: Approximately 5.5 river miles from West Brattleboro to the confluence with the Connecticut River. Brattleboro was selected for the VERI project because of its role as a regional economic center – it has the fourth highest economic activity in the State (tied with Rutland). It is also located on Routes 5 and 9, critical north-south and east-west travel corridors that are particularly vulnerable to floods. Finally, Brattleboro has completed a number of flood protection projects identified in the 2008 River Corridor Plan and is working to floodproof many downtown buildings.

Figure 3.6: Map of Brattleboro Study Area



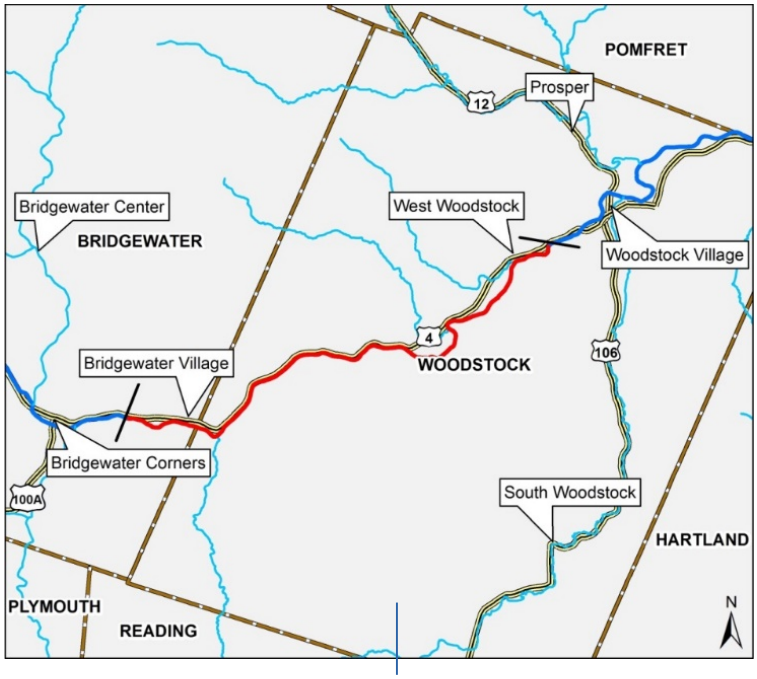
Tyler Branch in Enosburgh Town and Enosburgh Falls Village: Approximately 5.25 river miles from the confluence of Beaver Meadow Brook and Cold Hollow Brook to the town line. The Enosburgh Town and Enosburg Falls Village were selected as they represent an agricultural-based economy that is impacted by flooding and erosion. The community has worked to identify flood and erosion risks and projects are regularly implemented to strengthen the transportation network that is essential to access local farms and move agricultural products to market.

Figure 3.7: Map of Enosburg Study Area



The Ottauquechee River in Woodstock: Approximately 6.4 river miles of the main stem from Bridgewater Village to West Woodstock outside of Woodstock Village. Woodstock was selected as it has a densely developed downtown area with significant economic activity, critical transportation infrastructure and commercial buildings at risk of flooding and a history of community engagement, including past efforts to identify flood risks throughout the town. For example, the Town of Woodstock has adopted strategies for protecting new development and substantially improved buildings from flood hazards through regulations that offer greater protection to the community than the minimum National Flood Insurance Program (NFIP) guidelines. With its completion of a town hazard mitigation plan in 2015, the town and village now qualify for the intermediate level of state ERAF reimbursement (12.5%) for costs related to federally-declared disasters.

Figure 3.8: Map of Woodstock Study Area



Chapter 4 provides an overview of the in-depth work in each of these regions.

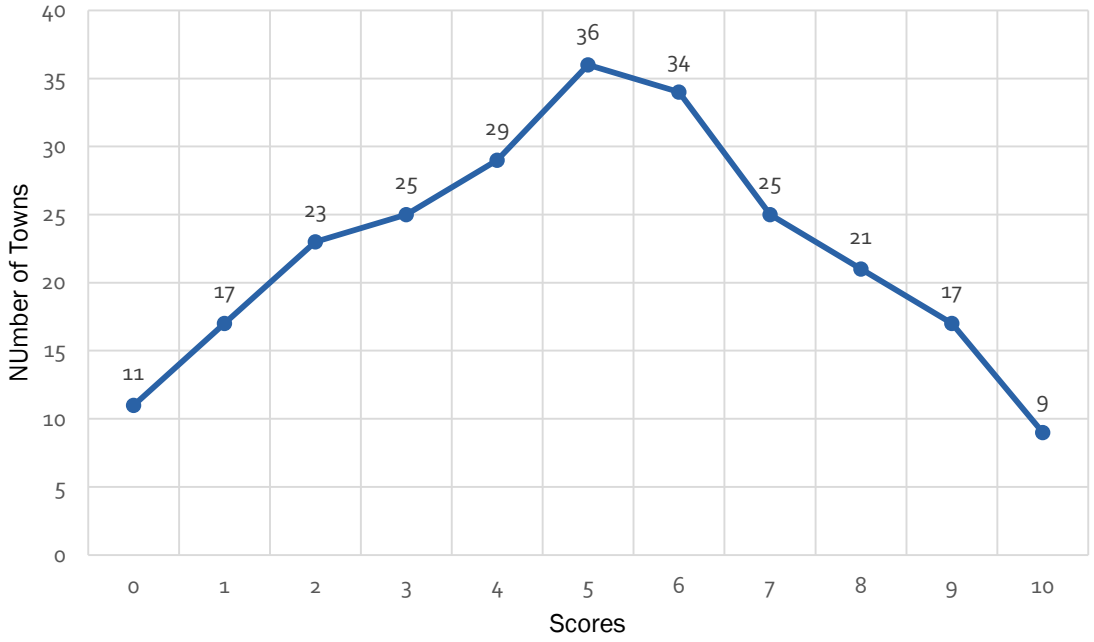
Appendix 3.1:

Annual Average Employment, 2012 (VT DOL data). The number of jobs in each town. The annual average of the monthly employment figures in each town, as reported by covered employers. These data exclude self-employed people, most farms, some non-profits, churches, rail workers, elected officials, student workers, and officers and family members of sole proprietorships or partnerships.

Table 3.7: Annual Average Employment (2012)

Range	Score	Number of Towns With Rank
8,000-33,177	10	9
2,500-7,999	9	17
1,260-2,499	8	21
700-1,259	7	25
300-699	6	34
170-299	5	36
100-169	4	29
60-99	3	25
31-59	2	23
12-30	1	17
0	0	11

Figure 3.9: Annual Average Employment (2012)

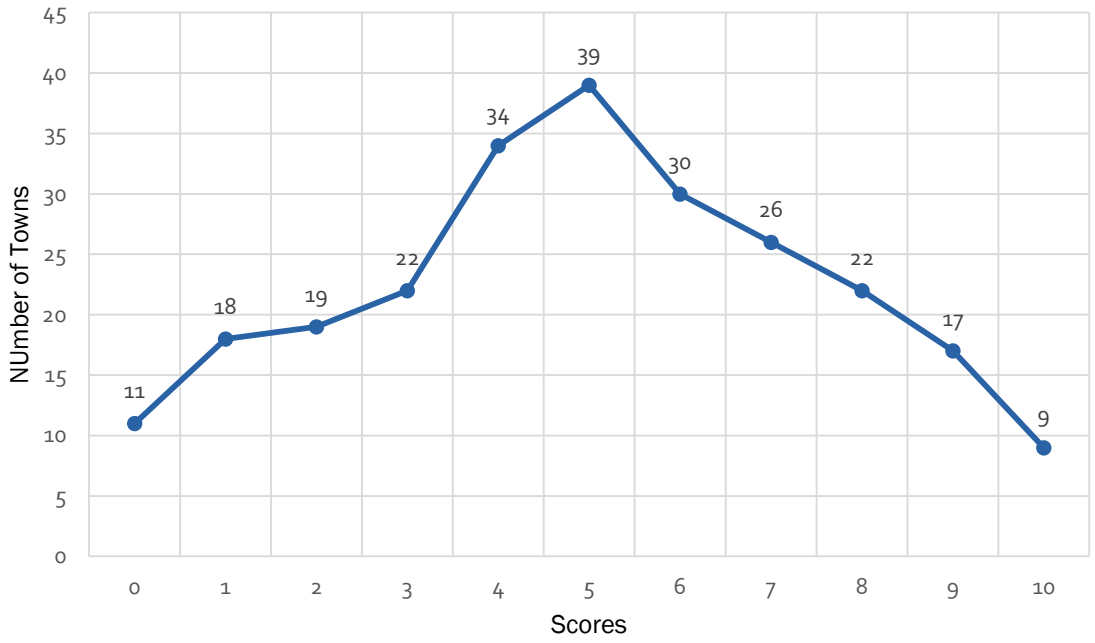


Total wages, 2012, (VT DOL data). The total of all wages paid by reporting establishments in each town.

Table 3.8: Total Town Wages (2012)

Range	Score	Number of Towns With Rank
$300 m - $1.7 b	10	9
$100 m - $299 m	9	17
$40 m - $ 99 m	8	22
$25 m - $39 m	7	26
$11 m - $24 m	6	30
$5.5 m - $10 m	5	39
$3.0 m - $5.4 m	4	34
$1.7 m - $2.9 m	3	22
$1.0 m - $1.6 m	2	19
$100,000 - $999,000	1	18
0	0	11

Figure 3.10: Total Town Wages (2012)

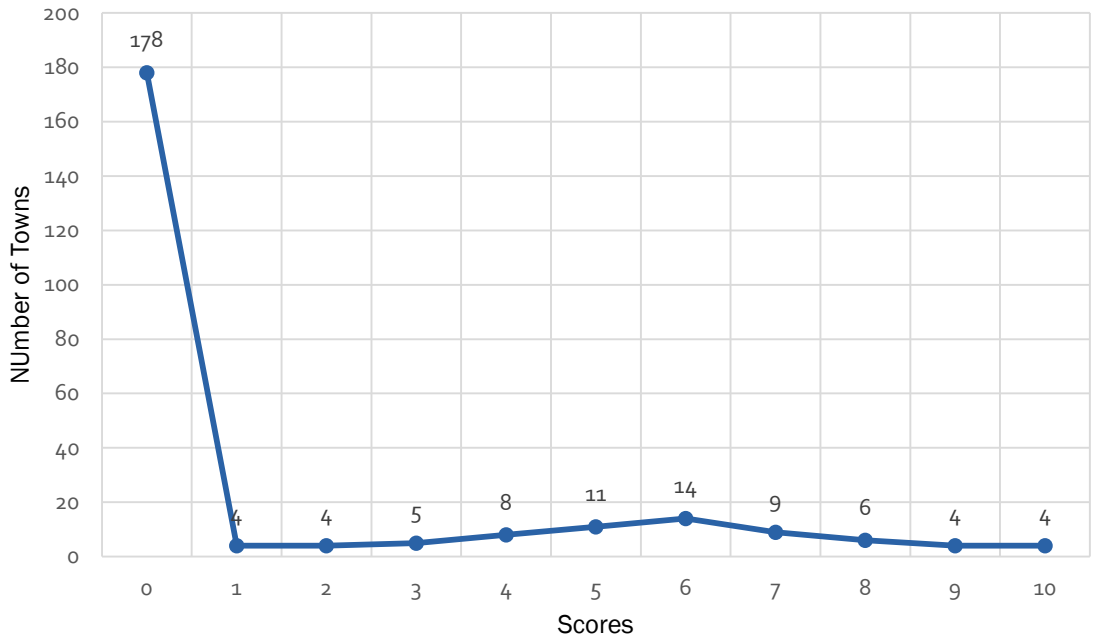


Rooms Sales, 2012, (VT DOT data). This was used as a proxy for the tourism sector of the economy.

Table 3.9: Room Taxes (2012)

Range	Score	Number of Towns With Rank
$20 m - $53 m	10	4
$12 m - $19 m	9	4
$7 m - $11 m	8	6
$3 m - $6 m	7	9
$1 m - $2.9 m	6	14
$600 k - $999 k	5	11
$300 k - $599 k	4	8
$200 k - $299 k	3	5
$150 k - $199 m	2	4
$100 k - $149 k	1	4
0	0	178

Figure 3.11: Room Taxes (2012)



Appendix 3.2

Table 3.10: Total Economic Scores for Top 82 Vermont Municipalities

Town	Annual Average Establish-ments Score	Annual Average Employ-ment Score	Total Wages Score	Rooms Tax Receipts Score	Total Score	Rank
Burlington	10	10	10	10	40	1
South Burlington	10	10	10	10	40	2
Colchester	10	10	10	9	39	3
Brattleboro	10	10	10	8	38	4
Rutland	8	9	8	0	25	5
Bennington	10	10	10	7	37	6
Montpelier	10	10	10	7	37	7
Stowe	9	9	9	10	37	8
Manchester	9	9	9	9	36	9
Hartford	9	9	9	8	35	10
Middlebury	9	9	9	7	34	11
Shelburne	9	9	9	7	34	12
Waterbury	9	9	9	7	34	13
Barre City	9	9	9	6	33	14
Killington	8	8	7	10	33	15
Ludlow	8	8	8	9	33	16
Morristown	9	9	9	6	33	17
Newport City	9	9	9	6	33	18
Woodstock	9	8	8	8	33	19
Cambridge	8	8	7	8	31	20
Waitsfield	9	8	8	6	31	21
Essex	10	10	10	0	30	22
Williston	10	10	10	0	30	23
Brandon	7	8	8	6	29	24
Derby	8	8	8	5	29	25
Dover	7	7	7	8	29	26
Castleton	8	8	8	4	28	27
Rockingham	8	8	8	4	28	28
Swanton	8	8	8	4	28	29
Wilmington	8	7	7	6	28	30
Arlington	7	7	7	6	27	31
Barton	7	8	8	4	27	32
Berlin	9	9	9	0	27	33

Town	Annual Average Establish-ments Score	Annual Average Employ-ment Score	Total Wages Score	Rooms Tax Receipts Score	Total Score	Rank
Chester	7	7	7	6	27	34
Milton	9	9	9	0	27	35
Randolph	9	9	9	0	27	36
Springfield	9	9	9	0	27	37
St. Albans City	9	9	9	0	27	38
St. Johnsbury	9	9	9	0	27	39
Warren	7	7	6	7	27	40
Dorset	7	6	7	6	26	41
Ferrisburg	7	6	6	7	26	42
Jay	4	7	6	9	26	43
Lyndon	9	9	8	0	26	44
Rutland City	10	10	10	8	38	45
Vergennes	8	8	9	0	25	46
Winooski	8	8	9	0	25	47
Barre town	8	8	8	0	24	48
Charlotte	8	6	6	4	24	49
Londonderry	7	6	6	5	24	50
Richmond	8	8	8	0	24	51
Stratton	4	7	6	7	24	52
Windsor	8	8	8	0	24	53
Bradford	7	8	8	0	23	54
Cavendish	6	6	5	6	23	55
Clarendon	7	8	8	0	23	56
Enosburg	7	8	8	0	23	57
Hinesburg	8	7	8	0	23	58
Northfield	7	8	8	0	23	59
Poultney	7	7	7	2	23	60
St. Albans Town	7	8	8	0	23	61
Bristol	8	7	7	0	22	62
Burke	6	6	5	5	22	63
Grand Isle	6	6	6	4	22	64
Hardwick	8	7	7	0	22	65
Newfane	6	6	5	5	22	66
Norwich	8	7	7	0	22	67
South Hero	6	6	5	5	22	68
Winhall	6	5	5	6	22	69

Town	Annual Average Establish-ments Score	Annual Average Employ-ment Score	Total Wages Score	Rooms Tax Receipts Score	Total Score	Rank
Bethel	7	7	7	0	21	70
Fairfax	7	7	7	0	21	71
Greensboro	6	6	5	4	21	72
Jericho	7	7	7	0	21	73
Johnson	7	7	7	0	21	74
Mendon	5	5	5	6	21	75
North Hero	5	5	5	6	21	76
Pittsford	7	7	7	0	21	77
Putney	7	7	7	0	21	78
Royalton	6	7	8	0	21	79
Vernon	6	7	8	0	21	80
Westminster	7	7	7	0	21	81
North Hero	5	5	5	6	21	82

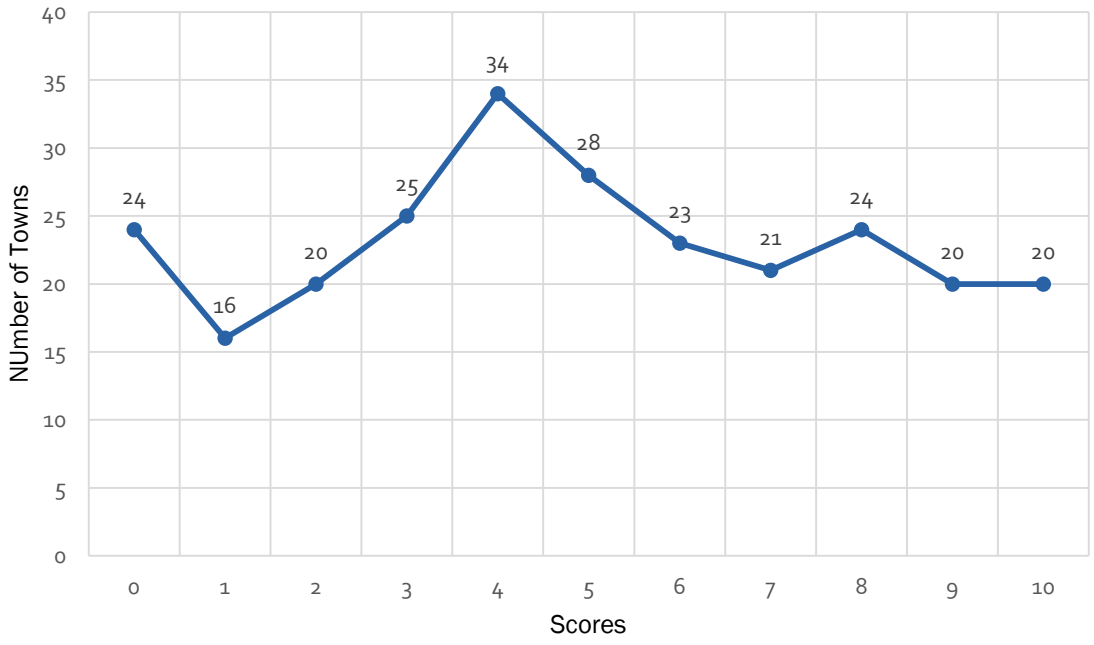
Appendix 3.3

Number of bridges having spans of less than bankfull width. These data show bridges that are too narrow to pass the flow of water from an annual or semi-annual flood event.

Table 3.11: Bridges Having Spans of Less than Bankfull Width

Range	Score	Number Of Towns Having This Rank
20-35	10	20
15-19	9	20
12-14	8	24
10-11	7	21
8-9	6	23
6-7	5	28
4-5	4	34
3	3	25
2	2	20
1	1	16
0	0	24

Figure 3.12: Bridges Having Spans of Less than Bankfull Width

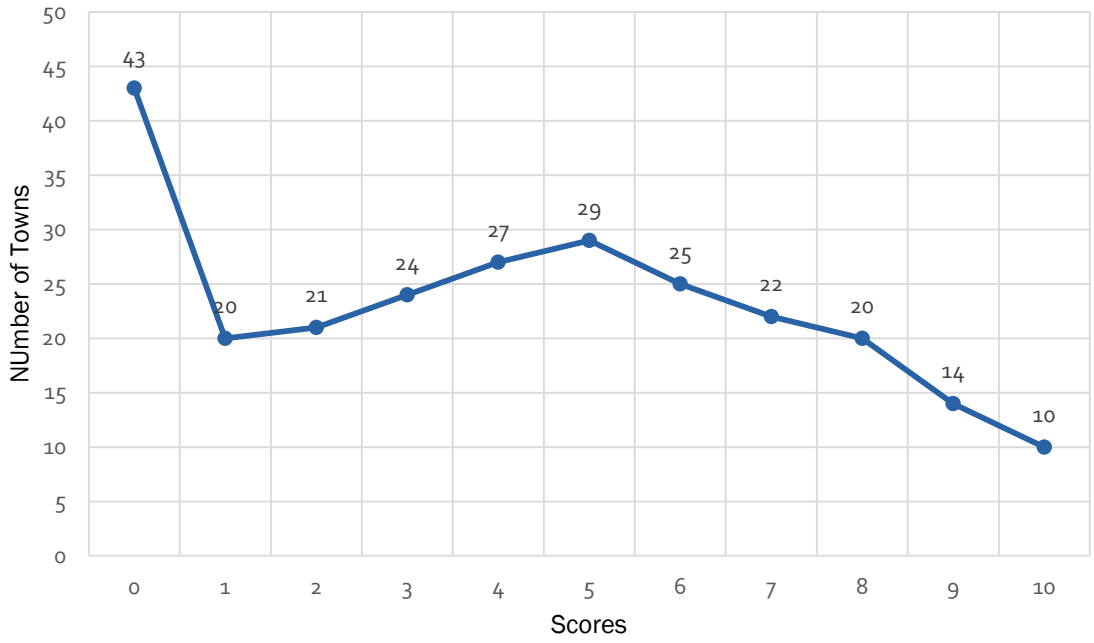


Number of federal aid road miles in high river erosion areas. High erosion and deposition areas are more likely to experience flooding that destroys a road, rather than temporarily making it impassable.

Table 3.12: Federal Aid Road Miles in High River Erosion Areas

Range	Score	Number of Towns Having This Rank
> 10	10	10
6.5-9	9	14
4.8-6.5	8	20
3.2-4.7	7	22
2.1-3.2	6	25
1.3-2.1	5	29
0.9-1.3	4	27
0.55-0.9	3	24
0.25-0.54	2	21
0.01-0.24	1	20
0	0	43

Figure 3.13: Federal Aid Road Miles in High River Erosion Areas

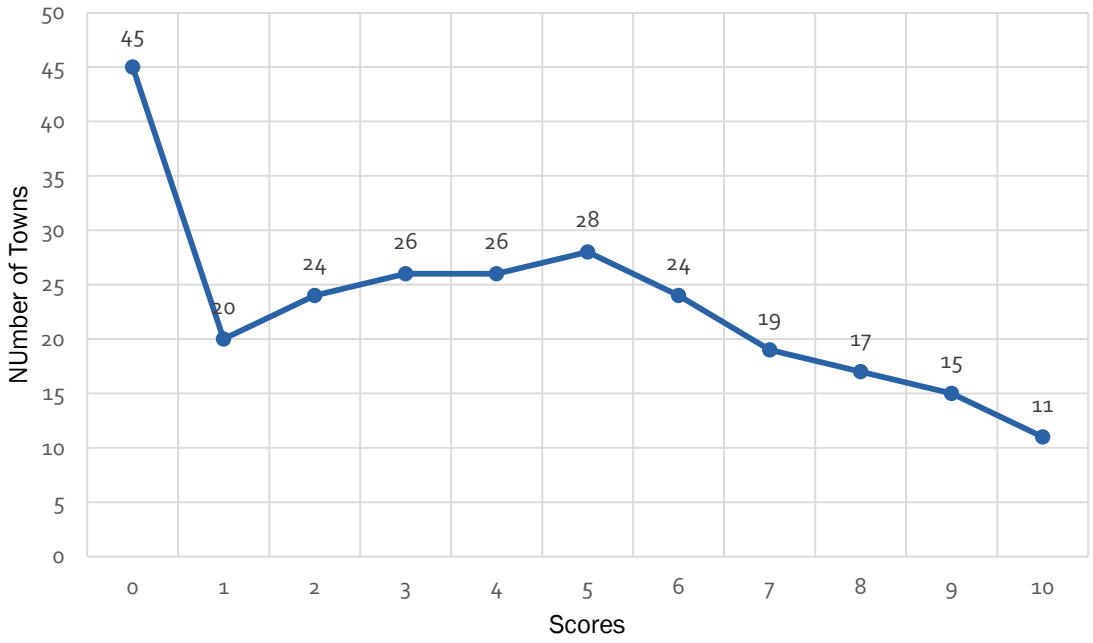


Number of federal aid road miles in high river deposition areas.

Table 3.13: Federal Aid Road Miles in High River Deposition Areas

Range	Score	Number of Towns Having This Rank
> 7.8	10	11
5.6-7.8	9	15
4.0-5.5	8	17
3.0-3.9	7	19
2.0-2.9	6	24
1.3-1.9	5	28
0.9-1.3	4	26
0.55-0.9	3	26
0.26-0.54	2	24
0.01-0.25	1	20
0	0	45

Figure 3.14: Federal Aid Road Miles in High River Deposition Areas



Appendix 3.4

Table 3.14: Total Infrastructure Vulnerability Score for Top 75 Vermont Municipalities

Town	Federal Aid Roads in River Corridor Score	Bridges with Spans Less than Bankfull Width Score	Highway in High Erosion Score	Highway in High Deposition Score	Total Score	Rank
Bethel	10	10	10	9	39	1
Barnet	9	10	9	9	37	2
Barton	10	10	8	9	37	3
Bennington	7	10	9	9	35	4
Bradford	9	8	9	9	35	5
Brattleboro	10	8	9	8	35	6
Hartford	10	10	10	5	35	7
Arlington	7	8	9	10	34	8
Berlin	10	9	6	9	34	9
Bridgewater	6	10	10	8	34	10
Montpelier	10	10	10	4	34	11
Barre City	6	9	9	9	33	12
Bolton	9	9	5	9	32	13
Cavendish	6	9	10	7	32	14
Chelsea	6	10	9	7	32	15
Chester	8	9	8	7	32	16
Fairfax	9	9	8	6	32	17
Sharon	10	10	10	2	32	18
Springfield	10	10	10	2	32	19
Barnard	5	8	8	10	31	20
Lyndon	10	10	7	4	31	21
Hardwick	8	10	7	5	30	22
St. Johnsbury	10	10	9	1	30	23
Woodstock	10	10	10	0	30	24
Brookfield	9	6	6	8	29	25
Cambridge	6	9	6	8	29	26
Dummerston	7	6	9	7	29	27
Northfield	8	10	8	3	29	28
Royalton	9	9	9	2	29	29
Brandon	7	8	4	9	28	30
Concord	6	8	7	7	28	31
Corinth	7	7	7	7	28	32
Danville	7	7	7	7	28	33

Town	Federal Aid Roads in River Corridor Score	Bridges with Spans Less than Bankfull Width Score	Highway in High Erosion Score	Highway in High Deposition Score	Total Score	Rank
Jamaica	7	6	10	5	28	34
Newbury	9	10	5	4	28	35
Randolph	9	10	6	3	28	36
Bristol	6	5	8	8	27	37
Coventry	7	8	5	7	27	38
Craftsbury	6	9	5	7	27	39
Granville	5	9	7	6	27	40
Johnson	5	9	8	5	27	41
Londonderry	6	8	9	4	27	42
Ludlow	7	8	8	4	27	43
Marshfield	6	10	7	4	27	44
Middlesex	9	8	6	4	27	45
Plymouth	6	9	9	3	27	46
Waterbury	9	10	8	0	27	47
Burke	5	8	5	8	26	48
Georgia	8	7	5	6	26	49
Halifax	6	7	8	5	26	50
Morristown	6	9	7	4	26	51
Richmond	9	10	5	2	26	52
Rochester	6	9	9	2	26	53
Rockingham	10	6	8	2	26	54
Danby	7	5	6	7	25	55
Derby	10	5	3	7	25	56
Fairfield	8	8	3	6	25	57
Glover	9	6	4	6	25	58
Grafton	9	3	7	6	25	59
Moretown	6	8	7	4	25	60
Barre Town	5	4	6	9	24	61
Calais	7	5	4	8	24	62
Castleton	6	8	2	8	24	63
Clarendon	6	7	4	7	24	64
Enosburg	7	8	3	6	24	65
Essex	6	9	3	6	24	66
Guilford	9	3	7	5	24	67
Hartland	9	8	2	5	24	68
Newfane	7	5	9	3	24	69
Norwich	8	7	6	3	24	70

Town	Federal Aid Roads in River Corridor Score	Bridges with Spans Less than Bankfull Width Score	Highway in High Erosion Score	Highway in High Deposition Score	Total Score	Rank
Richford	6	8	7	3	24	71
Stockbridge	5	8	10	1	24	72
Topsham	7	9	7	1	24	73
Berkshire	4	4	6	9	23	74
Chittenden	5	5	6	7	23	75

Appendix 3.5

Table 3.15: Municipalities with 10 or More Businesses At-risk

Ranking	Town	Non Residential Buildings In Corridors
1	Montpelier	300
2	Barre City	169
3	Springfield	154
4	Woodstock	140
5	St. Johnsbury	126
6	Ludlow	84
7	Bennington	80
8	Brattleboro	73
9	Manchester	69
10	Wilmington	69
11	Barton	68
12	Waterbury	67
13	Berlin	61
14	Johnson	57
15	Hardwick	55
16	Middlebury	51
17	Morristown	46
18	Hartford	45
19	Stowe	43
20	Rutland City	43
21	Northfield	40
22	Lyndon	39
23	Bethel	38
24	Cambridge	35
25	Londonderry	31
26	Chelsea	30
27	Dover	30
28	Waitsfield	30
29	Barre Town	29
30	Moretown	29
31	Newbury	29
32	Warren	27
33	Brandon	26
34	Bridgewater	25
35	Chester	24
36	Rutland Town	24
37	Barnet	23
38	Burke	22
39	Randolph	22

Ranking	Town	Non Residential Buildings In Corridors
40	Castleton	21
41	Charleston	21
42	Richmond	21
43	Richford	20
44	Wolcott	19
45	Sharon	19
46	Rochester	18
47	Pawlet	17
48	Putney	17
49	Bradford	16
50	Wallingford	16
51	Whitingham	16
52	Arlington	15
53	Concord	15
54	Middlesex	15
55	Weybridge	15
56	Royalton	15
57	Corinth	14
58	Winhall	14
59	Proctor	14
60	Rockingham	14
61	Hancock	13
62	Hartland	13
63	Williamstown	13
64	Ryegate	13
65	Sheldon	13
66	East Montpelier	12
67	Essex	12
68	Fairfax	12
69	Marshfield	12
70	Weston	12
71	Cavendish	11
72	Danby	11
73	Fair Haven	11
74	Newport City	11
75	Glover	11
76	Grafton	11
77	Jamaica	11
78	Lincoln	11
79	Plainfield	11
80	Enosburg	10
81	Montgomery	10

Ranking	Town	Non Residential Buildings In Corridors
82	Stockbridge	10
83	Townshend	10
84	West Windsor	10
85	Plymouth	10

Appendix 3.6

Table 3.16: Thirty Two Vermont Municipalities with High Economic Activity and Flood Risk

Town	Economic Activity Ranking	County	2011 Pop. Estimate	Infra-structure Vulnerability Ranking	Number of Vulnerable Commercial Buildings Ranking	Designated Downtown or Village Center	Critical Employer	Critical System Risk	SGA	Parcel Map	LiDAR
Arlington	31	Bennington	2,308	8	15		Yes		Yes	2009	Yes
Barre City	14	Washington	9,066	12	169	Downtown			Yes	2007	Yes
Barre Town	24	Washington	7,937	61	29				Yes	2007	Yes
Barton	32	Orleans	2,805	3	68	Village			Yes	2011	No
Berlin	33	Washington	2,886	9	61		Yes		Yes	2005	Yes
Bethel	70	Windsor	2,022	1	38	Village	Yes		Yes	2009	Yes
Bradford	54	Orange	2,804	5	16	Downtown			Yes	2013	No
Brandon	24	Rutland	3,943	30	26	Downtown			Yes	2011	No
Brattleboro	4	Windham	11,978	6	73	Downtown	Yes	Yes	Yes	2014	Yes
Burke	22	Caledonia	1,751	48	22	Village			Yes	2014	Yes
Cambridge	20	Lamoille	3,695	26	35	Village			Yes	2006	No
Castleton	28	Rutland	4,695	63	21	Village			Yes	2007	No
Cavendish	55	Windsor	1,367	14	11	Village			Yes	2009	No
Chester	34	Windsor	3,153	16	24	Village	Yes		Yes	2014	Yes
Enosburg	57	Franklin	2,800	65	10	Village			Yes	2014	Yes
Essex	30	Chittenden	19,713	66	12		Yes		Yes	2014	Yes
Fairfax	71	Franklin	4,319	17	12	Village			Yes	2012	Yes
Hardwick	65	Caledonia	3,003	22	55	Village			Yes	2000	No
Hartford	10	Windsor	9,952	7	45	Downtown			Yes	2014	Yes
Johnson	74	Lamoille	3,472	41	57	Village	Yes		Yes	2012	No
Londonderry	50	Windham	1,758	42	31	Village			No	2013	No
Ludlow	16	Windsor	1,963	43	84	Village			Yes	2014	No
Lyndon	44	Caledonia	5,971	21	39	Village	Yes		Yes	2006	No
Montpelier	7	Washington	7,868	11	300	Downtown	Yes		Yes	2014	Yes
Morristown	33	Lamoille	5,277	51	46	Downtown	Yes		Yes	2012	No
Northfield	59	Washington	6,221	28	40	Village	Yes		Yes	2011	Yes

Town	Economic Activity Ranking	County	2011 Pop. Estimate	Infra-structure Vulnerability Ranking	Number of Vulnerable Commercial Buildings Ranking	Designated Downtown or Village Center	Critical Employer	Critical System Risk	SGA	Parcel Map	LiDAR
Randolph	36	Orange	4,788	36	22	Downtown			Yes	2010	Yes
Richmond	51	Chittenden	4,108	52	21	Village			Yes	2013	Yes
Rockingham	28	Windham	5,255	54	14	Downtown			No	2012	No
Springfield	37	Windsor	9,373	19	154	Downtown	Yes		Yes	2013	No
St. Johnsbury	39	Caledonia	7,594	23	126	Downtown	Yes		Yes	2007	No
Woodstock	19	Windsor	3,047	24	140	Village		Yes	Yes	2010	Yes

Map of Vermont Commercial Site Density