



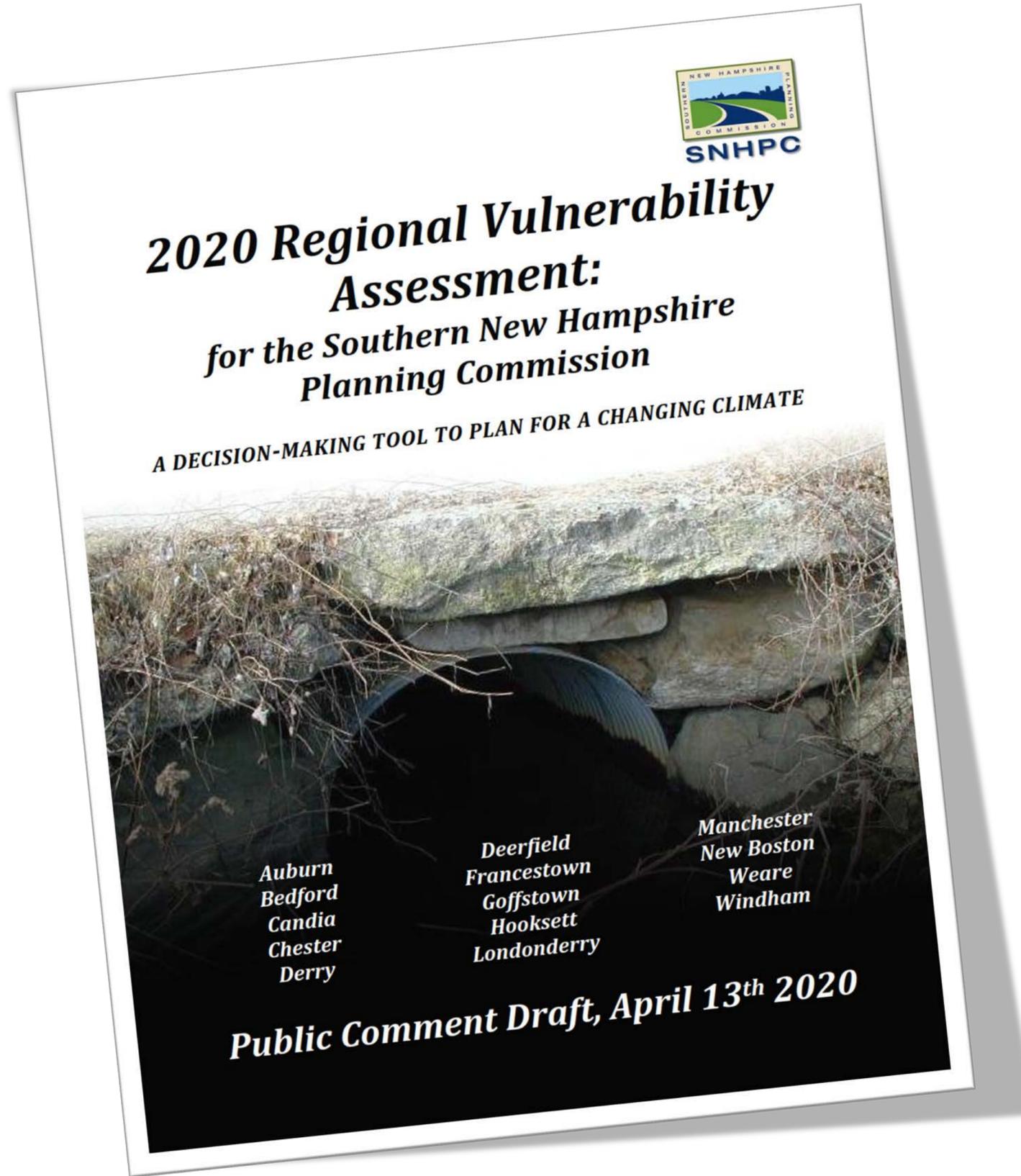
2020

Regional Vulnerability Assessment
Southern New Hampshire Planning Commission

Assessment Findings Presentation, May 2020

VULNERABILITY ASSESSMENT

FULL REPORT



SOUTHERN NH
PLANNING COMMISSION

VULNERABILITY ASSESSMENT

PROJECT PARTNERS



NH SADES
UNH T²

Municipal Representatives

Engineering Staff & Road Agents

State & Regional Technical Assistance

UNH T2, Homeland Security Emergency Management, NH Geological Survey

Technical Guidance

UNH Sustainability Institute, NH Fish & Game, Trout Unlimited

Presentation Overview

- 1. 2020 Vulnerability Assessment Report**
- 2. Comments on the Report**
- 3. Recommendation for Adoption**

Presentation Overview

- 1. 2020 Vulnerability Assessment Report**
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VULNERABILITY ASSESSMENT

SCOPE OF WORK



Assessment Activities

- **Stakeholder outreach and engagement**
- **Empirical climate and asset data collection**
- **Identification of possible impacts to road network**
- **Scoring of risk and prioritization of assets**
- **Identification of high-priority assets**
- **Adaptation and mitigation recommendations**

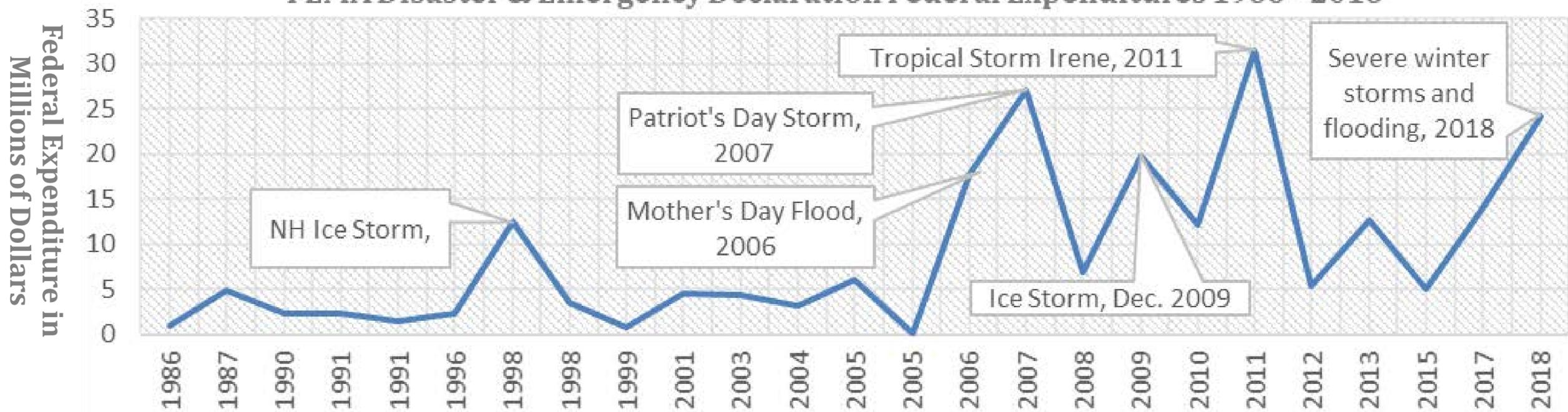
VULNERABILITY ASSESSMENT

SCOPE OF WORK



9 out of 10 Major Disaster Declarations in the past 25 years were the result of flooding.

FEMA Disaster & Emergency Declaration Federal Expenditures 1986 - 2018



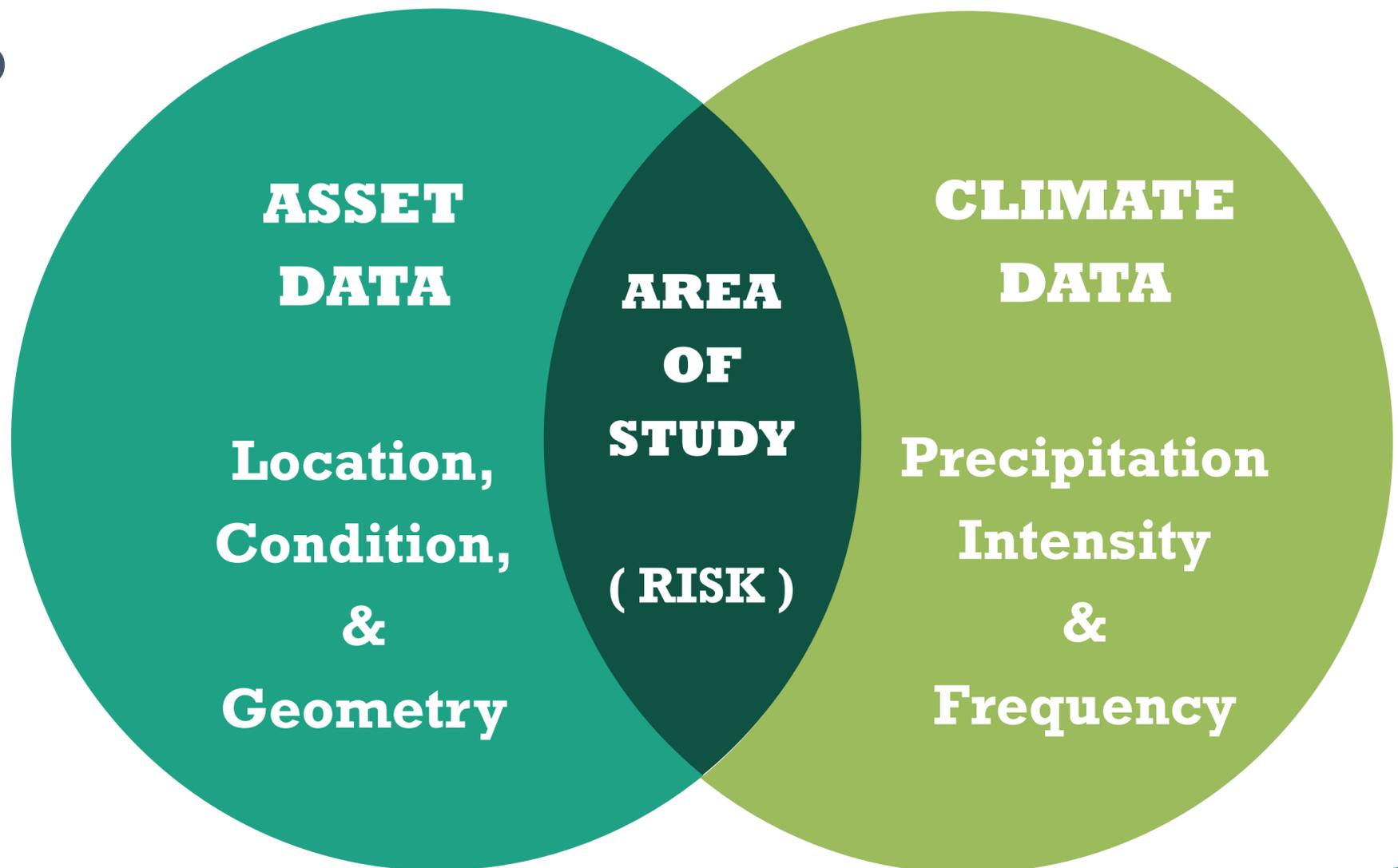
VULNERABILITY ASSESSMENT

SCOPE OF WORK



Risk Factors to the Region's Road Network

Options for Adaptation & Mitigation



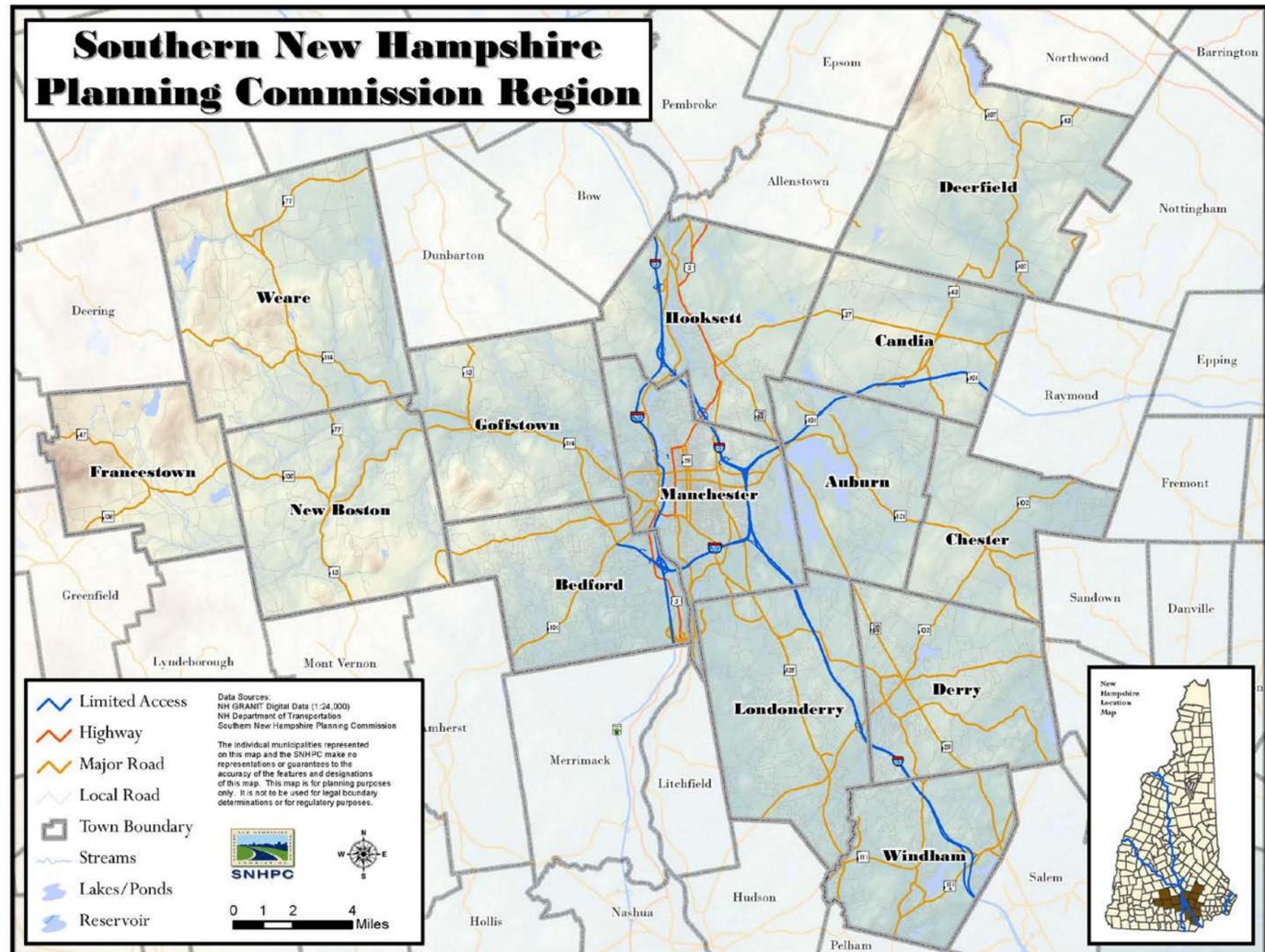
VULNERABILITY ASSESSMENT

SCOPE OF WORK



Auburn
Bedford
Candia
Chester
Derry
Deerfield
Fracestown

Goffstown
Hooksett
Londonderry
Manchester
New Boston
Weare
Windham

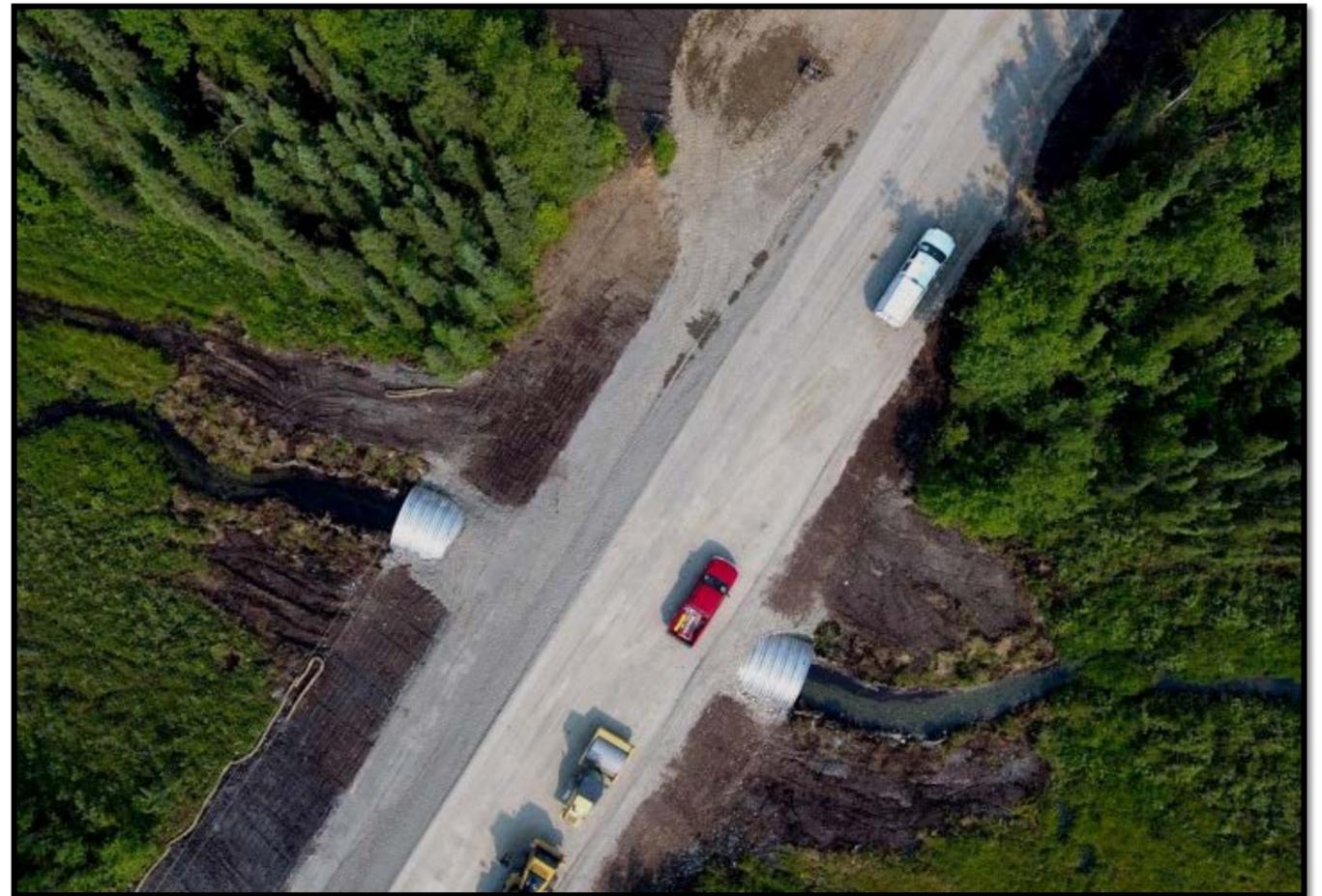


VULNERABILITY ASSESSMENT

SCOPE OF WORK



Auburn Goffstown
Bedford Hooksett
The region's
Candia Londonderry
intersection
Chester Manchester
of roads and
Derry New Boston
streams.
Deerfield Weare
Francestown Windham



VULNERABILITY ASSESSMENT

SCOPE OF WORK



Culverts & Small Bridges: Collectively referred to as “Stream Crossings”

VULNERABILITY ASSESSMENT

SCOPE OF WORK



WHAT ARE THE RISKS POSED?

More intense and increased frequency of heavy rainfall.

- **Flooding and elevated stormwater runoff.**
 - **Downstream bank erosion**
 - **Stream bed scouring.**
 - **Overtopping of roadways.**



VULNERABILITY ASSESSMENT

SCOPE OF WORK



WHAT ARE THE RISKS POSED?

More intense and increased frequency of heavy rainfall.

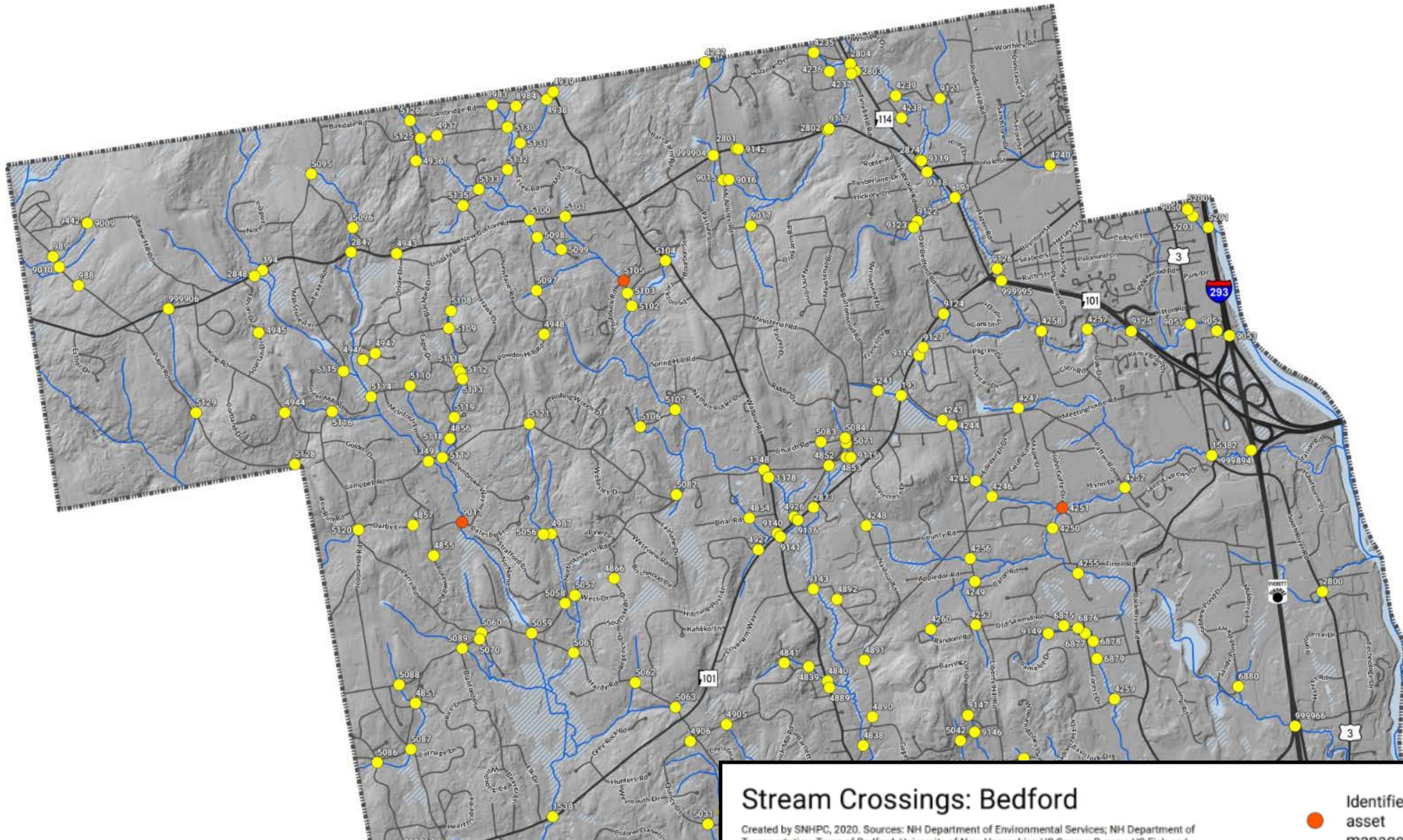
- **Wash out of crossings.**
 - **Loss of road network connectivity.**
 - **Detours, Delays, and reductions in trips.**
 - **Increased costs through emergency repairs.**



VULNERABILITY ASSESSMENT

ACTIVITY OUTCOMES AND PRIORITIZATION RESULTS

STREAM CROSSING MAPPING



Stream Crossings: Bedford

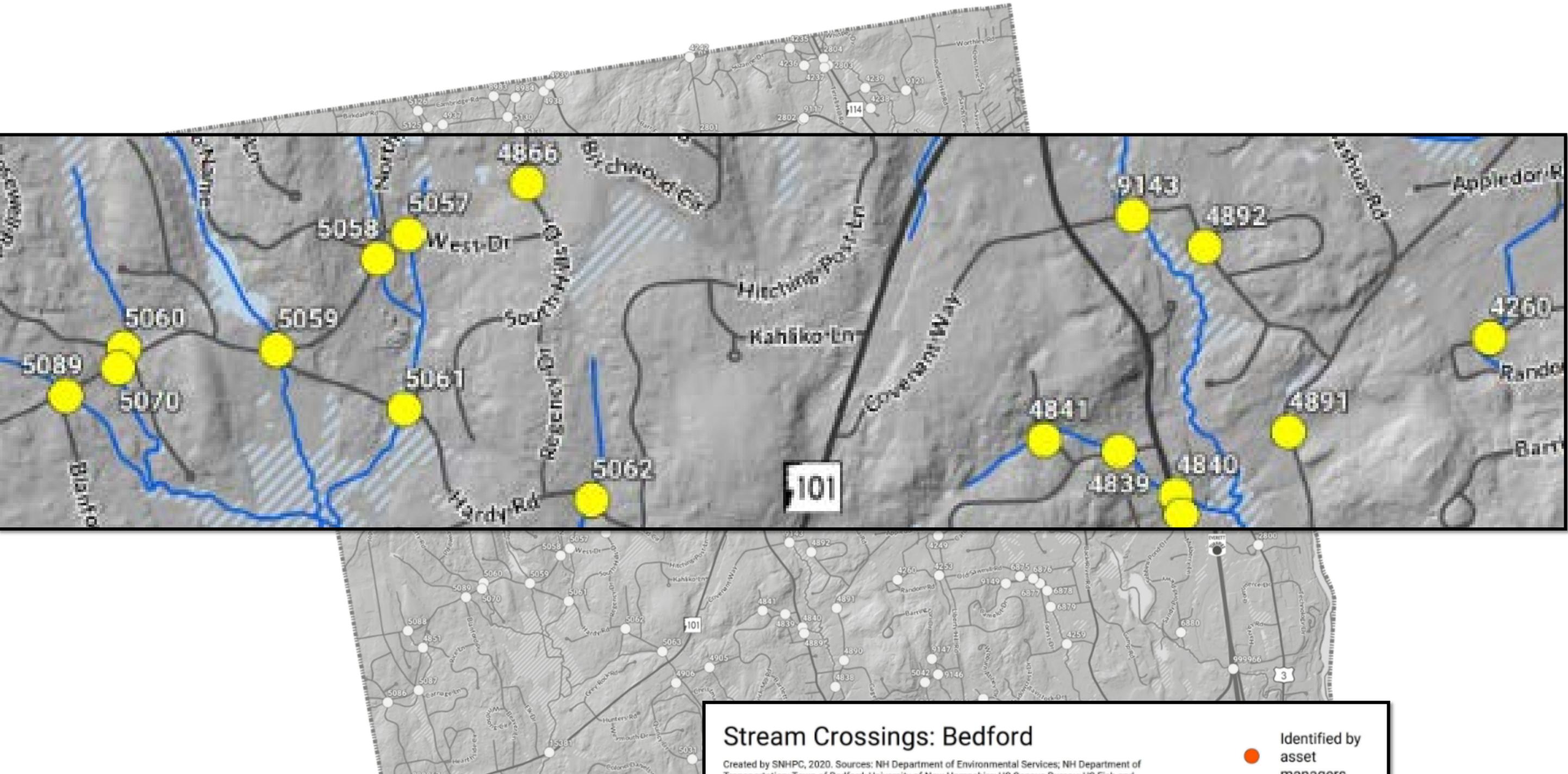
Created by SNHPC, 2020. Sources: NH Department of Environmental Services; NH Department of Transportation; Town of Bedford; University of New Hampshire; US Census Bureau; US Fish and Wildlife Service; US Geological Survey.

Identified by asset managers

VULNERABILITY ASSESSMENT

ACTIVITY OUTCOMES AND PRIORITIZATION RESULTS

STREAM CROSSING MAPPING



Stream Crossings: Bedford

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Identified by asset managers



SOUTHERN NH
PLANNING COMMISSION

VULNERABILITY ASSESSMENT

ACTIVITY OUTCOMES AND PRIORITIZATION RESULTS

Road Segment Traffic Volume (NHDOT):	10	Greater than 30k cars/day
	8	Between 20k and 30k cars/day
	6	Between 10k and 20k cars/day
	4	Between 5k and 10k cars/day
	2	Between 1k and 5k cars/day
0	Less than 1k cars/day	

Stream Crossing Proximity to Flood Zone (FEMA):	5	Within 100' of the floodway
	4	Within 100' of 100-yr flood zone
	3	Within 100' of 500-yr flood zone
	2	Within 100' of other flood zone
	0	Beyond 100' of any flood zone

Hydraulic Vulnerability 10-Yr Storm (NHGS):	5	Overtop
	4	Vulnerable
	3	Unknown (Data Missing)
	0	Not Applicable to Crossing Type
	0	Pass

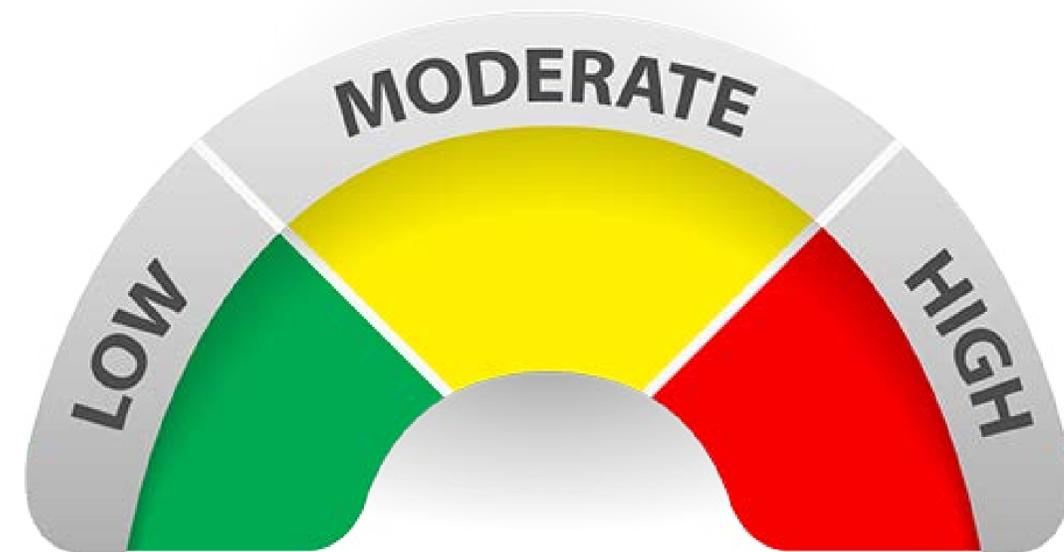
Beaver Activity (SADES)	2	Beaver Activity Documented
	0	No Activity Documented

Structure Condition (SADES):	10	Crossing in poor condition
	5	Crossing in fair condition (or unknown condition)
	0	Crossing in Good condition

Struct. Matl. (SADES):	2	Structure is metal
	0	Structure is not metal

Local Flood Hazard (NHGS):	5	Stream crossing within' 100 of flood hazards
	0	Stream crossing not within' 100' of flood hazards

Asset Mngr. (SNHPC):	10	Stream crossing ID'd
	0	Stream crossing not ID'd



Lowest possible score of "0"

(85 crossings have a score of 0)

Highest possible score of "49"

(Top crossing score is 37)

VULNERABILITY ASSESSMENT

ACTIVITY OUTCOMES AND PRIORITIZATION RESULTS

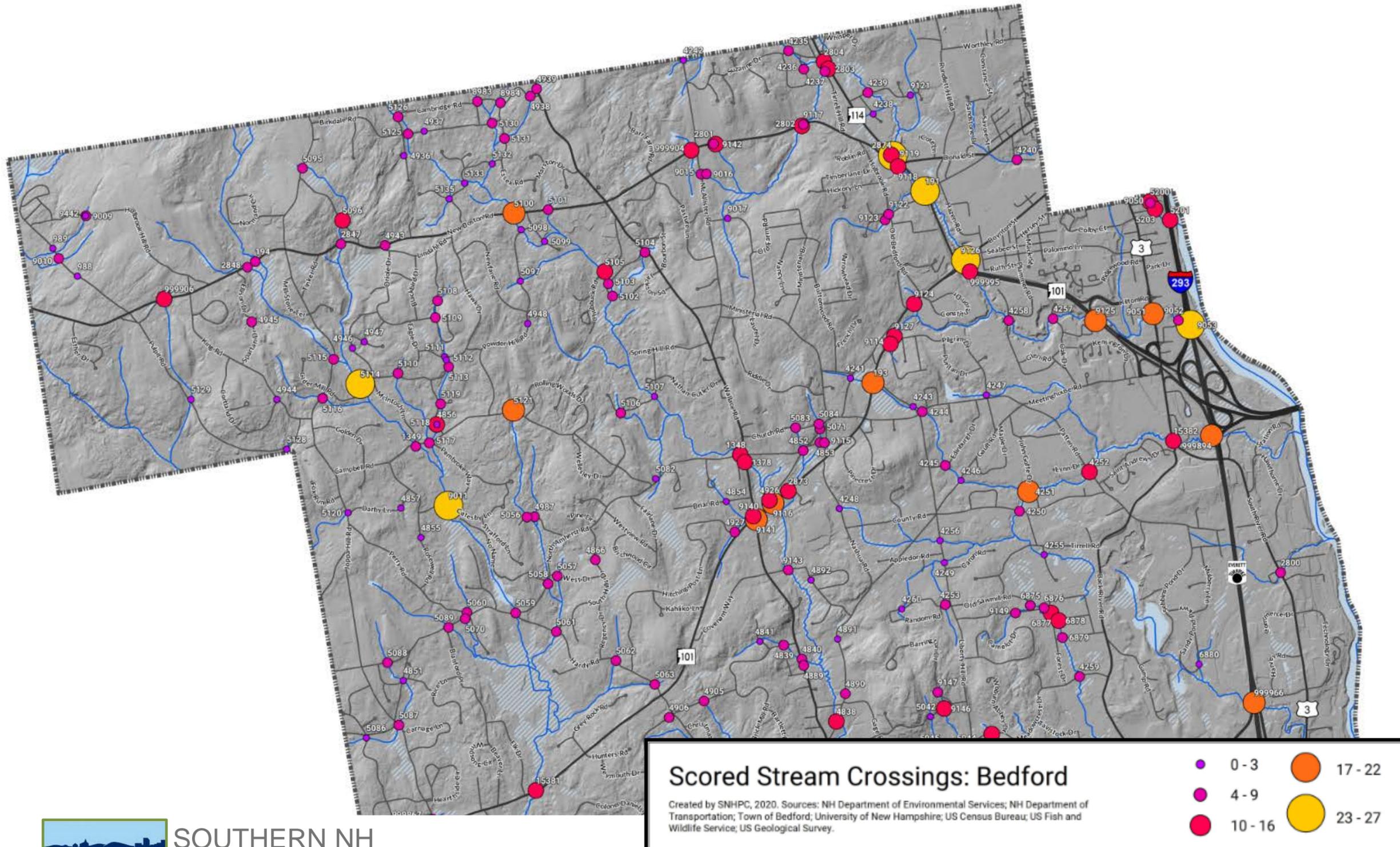
PRIORITIZATION RESULTS

SADES	Annual Avg. Daily Trips (AADT)	AADT Score	Asset Mgr ID'd Cross	Asset Mgr ID Score	History of Flood Haza	Hazard Score	Flood Zone Category (FEM)	Zone Score	Culvert Condition	Condition Score	10yr Hydraulic Vulnerabil	Vuln. Score (10yr)	Culvert Mater	Metal Score	Beaver Activ	Beaver Score	Total Score	Town Name
6232	AADT<5,000	2	Yes	10	Yes	5	Floodway	5	Poor	10	Unknown	3	Metal	2	No	0	37	Derry
5927	AADT<20,000	6	No	0	Yes	5	Floodway	5	Poor	10	Overtop	5	Metal	2	No	0	33	Londonderry
8732	AADT<5,000	2	Yes	10	Yes	5	100-Year Flood Zone	4	Poor	10	Not Applicable	0	Not Metal	0	Yes	2	33	Chester
5877	AADT<5,000	2	Yes	10	No	0	Minimal Hazard	0	Poor	10	Overtop	5	Metal	2	No	0	29	Londonderry
196	AADT<30,000	8	Yes	10	No	0	100-Year Flood Zone	4	Fair	5	Not Applicable	0	Metal	2	No	0	29	Candia
5464	AADT<1,000	0	Yes	10	No	0	100-Year Flood Zone	4	Poor	10	Unknown	3	Metal	2	No	0	29	Candia
15109	AADT<1,000	0	Yes	10	Yes	5	100-Year Flood Zone	4	Fair	5	Vulnerable	4	Not Metal	0	No	0	28	Hooksett
5926	AADT<20,000	6	No	0	Yes	5	Floodway	5	Fair	5	Overtop	5	Metal	2	No	0	28	Londonderry
8255	AADT<1,000	0	Yes	10	Yes	5	Minimal Hazard	0	Poor	10	Unknown	3	Not Metal	0	No	0	28	Auburn
5190	AADT<20,000	6	Yes	10	Yes	5	100-Year Flood Zone	4	Good	0	Unknown	3	Not Metal	0	No	0	28	Goffstown
999971	AADT>=30,000	10	No	0	Yes	5	Floodway	5	Unknown	5	Unknown	3	Not Metal	0	No	0	28	Derry
901	AADT<10,000	4	No	0	Yes	5	100-Year Flood Zone	4	Poor	10	Unknown	3	Metal	2	No	0	28	Weare
900	AADT<10,000	4	No	0	Yes	5	100-Year Flood Zone	4	Poor	10	Unknown	3	Metal	2	No	0	28	Weare
6868	AADT<10,000	4	Yes	10	Yes	5	100-Year Flood Zone	4	Fair	5	Not Applicable	0	Not Metal	0	No	0	28	Chester
6804	AADT<1,000	0	Yes	10	Yes	5	Minimal Hazard	0	Poor	10	Unknown	3	Not Metal	0	No	0	28	Chester
9011	AADT<1,000	0	Yes	10	Yes	5	100-Year Flood Zone	4	Fair	5	Unknown	3	Not Metal	0	No	0	27	Bedford
12607	AADT<10,000	4	Yes	10	No	0	100-Year Flood Zone	4	Fair	5	Vulnerable	4	Not Metal	0	No	0	27	Manchester
12556	AADT<1,000	0	Yes	10	Yes	5	100-Year Flood Zone	4	Fair	5	Unknown	3	Not Metal	0	No	0	27	Manchester
5053	AADT<1,000	0	Yes	10	Yes	5	Floodway	5	Good	0	Overtop	5	Metal	2	No	0	27	Bedford
999969	AADT>=30,000	10	No	0	Yes	5	100-Year Flood Zone	4	Unknown	5	Unknown	3	Not Metal	0	No	0	27	Hooksett
10248	AADT<30,000	8	No	0	Yes	5	100-Year Flood Zone	4	Fair	5	Overtop	5	Not Metal	0	No	0	27	Hooksett
5930	AADT<20,000	6	No	0	Yes	5	Floodway	5	Fair	5	Vulnerable	4	Metal	2	No	0	27	Londonderry
999955	AADT<1,000	0	Yes	10	Yes	5	100-Year Flood Zone	4	Unknown	5	Unknown	3	Not Metal	0	No	0	27	Weare
6506	AADT<1,000	0	Yes	10	Yes	5	Minimal Hazard	0	Poor	10	Not Applicable	0	Metal	2	No	0	27	Chester
192	AADT<20,000	6	No	0	Yes	5	Floodway	5	Poor	10	Not Applicable	0	Not Metal	0	No	0	26	Bedford
6770	AADT<10,000	4	Yes	10	No	0	Floodway	5	Fair	5	Pass	0	Metal	2	No	0	26	Londonderry
7199	AADT<20,000	6	No	0	Yes	5	100-Year Flood Zone	4	Fair	5	Overtop	5	Not Metal	0	No	0	25	Windham
999977	AADT<30,000	8	No	0	Yes	5	100-Year Flood Zone	4	Unknown	5	Unknown	3	Not Metal	0	No	0	25	Manchester
6943	AADT<1,000	0	Yes	10	Yes	5	Floodway	5	Fair	5	Not Applicable	0	Not Metal	0	No	0	25	Windham
15110	AADT<20,000	6	Yes	10	No	0	100-Year Flood Zone	4	Fair	5	Pass	0	Not Metal	0	No	0	25	Hooksett
8637	AADT<1,000	0	Yes	10	Yes	5	Minimal Hazard	0	Fair	5	Unknown	3	Metal	2	No	0	25	Auburn
191	AADT<30,000	8	No	0	No	0	Floodway	5	Poor	10	Pass	0	Metal	2	No	0	25	Bedford
10887	AADT<5,000	2	No	0	Yes	5	100-Year Flood Zone	4	Poor	10	Vulnerable	4	Not Metal	0	No	0	25	Hooksett
5758	AADT<1,000	0	No	0	Yes	5	Floodway	5	Poor	10	Unknown	3	Metal	2	No	0	25	Windham
197	AADT<30,000	8	Yes	10	No	0	Minimal Hazard	0	Fair	5	Not Applicable	0	Metal	2	No	0	25	Candia
6357	AADT<5,000	2	Yes	10	Yes	5	Floodway	5	Good	0	Unknown	3	Not Metal	0	No	0	25	Derry
5997	AADT<1,000	0	No	0	Yes	5	Floodway	5	Poor	10	Unknown	3	Metal	2	No	0	25	Derry
6022	AADT<5,000	2	No	0	Yes	5	100-Year Flood Zone	4	Poor	10	Vulnerable	4	Not Metal	0	No	0	25	Deerfield

VULNERABILITY ASSESSMENT

ACTIVITY OUTCOMES AND PRIORITIZATION RESULTS

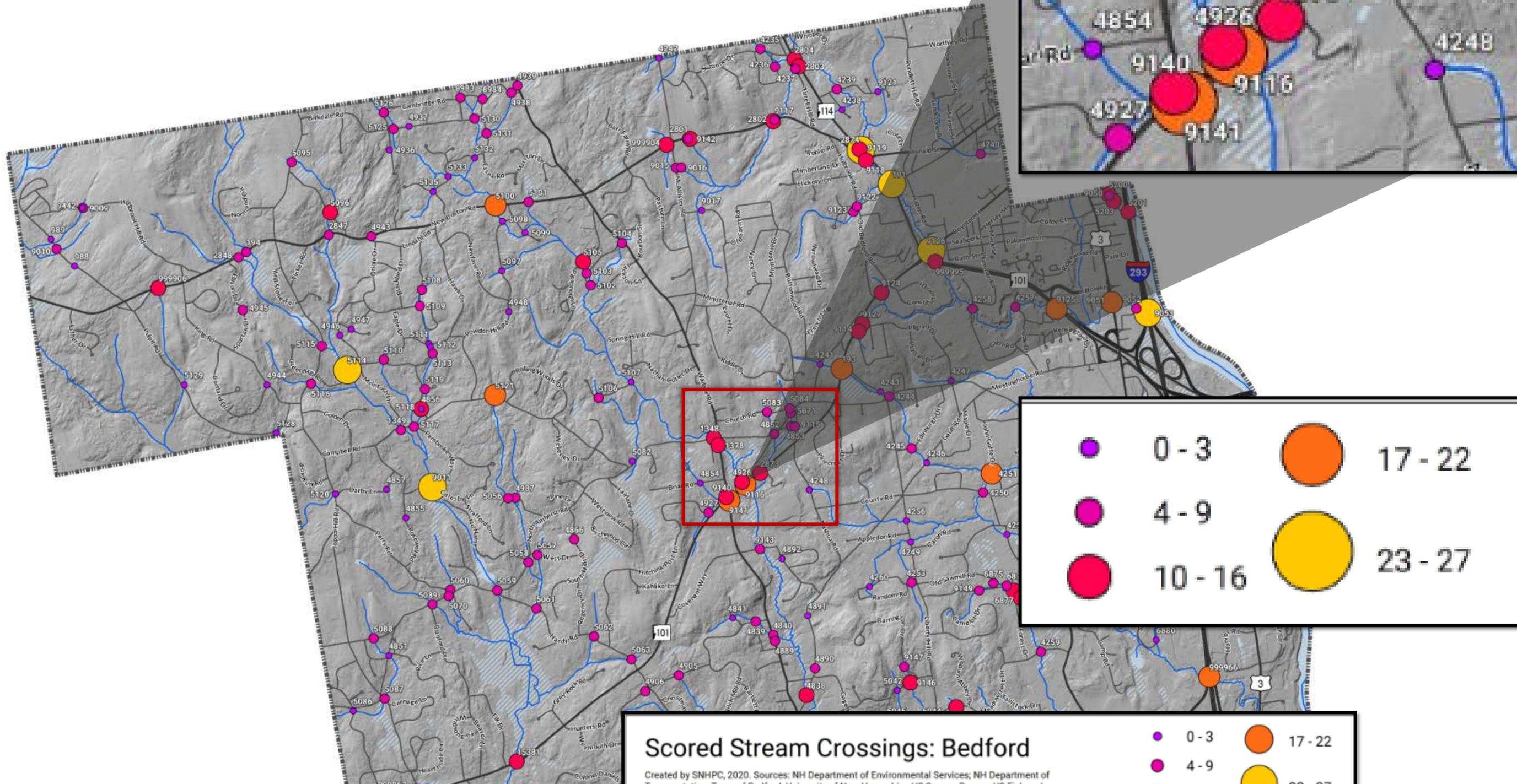
STREAM CROSSING MAPPING



VULNERABILITY ASSESSMENT

ACTIVITY OUTCOMES AND PRIORITIZATION RESULTS

STREAM CROSSING MAPPING



Scored Stream Crossings: Bedford

Created by SNHPC, 2020. Sources: NH Department of Environmental Services; NH Department of Transportation; Town of Bedford; University of New Hampshire; US Census Bureau; US Fish and Wildlife Service; US Geological Survey.

- 0 - 3
- 4 - 9
- 10 - 16
- 17 - 22
- 23 - 27



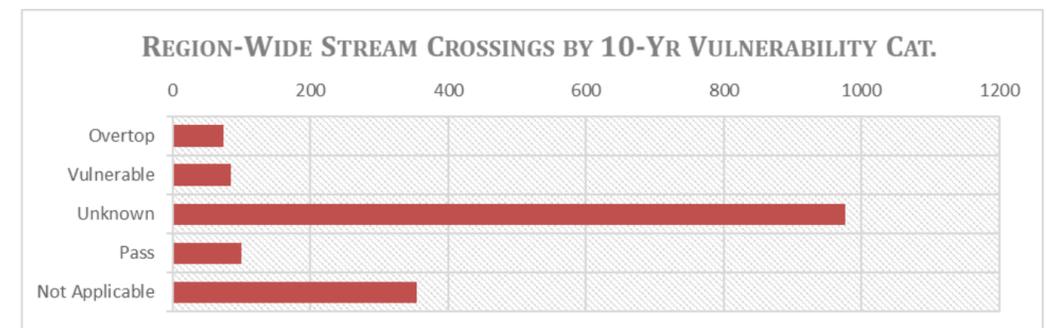
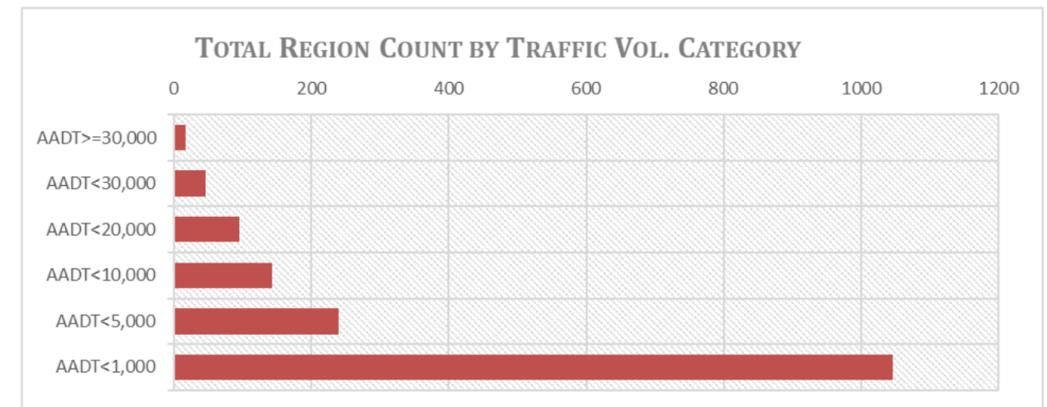
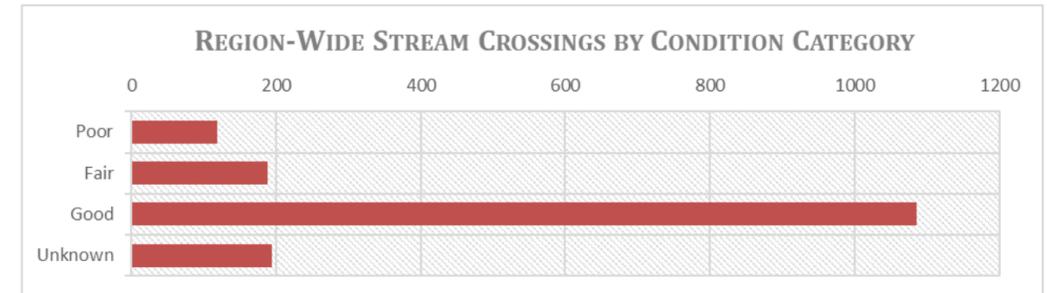
SOUTHERN NH
PLANNING COMMISSION

VULNERABILITY ASSESSMENT

ACTIVITY OUTCOMES AND PRIORITIZATION RESULTS

STREAM CROSSING STATISTICAL SUMMARY

Scoring Summary		10-Yr Vulnerability		Crossing Count By Town	
SNHPC Region		Category	Count	Municipality	Count
Traffic Volume	Totals				
Count		Overtop	74	Auburn	81
AADT>=30,000	17	Vulnerable	84	Bedford	216
AADT<30,000	46	Unknown	976	Candia	73
AADT<20,000	95	Pass	99	Chester	76
AADT<10,000	142	Not Applicable	354	Deerfield	93
AADT<5,000	240	TOTAL:	1587	Derry	155
AADT<1,000	1047			Francestown	66
TOTAL:	1587	Culvert Material		Goffstown	144
		Metal	317	Hooksett	74
Flood Zone		Not Metal	1270	Londonderry	150
Floodway	201	TOTAL:	1587	Manchester	77
100-Year Flood Zone	425			New Boston	133
500-Year Flood Zone	53	Flood Hazard		Weare	166
Minimal Hazard	908	ID'd	367	Windham	83
TOTAL:	1587	Not ID'd	1220	TOTAL:	1,587
		TOTAL:	1587		
Culvert Condition		Beaver Activity			
Poor	119	Yes	90		
Fair	188	No	1497		
Good	1086	TOTAL:	1587		
Unknown	194				
TOTAL:	1587				

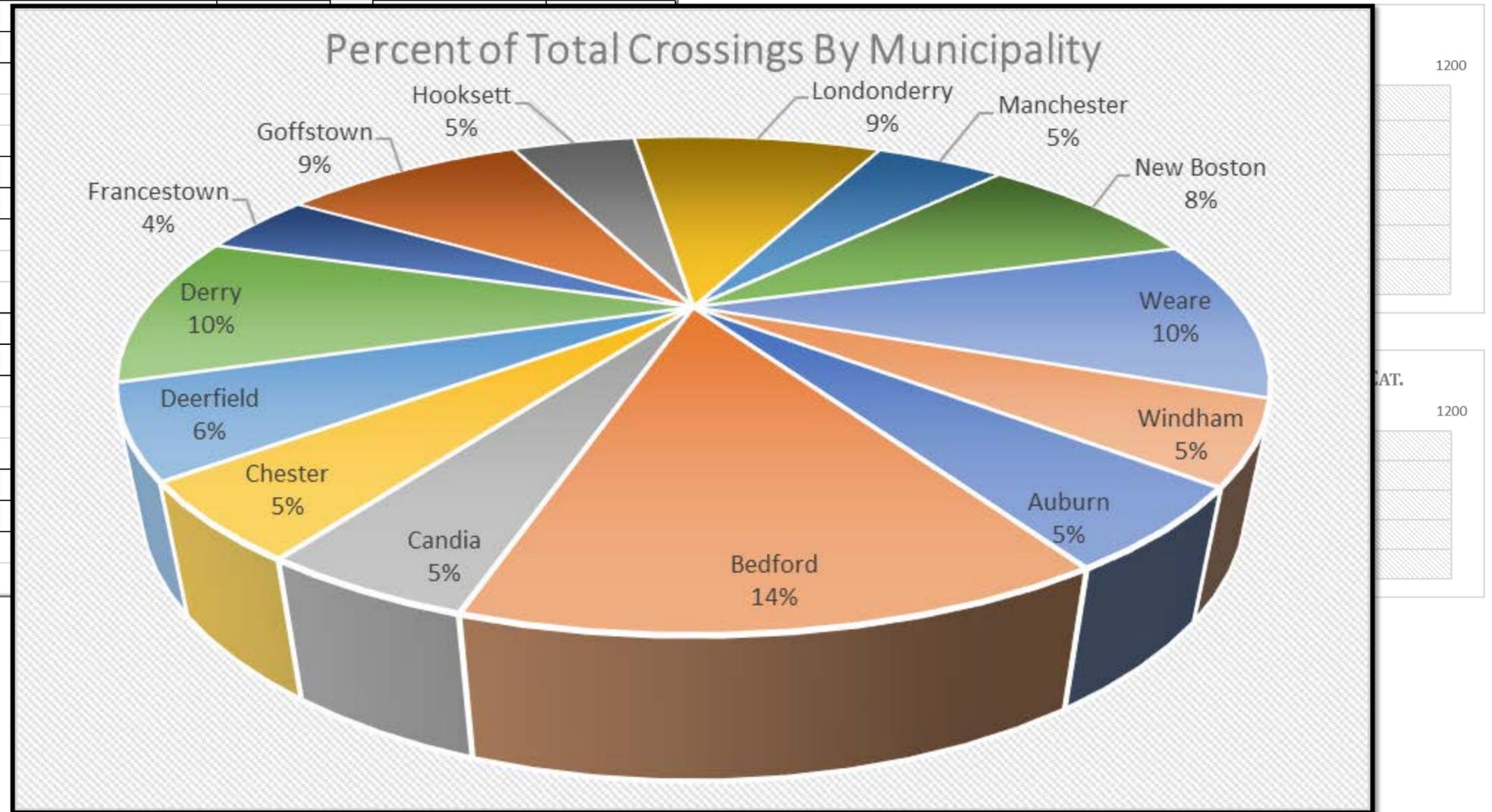
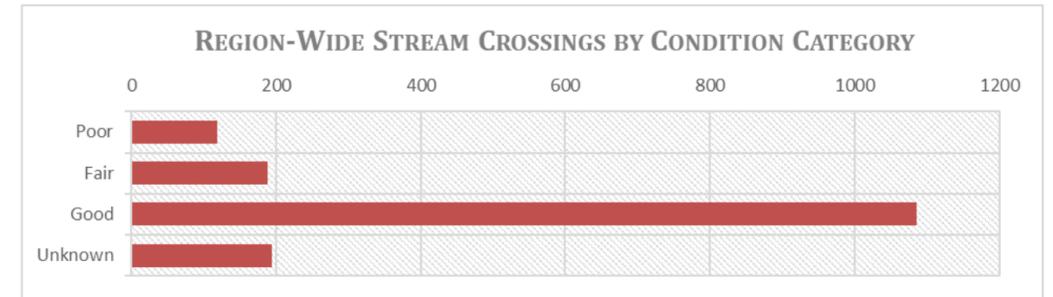


VULNERABILITY ASSESSMENT

ACTIVITY OUTCOMES AND PRIORITIZATION RESULTS

STREAM CROSSING STATISTICAL SUMMARY

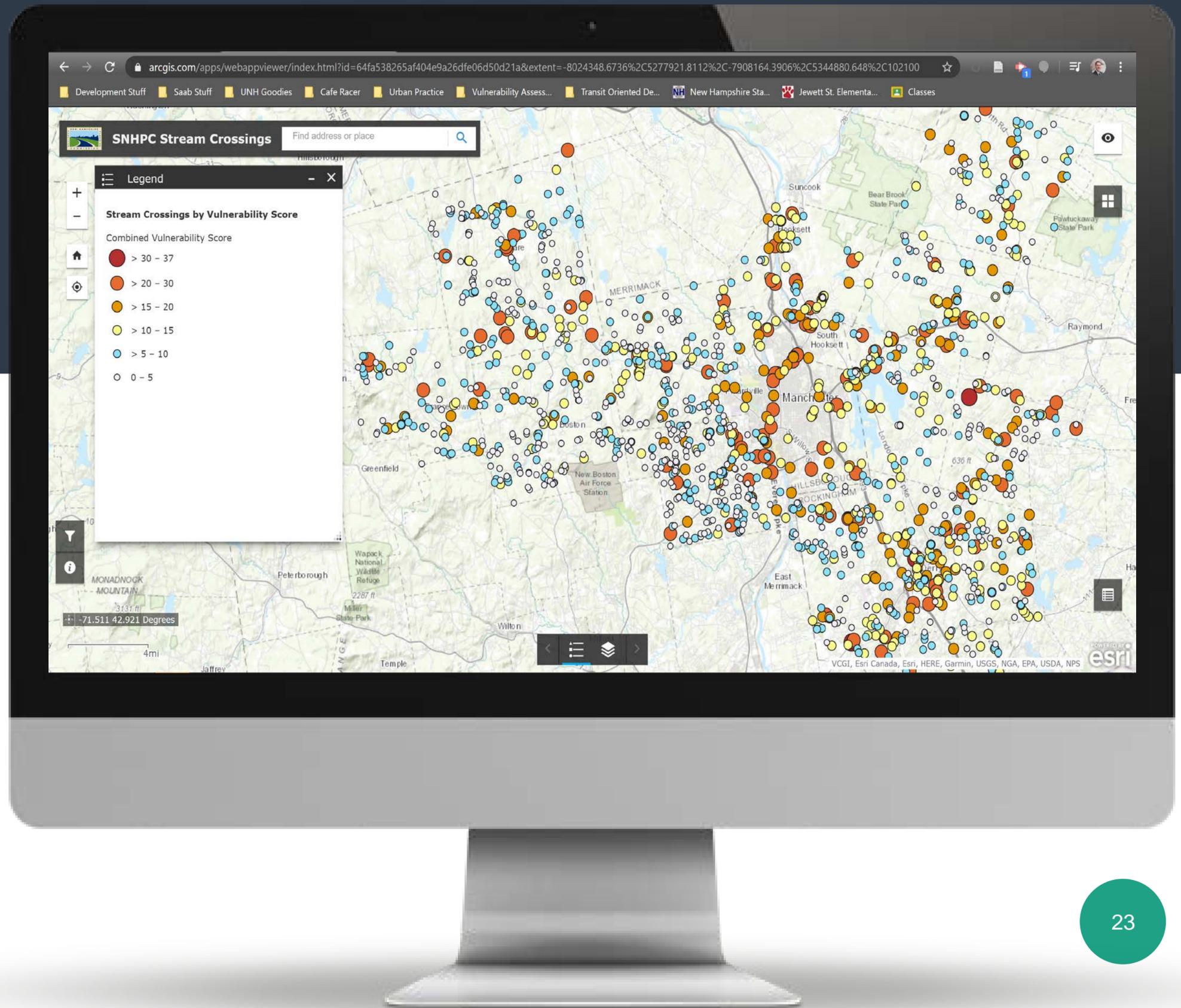
Stream Crossing Statistical Summary		10-Yr Vulnerability		Crossing Count By Town	
Scoring Summary		Category	Count	Municipality	Count
SNHPC Region					
Traffic Volume					
Count	Totals				
AADT >= 30,000	17	Overtop	74	Auburn	81
AADT < 30,000	46	Vulnerable	84	Bedford	216
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AADT < 10,000	142				
AADT < 5,000	240				
AADT < 1,000	1047				
TOTAL:	1587				
Flood Zone					
Floodway	201				
100-Year Flood Zone	425				
500-Year Flood Zone	53				
Minimal Hazard	908				
TOTAL:	1587				
Culvert Condition					
Poor	119				
Fair	188				
Good	1086				
Unknown	194				
TOTAL:	1587				



Vulnerability Assessment

ACTIVITY OUTCOMES AND PRIORITIZATION RESULTS

<https://www.snhpc.org/environmental-energy-planning/climate-adaptation/pages/stream-crossing-gis-map>



ROBUST DATA

The SNHPC Region contains more than 1,500 stream crossings



LOCAL ACCESS

The GIS data can be filtered by municipality, ownership, and crossing size.



COLLABORATIVE

Map information can be used for coordination between municipal and state agencies.

REPORT RECOMMENDATIONS

Municipal Recommendations:

- **Revise Online Stream Crossings Map Tool**
 - **Add New Filtering Functions Over Time**
- **Document Clearing of Beaver Activity**
- **Incorporate Data into Hazard Mitigation Plans**
- **Incorporate Crossing Replacement into CIP Plans**

VULNERABILITY ASSESSMENT

RECOMMENDATIONS

REPORT RECOMMENDATIONS

Regional Recommendations:

- (SNHPC) Assist Communities in Public Outreach and Awareness of Stream Crossing Hazards
- Incorporate Findings of Vulnerability Assessment into Future Land Development Studies
- Coordinate with Regional Long-Range Infrastructure Planning & Capital Investments
- NH DES Coordination / NH DOT Outreach

Presentation Overview

1. 2020 Vulnerability Assessment Report
- 2. Public Comment on the Draft Report**
3. Recommendation for Action

VULNERABILITY ASSESSMENT

RECOMMENDATIONS

PUBLIC COMMENT ON DRAFT REPORT

Period for Public Comment:

- **Thirty (30) Day Public Comment (in line with PIP)**
- **Open April 20th, / Closes May 21st (*Today*)**
- **One Comment Received from NH Geological Survey**
 - Request for Clarification of “Small Bridge” terminology
 - Comment on the draft nature of early ponding analysis
 - Reference to NHDES Vs. NHGS in body of report
 - Comment on the nature of the Streamworks-TU model
 - Comment on labeling “Flood Hazards Geodatabase”



Presentation Overview

1. *Assessment Activity & Scope*
2. *Outputs of Assessment Activity*
3. **Recommendations for Action**

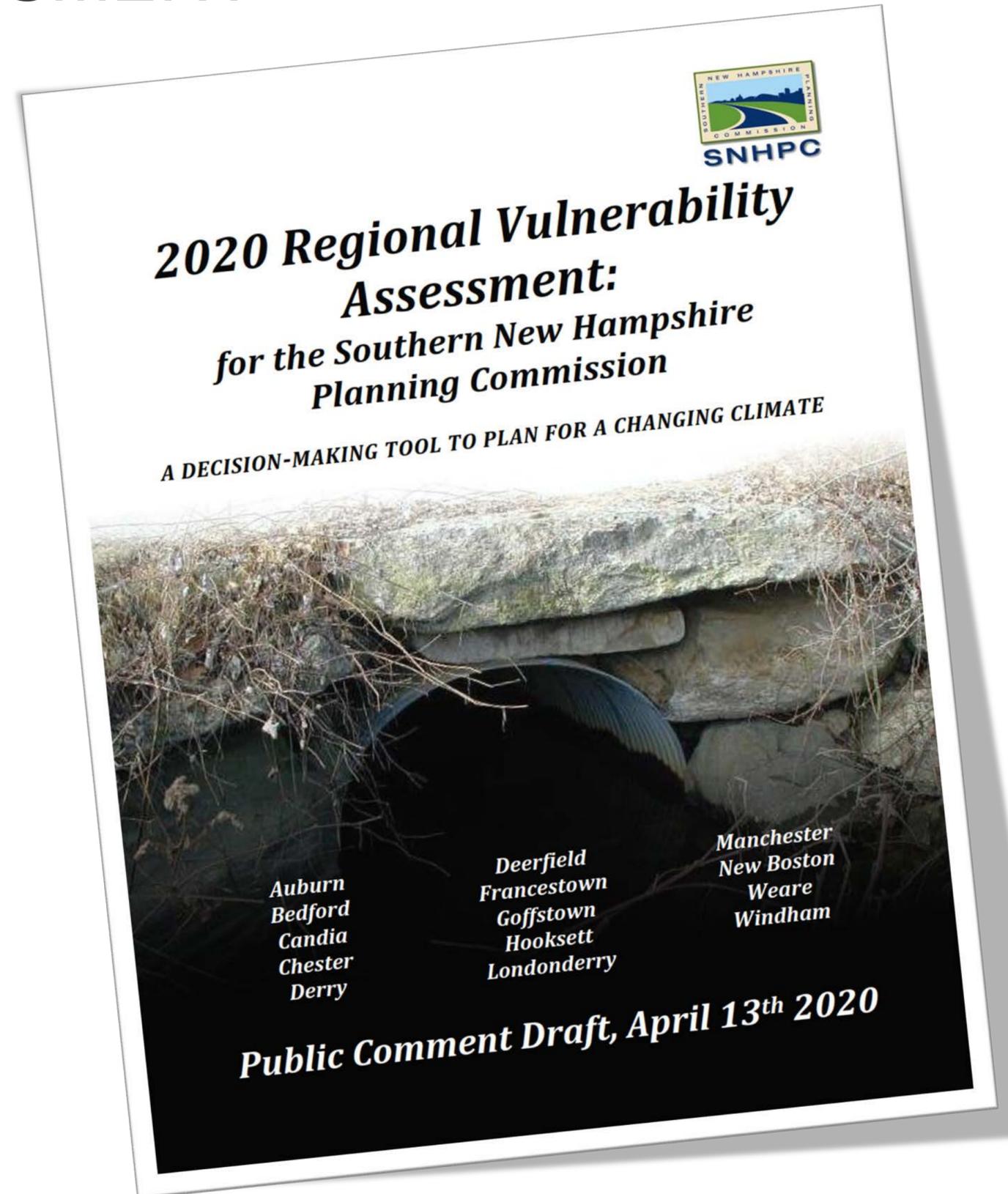


VULNERABILITY ASSESSMENT

FULL REPORT

TAC Action:

- Seeking a vote...
- Recommend adoption of the 2020 Regional Vulnerability Assessment to the MPO Policy Committee



SOUTHERN NH
PLANNING COMMISSION



QUESTIONS & COMMENTS

FEEL FREE TO CONTACT US ANYTIME

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Manchester, NH 03102

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