

TOWN OF DERRY, NEW HAMPSHIRE



Derry Municipal Center and Emergency Management Center

HAZARD MITIGATION PLAN 2020

Town of Derry, New Hampshire

Hazard Mitigation Plan

Update 2020

**Prepared for the Town of Derry, New Hampshire,
New Hampshire Homeland Security & Emergency Management
(NHHSEM), and the Federal Emergency Management Agency
(FEMA)**

**Prepared by The Southern New Hampshire Planning Commission
with assistance from the Derry Hazard Mitigation Committee**

2020

Final Plan

ACKNOWLEDGEMENTS

The Southern NH Planning Commission and the Town of Derry wish to thank the following individuals for serving on the Town's Hazard Mitigation Committee and for their assistance in the development of this Plan:

2020 Derry Hazard Mitigation Committee

Chief Michael Gagnon	Derry Fire Department, Emergency Management Director
Assistant Chief Jim Richardson	Derry Fire Department, Deputy Emergency Management Director
Battalion Chief Bill Gillis	Derry Fire Department, Deputy Emergency Management Director
Captain Ryan Bump	Derry Fire Department, EM Project Manager
Todd Donovan	Derry Fire Department, EM Project Manager
Captain Vern Thomas	Derry Police Operations
Robert Mackey	Derry Code Enforcement Director
George Sioras	Derry Planning Director
Elizabeth Robidoux	Derry Planning and Economic Development Assistant
Doug Rathburn	Derry IT/GIS Coordinator
Michael Fowler	Derry Public Works - Director
Mark L'Heureux	Derry Public Works - Engineering Coordinator
Alan Cote	Derry Public Works - Superintendent of Operations

DRAFT

The preparation of this document has been financed in part by a grant from the State of New Hampshire Department of Safety, Division of Homeland Security and Emergency Management.

CERTIFICATES OF ADOPTION

DRAFT

PREFACE

Hazard mitigation planning is a relatively new field, spearheaded by the Federal Emergency Management Agency (FEMA) during the 1990s after Hurricane Andrew caused more than \$20 billion dollars in damage across several southern states. That event resulted in 54 fatalities and the disruption of millions of lives. Since that time many more natural disasters have caused great losses in the United States, including Hurricane Katrina and most recently, Hurricane Sandy. The Disaster Mitigation Act of 2000, developed by FEMA, was intended to help both communities and states prepare for, and deal with, such disasters. While New England normally does not have hurricanes of Andrew's magnitude, this area does experience many types of natural disasters that cost both lives and money.

Natural disasters can occur during all four seasons in the Northeast: winter ice, snow, and nor'easters; spring flooding; summer downbursts and thunderstorms; and fall hurricanes. Planning to make a community *disaster-resistant* before these storms occur can help save lives as well as homes and infrastructure.

Several FEMA programs are designed to strengthen the nation's disaster resistance by reducing risks. This means changing conditions and behaviors prior to disasters to protect lives and prevent the loss of property. Such measures include building safely within the floodplain or removing homes altogether, engineering buildings and infrastructure to withstand earthquakes, and creating and enforcing effective building codes to protect property from floods, hurricanes, and other natural hazards.

A community's eligibility for hazard mitigation funding depends upon its having adopted a FEMA approved hazard mitigation plan. Mitigation measures contained within the *Derry Hazard Mitigation Plan Update 2020* may be sufficient to receive grant funding.

It is hoped that this document will be a good first step toward analyzing natural hazards in Derry, forecasting where potential disasters might occur, and reducing the impact on lives and the community.

Table of Contents

Acknowledgements	iii
2020 Derry Hazard Mitigation Committee	iii
Certificates of Adoption	iv
Preface	v
Executive Summary	ix
Existing Hazard Mitigation Strategies	ix
Prioritized Hazard Mitigation Strategies.....	x
I. Introduction	11
Natural Hazards and Their Consequences.....	11
What Is Hazard Mitigation?.....	13
Why Develop a Mitigation Plan?.....	13
Benefits of Hazard Mitigation.....	14
Background: Derry Hazard Mitigation Planning.....	14
Purpose.....	14
Authority.....	14
Methodology	14
Public Outreach Process and Public Committee Meetings.....	16
Hazard Mitigation Goals and Objectives.....	17
II. Community Profile	18
Community Profile.....	18
Development and Population Trends.....	19
Disaster Risk.....	20
III. Determining How Much Will Be Affected	21
Identifying Vulnerable Facilities	21
National Flood Insurance Program.....	22
IV. Assessing Probability, Severity and Risk	27
V. Profile of Past and Potential Hazards	28
Natural Hazards	28
Technological Hazards	52
Human-caused Hazards	54
VI. Climate Change in New Hampshire	56
VII. Critical Facilities	61
VIII. Existing Mitigation Strategies and Proposed Improvements	71
IX. Summary of Mitigation Strategies and Prioritization	82
Prioritization of Mitigation Strategies	84
STAPLEE Ranking Matrix	85
X. Prioritized Implementation Schedule and Action Plan	87
Implementation and Action Plan.....	87
XI. Administrative Procedures Regarding Adoption, Evaluation and Monitoring of the Plan	93
Incorporating the Plan into Existing Planning Mechanisms	93
Monitoring, Evaluating and Updating the Plan	93
Appendix A. Bibliography and Resources	95
Appendix B: Technical and Financial Assistance for Hazard Mitigation	99

Appendix C. Minutes and Attendance Sheets 107
Appendix D. Documentation of Outreach for Planning Process 121
**Appendix E. Southern New Hampshire Planning Commission 2020 Vulnerability
Assessment: A Decision-Making Tool to Plan for a Changing Climate 122**
Appendix F. Maps 123

List of Figures

Figure 1: Location Map, Derry NH 18
Figure 2: Derry Wetlands 19
Figure 3: Population History and Long-Term Forecast Derry, NH 20
Figure 4: Average Annual Weeks of Mild or Worse and Moderate or Worse Drought
2000-2019 33
Figure 5: US Drought Monitor Intensity Scale..... 34
Figure 6: Earthquake Occurrence and Magnitude 1970-2019 35
Figure 7: National Weather Service Heat Index..... 37
Figure 8: Change in Hot Days Over Time in NH 38
Figure 9: National Weather Service Wind Chill Chart 39
Figure 10: Enhanced Fujita Scale 41
Figure 11: Downburst Scale 41
Figure 12: Lightning Activity Level (LAL) 43
Figure 13: NOAA Regional Snowfall Index (RSI) 44
Figure 14: Geomagnetic Storm Scale 46
Figure 15: Solar Radiation Storm Scale 47
Figure 16: Radio Blackout Scale..... 48
Figure 17: Tropical Storm Occurrence 1990-2019..... 49
Figure 18: The Saffir-Simpson Hurricane Wind Scale 50
Figure 19: National Wildfire Coordinating Group (NWCG) Fire Size Classification... 51
Figure 20: Observed Increase in Very Heavy Precipitation* 57
Figure 21: FEMA Disaster & Emergency Declaration, Federal Expenditures 1986-
2018 58
Figure 22: Maximum and Minimum Daily Temperatures Record for Winter and
Summer..... 59
23Example of public notice on SNHPC website 121

List of Tables

Table 1: Federal Declared Disasters in NH 2010- 2020 13
Table 2: Building Exposure in Flood zones 22
Table 3: Dams Derry NH..... 24
Table 4: Hazard Risk Assessment..... 27
Table 5: Problem Flooding Areas 31
Table 6: Modified Mercalli Intensity Scale 36
Table 7: Summary of Natural Hazard Past Occurrences 56
Table 8: Emergency Response Facilities and Services 63
Table 9: Non-Emergency Response Facilities & Areas at Risk 63
Table 10: Commercial Economic Impact Areas 67
Table 11: Hazardous Materials Facilities in Derry 70

Table 12: Existing Protection Policies, Programs and Proposed Improvements for Derry.....	81
Table 13: Summary of Mitigation Strategies and Prioritization	84
Table 14: STAPLEE Ranking Matrix.....	87
Table 15: 2020 Action Plan	91

DRAFT

EXECUTIVE SUMMARY

The *Derry Hazard Mitigation Plan Update 2020* has been developed to help Derry become a disaster-resilient community by taking measures to reduce future losses from natural or man-made hazardous events before they occur. The Derry Hazard Mitigation Plan Committee, made up of community members and town officials, developed the plan.

The plan addresses the following natural hazards:

- Flooding
- Drought
- Earthquake
- Extreme Temperatures
- High Wind Events
- Infectious Disease
- Lightning
- Severe Winter Weather
- Solar Storms and Space Weather
- Tropical and Post Tropical Cyclones
- Wildfire

The Derry Hazard Mitigation Plan Committee identified **Critical Facilities**, a list of emergency equipment or areas needed to respond at the time of a natural disaster, and **Areas at Risk**, equipment or areas that could be threatened if a natural disaster were to occur.

Critical Facilities

- Police Department
- Emergency Management
- Emergency Fuel Facilities
- Wastewater Treatment Plant
- Municipal Building
- Fire Service Facilities
- Post Office
- Public Works Garage
- Emergency Shelters
- Evacuation Routes
- Bridges
- Hospitals
- Hazardous Materials Facilities and Above-ground storage tanks
- Telephone and wireless communication facilities
- Back-up power facilities

Areas at Risk

- Water and wastewater systems
- Dams
- Electrical power substation
- Major highways
- Schools
- Daycare centers
- Churches
- Nursing homes and elderly housing
- Recreation areas
- Historic / unique resources
- Lodges and community centers
- Solid waste facilities
- Commercial / economic impact areas

Existing Hazard Mitigation Strategies

The Derry Hazard Mitigation Plan Committee identified existing strategies related to hazard mitigation as follows:

- Floodplain Development District (zoning)
- Conservation Corridor Overlay District (zoning)

- Wetlands Conservation Overlay District (zoning)
- Groundwater Resource Conservation District (zoning)
- Earth Removal Regulations (zoning)
- Manufactured Housing Park District (zoning)
- Emergency Operations Plan
- Evacuation and Notification
- State Dam Program
- Road Design Standards
- Shoreland and Water Quality Protection Act
- Best Management Practices
- Back-up Electrical Generators
- Town Radio System
- Hazardous Materials Regulations
- Regulation of Travel Trailers and Motor Homes
- International Building Code and Local Building Code
- Steep Slopes and Class VI Roads
- Comprehensive Emergency Management Planning for Schools
- Elevation Certificates
- Haz-Mat Response Team
- GIS System
- Telecommunication Overlay District
- Wellhead Protection Program
- Community Notification System

Prioritized Hazard Mitigation Strategies

The Derry Hazard Mitigation Committee prioritized the following hazard mitigation strategies to be put forth in to the 2020 hazard mitigation plan update:

1. Implement emergency drills and exercises in town facilities and schools and increase coordination between schools and Derry BEM.
2. Continue to prohibit construction in the floodplain during review & permitting processes.
3. Continue to implement a public awareness program for emergency management and hazard mitigation.
4. Encourage locating underground utilities for redevelopment.
5. Continue to participate and comply with the NFIP and consider participation in the CRS.
6. Continue to purchase / lease emergency vehicles and equipment to update and expand existing supply.
7. Improve drainage structures at Folsom and N. High Street as well as Tsienneto Rd. and NH Rt. 102.
8. Continue to implement culvert analysis for inventory and condition assessment.
9. Continue to implement a culvert maintenance system.
10. Identify funding source for an additional portable generator that can be used in emergencies.
11. Continue maintenance program for detention/retention ponds.
12. Continue to encourage property owners to elevate structures in the floodplain, especially insured and repetitive loss properties.

13. Encourage Conservation Commission to become active in acquiring flood-prone properties.
14. Continue to pursue funding for the upgrade of the DPW Radio system for compatibility with FD and PD.
15. Test and develop staffing plan for Pinkerton Academy Emergency Shelter Ops
16. Continue current plan to control the potential for waterborne illnesses from standing water; disseminate hazard information.
17. Install visual river gauges at known points of repetitive floods.
18. Implement public outreach campaign to property owners along flood-prone areas.
19. Increase coordination with Eversource Utilities in pruning tree limbs around powerlines.
20. Promote installation of underground powerlines and utilities.
21. Implement procedures identified in town's damage assessment report and EOP to determine extent and impact of natural disasters on people and property.
22. Improve community surveillance capabilities and implement safeguards to reduce the spread of disease in the event of an epidemic.
23. Ensure town maintains an adequate supply of PPE for potential disease/virus outbreaks.
24. Maintain mosquito control and public education program in Town to monitor for EEE and West Nile Virus
25. Continue monitoring for PFAS and arsenic in town water supplies in coordination with NHDES.
26. Provide training opportunities to municipal staff on cyber security and threats.
27. Continue providing trainings and active shooter drills in schools and municipal buildings.
28. Maintain coordination with regional hazmat team in monitoring potential terror or violence threats.
29. Continue to identify and remove hazardous trees in the Right of Way
30. Continue to pursue GIS data for utility infrastructure such as electric poles/circuits in Town
31. Complete update Telecom Overlay ordinance
32. Increase and improve sanitation and disinfecting capabilities in schools and town facilities during outbreaks and peak transmission seasons.
33. Continue to maintain current snow removal equipment and upgrade as needed to cope with snow emergencies.

This plan is scheduled to be reviewed and updated on an annual basis by the Derry Emergency Management Director in coordination with the Derry Town Council. The next update will occur one year after Town Council approval.

I. INTRODUCTION

Natural Hazards and Their Consequences

In the United States, millions of dollars are spent each year on disaster response and recovery¹. In 1992, Hurricane Andrew caused an estimated \$25 billion in damage. The 1993 Midwest floods resulted in some \$12-\$16 billion in damage. The 1994 Northridge earthquake caused \$20 billion in damage, and the 2002 summer flooding in central Texas topped \$1 billion in damage. Hurricane Katrina in 2005 was the costliest storm on record,

¹ State of New Hampshire Multi-Hazard Mitigation Plan, 2018

causing over 1,800 deaths and over \$100 billion in damage. In 2012, Hurricane Sandy caused almost 120 deaths and an estimated \$75 billion in damage. These types of natural disasters exacerbate the need for communities to adopt measures and activities to become better prepared and more resilient. By undertaking activities which reduce the impact of future disasters, known as hazard mitigation, local governments and the State can reduce the costs of New Hampshire's response and recovery costs as well as minimize the impacts of future disaster events².



December 2008 Ice Storm, Derry, New Hampshire³.

Natural hazards such as floods, tornadoes, winter storms, hurricanes, earthquakes, and wildfires are part of the world around us. Their occurrence is inevitable. These events can wreak havoc on the natural environment by uprooting trees, eroding riverbanks and shorelines, carving new inlets, and blackening forests. Yet the natural environment is amazingly resilient, often recuperating in a matter of days or weeks.

When these events strike the man-made environment, however, the result is often more devastating. Disasters occur when a natural occurrence crosses paths with elements of the man-made environment such as buildings, roads, pipelines, or crops. When hurricanes tear roofs off houses, it is a disaster. When tornadoes ravage a town, it is a disaster. And when floods invade low-lying homes, it is a disaster. If only undeveloped wetlands and floodplains were flooded, rather than homes and businesses, we would hardly take notice. The natural environment takes care of itself. The man-made environment, in contrast, often needs some emergency assistance.

² State of New Hampshire Multi-Hazard Mitigation Plan, 2018

³ Photo courtesy Cheryl Senter/AP Photo

The following table details major hazard events in the last 10 years that affected the Town of Derry and Southern New Hampshire:

Date	Event	Impacts
March 29th, 2010	Severe Winter Storm (FEMA-1892-DR):	extensive debris blocking roadways and causing damage to structures.
May 12th, 2010	Severe Storms and Flooding (FEMA-1913-DR):	Damage to roads and bridges
August 26 - September 6, 2011	New Hampshire Tropical Storm Irene (DR-4026-NH)	Heavy rain, damage to roads and bridges
October 29 th – 30 th , 2011	Severe storm and snowstorm (Halloween storm) (DR-4049-NH)	Heavy early snowstorm caused extensive power outages; costs associated with debris removal
October 26 th – November 8 th , 2012	Hurricane Sandy (DR-4095-NH)	Strong storm surge and heavy rains across New England, NYC, and New Jersey
February 8 th – February 10 th , 2013	Severe winter storm and snowstorm	Heavy snow caused damage and disruption to transportation network and infrastructure
January 26 th – 28 th , 2015	Severe winter storm and snowstorm	Heavy snow
January 20 th , 2020 and continuing	New Hampshire Covid-19 Pandemic (DR-4516-NH)	Ongoing health and economic crisis

Table 1: Federal Declared Disasters in NH 2010- 2020

What Is Hazard Mitigation?

Hazard mitigation is any sustained action taken to reduce or eliminate the long-term risk to human life and property from hazards (44 CFR 201.2). Hazard mitigation activities may be implemented prior to, during, or after an event. However, it has been demonstrated that hazard mitigation is most effective when based on an inclusive, comprehensive, long-term plan that is developed before a disaster occurs.⁴ It includes both structural interventions, such as flood control devices, and nonstructural measures, such as avoiding construction in the most flood-prone areas. Mitigation includes not only avoiding the development of vulnerable sections of the community, but also making existing development in hazard-prone areas safer. For example, a community could identify areas that are susceptible to damage from natural disasters and take steps to make these areas less vulnerable. It could also steer growth to less risky areas. Keeping buildings and people out of harm's way is the essence of mitigation.

Mitigation should not be an impediment to growth and development. On the contrary, incorporating mitigation into development decisions could result in a safer, more resilient community, one that is more attractive to new families and businesses.

Why Develop a Mitigation Plan?

The full cost of the damage resulting from natural disasters—personal suffering, loss of lives, disruption of the economy, and loss of tax base—is difficult to measure. New Hampshire is subject to many types of natural disasters: floods, hurricanes, nor'easters, winter storms, earthquakes, tornadoes, and wildfires, all of which can have significant economic and social

⁴ FEMA *Local Mitigation Plan Review Guide*. October 1, 2011.

impacts. Some, such as hurricanes, are seasonal and often strike in predictable locations. Others, such as floods, can occur any time of the year and almost anywhere in the state.

Benefits of Hazard Mitigation

Hazard mitigation offers many benefits for a community. It can:

- **Save lives and property** - A community can save lives and reduce property damage from natural hazards by identifying risks and acting, such as elevating structures located in the floodplain.
- **Reduce vulnerability to future hazards** - By having a mitigation plan in place, a community is prepared to take steps that will permanently reduce the risk of future losses. This opportunity is often lost when we build our communities without regard to natural hazards or when we rebuild them after a disaster “just like they were before.” While it is natural to want to return things to the way they were, it is important to remember that, in many cases, the disaster would not have been as severe if a mitigation plan had been implemented.
- **Facilitate post-disaster funding** - By identifying and ranking recovery projects before the next disaster, a community will be in a better position to obtain post-disaster funding because much of the background work necessary for applying for federal funding will already be done.
- **Speed recovery** – By developing a mitigation strategy, a community can identify post-disaster mitigation opportunities in advance of a disaster and be ready to respond quickly after a disaster.

Background: Derry Hazard Mitigation Planning

The Federal Emergency Management Agency (FEMA) has mandated that all communities in the State of New Hampshire establish local hazard mitigation plans to reduce future losses from natural or man-made hazard events before they occur. In order to satisfy the planning requirements of the Disaster Mitigation Act (DMA) of 2000, the initial Plan was developed in 2002-2003, and has been updated and resubmitted to FEMA for approval every five years to reflect the most recent information for hazard mitigation in the Town.

Purpose

The **Derry Hazard Mitigation Plan Update 2020** serves as a strategic planning tool for use by the Town of Derry in its efforts to reduce future losses from natural or man-made hazardous events before they occur. This plan may constitute a new section of the Derry Master Plan, in accordance with RSA 674:2.

Authority

This Hazard Mitigation Plan Update 2020 was prepared in accordance with the Town of Derry's Emergency Operations Plan, effective in 2016, under the authority of the Planning Mandate of Section 409 of Public Law 93-288 as amended by Public Law 100-707, the Robert T. Stafford Act of 1988, and the Disaster Mitigation Act of 2000. The ***Derry Hazard Mitigation Plan Update 2020*** will be referred to as the "Plan." **The Derry Town Council formally adopted this plan after a public hearing was held on December 15th, 2020. Documentation of the Town Council's adoption of the Plan is provided at the beginning of this plan.**

Methodology

In February 2020, the Derry Hazard Mitigation Plan Update Committee was formed to begin updating the plan. The Committee developed the contents of the Plan using the 10-step planning process set forth in the Hazard Mitigation Planning for New Hampshire Communities

handbook, along with the FEMA State and Local Mitigation Planning How-To Guides. Each section of the plan was reviewed and updated according to new information and the events of the past five years. The Update Committee consisted of representatives from various local agencies, including the Planning Department, Fire Department, Police Department, Public Works Department, IT Department, and Code Enforcement. The Committee held a total of four public meetings beginning February and June 2020 to collect information, compile the plan update, and review the plan. Tasks to complete the plan update were as follows:

Task 1: Determine the Planning Area & Resources: This task was conducted by Town staff and the Regional Planning Commission. Information from the previous plan was reviewed and revised. The results of this research can be found in Section II, "Community Profile".

Task 2: Building the Planning Team: This task was conducted by town staff and the Regional Planning Commission. Commission staff contacted department heads and land use board volunteers. Town staff made further inquiries and posted notices for residents and other stakeholders who might wish to volunteer their time and serve on a committee. The first committee meeting was held February 21st, 2020 at the Derry Municipal Center to introduce the mitigation planning process to the committee.

Task 3: Create an Outreach Strategy: This task was conducted by town staff and the Regional Planning Commission throughout the plan update. Together, multiple efforts were made to involve and educate the public regarding the process and input of the plan. Details of various outreach efforts can be found in this section of the plan.

Task 4: Review Community Capabilities: The Committee reviewed hazard types and the areas in Town that were most vulnerable. The committee updated previous year's past and potential hazards maps using the Statewide Asset Data Exchange System data and FEMA flood zones maps. Furthermore, the Committee identified and catalogued all the critical facilities and areas at risk within the town, see Section IV and maps "Critical Facilities," and "Areas at Risk."

Task 5: Conduct a Risk Assessment: The Committee conducted several assessments to help determine the gaps in coverage. These include Assessing the Probability, Severity, and Risk of natural, technological, and human-caused hazards (Section IV).

Task 6: Develop a Mitigation Strategy: The Committee reviewed all hazards and the existing mitigation strategies meant to address those hazards in Section VIII. Additionally, the Committee evaluated the effectiveness of the existing measures to identify where they can be improved. Section IX summarizes the Committee's efforts in reviewing "complete", "completed and ongoing" or "deferred" action items from the 2015 Plan update as well as newly identified action items for the 2020 plan update. The Committee then evaluated all mitigation actions and prioritized them (Table 14: STAPLEE ranking matrix). The results can be found in The Community's action plan (Section X), which outlines each action item's associated hazard, responsible party, anticipated cost, and anticipated timeframe for implementation.

Task 7: Keep the Plan Current: The Town of Derry understands the ramifications for ensuring that this plan be monitored and updated annually or after a presidentially declared disaster. Section XI addresses this issue.

Task 8: Review & Adopt the Plan: After acceptance by the Committee, the Plan was submitted to New Hampshire Homeland Security and Emergency Management (HSEM) and the Federal Emergency Management Agency (FEMA) Region 1 Office, for review. At a public meeting, the Town Council formally adopted the plan on December 15th, 2020. The plan was then granted formal approval by FEMA on (date of FEMA approval).

Task 9: Create a Safe & Resilient Community: The committee discussed the mitigation actions in the Action Plan and the ways in which the implementation of the actions will be beneficial to the community. Annual reviews of the Action Plan by the committee are needed to maintain the timeframes identified for completion of activities. Incorporation of the plan into other land use plans and the Capital Improvement Plan may help ensure that the goals of this plan are met.

Public Outreach Process and Public Committee Meetings

The Derry Hazard Mitigation Plan Committee held four public meetings throughout the hazard mitigation plan update process. The first meeting was held February 21st, 2020 at the Derry Municipal Center. Due to the State of Emergency declared by the Governor as a result of the COVID-19 pandemic and in accordance with the Governor's Emergency Order #12 pursuant to Executive Order 2020-04 April 4, the following five meetings were held electronically on April 10th, May 8th, June 12th, and November 19th 2020. Meeting access information, including instructions on how to log on to the electronic meetings were posted in two public places at least 24 hours in advance, as required by New Hampshire state law, RSA 91-A, including both the Town's and Commission's websites. Southern New Hampshire Planning Commission (SNHPC) staff facilitated each meeting and prepared an agenda, attendance sheet and minutes, which were distributed to the committee and made available for public review upon request. Although the public was noticed about the committee meetings, there was no public attendance or input received. Copies of the meeting agendas, minutes and attendance sheets are provided in Appendix F.

Coordination with Other Agencies and Individuals

The Hazard Mitigation Committee members and their respective town departments contributed to the contents and reviewed the Plan drafts. Departments represented were:

- Town Council
- IT Department
- Emergency Management
- Department of Public Works
- Code Enforcement
- Planning Department
- Building Department
- Fire Department
- Police Department

... [M]itigation works. The Seattle-Tacoma area did not suffer significant losses [following the February 28, 2001, earthquake] because 20 to 30 years ago local leaders invested in its future by passing building codes and issuing municipal bonds that implemented solid protective measures.

**-FEMA Director Joe Allbaugh
Congressional testimony, May 16, 2001**

Hazard Mitigation Goals and Objectives

The Derry Hazard Mitigation Committee adopted the following goals, derived from the State of New Hampshire Multi-Hazard Mitigation Plan, 2018, for the Town of Derry at the February 21st, 2020 public meeting:

1. Minimize loss and disruption of human life, property, the environment, and the economy due to natural, technological, and human-caused hazards through a coordinated and collaborative effort between federal, State, and local authorities to implement appropriate hazard mitigation measures.
2. Enhance protection of the general population, citizens, and guests in the Town of Derry before, during, and after a hazard event through public education about disaster preparedness and resilience, and expanded awareness of the threats and hazards which face the Town and State.
3. Promote continued comprehensive hazard mitigation planning throughout the Town of Derry to identify, introduce, and implement cost effective hazard mitigation measures.
4. Address the challenges posed by climate change as they pertain to increasing the risk and impacts of the hazards identified within this plan.
5. Strengthen Continuity of Operations and Continuity of Government across the Town to ensure continuation of essential services.

DRAFT

II. COMMUNITY PROFILE

Community Profile

The Town of Derry is located in the south-central portion of the State of New Hampshire in Rockingham County. Derry is bordered by the Towns of Chester and Auburn to the north, Londonderry to the west, Windham and Salem to the south, and Atkinson, Hampstead, and Sandown to the east. It is located about 10 miles southeast of the City of Manchester and about 13 miles northeast of the City of Nashua.

Primary highway access is provided in part by U.S. Interstate 93, which runs north-south through the southwestern part of Town. Route 28 Bypass connects Derry with Auburn to the north and Windham to the south, and Route 102 provides access to Londonderry to the west and Chester to the east.

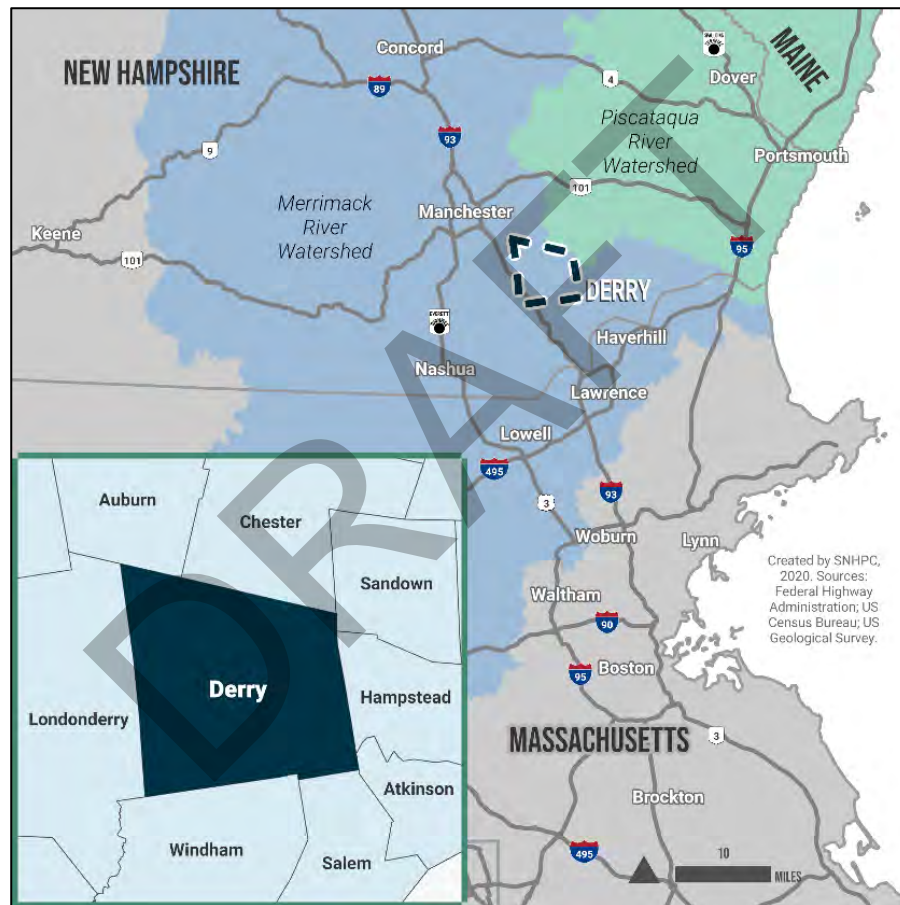


Figure 1: Location Map, Derry NH

The town lies within two major watersheds, with the largest encompassing Beaver and Horne's Brooks, contributing to the Merrimack River Watershed. The Beaver Lake Watershed, a sub-watershed of the Merrimack, covers 7.72 square miles in the northern end of Derry.⁵ Several streams, ponds and wetlands are also scattered throughout the Town. Most of the wetlands are associated with the Town's many low points, ponds, and streams in the form of swamps. The largest wetland areas are in the southeast corner of the town around Ballard Lake and to the north of Big Island Pond, as well as east part of the town around the Hoodcroft Country

⁵ Town of Derry, NH Master Plan, 2020

Club and Lower Shields Pond. To protect these areas, the town has established a Wetlands Conservation Overlay District, as well as a Conservation Corridor Overlay District (Derry Master Plan, 2020).

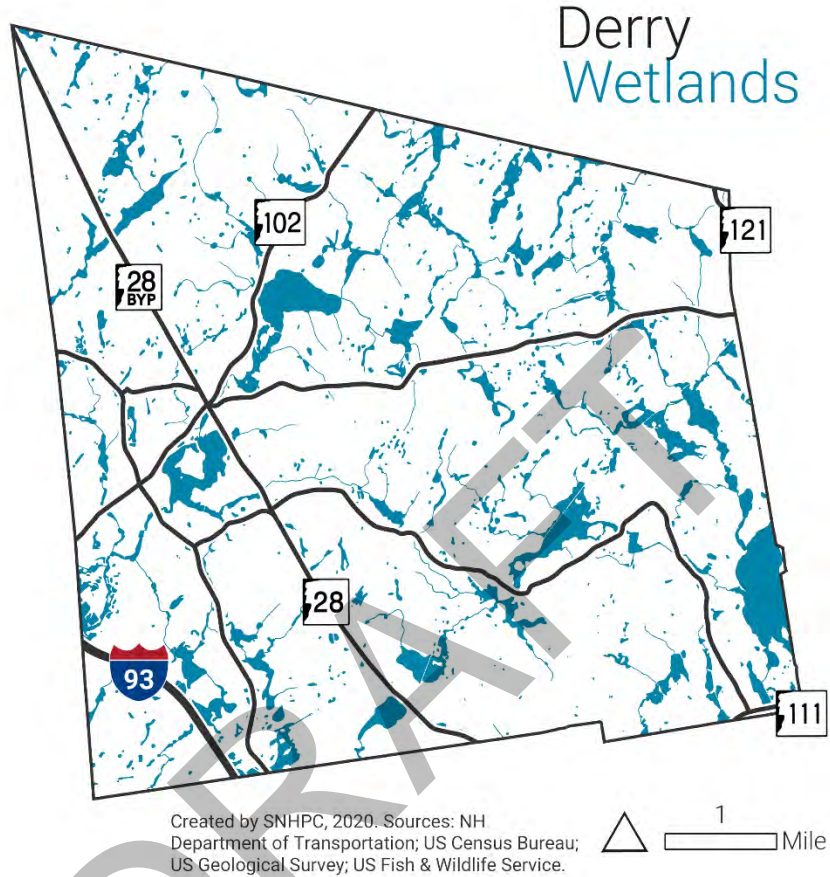


Figure 2: Derry Wetlands

The Town is characterized by stratified and unstratified material deposited by a receding glacial ice sheet. Irregular slopes, coarse soils, occasional outcrops of bedrock, and boulders are common. Soils are very acidic and are associated with swamps and wetlands. Wet swamp areas and kettle-hole ponds serve as the headwaters for many streams in the area. These swamps and ponds provide large amounts of natural storage and reduce peak discharges.

Elevations in the Town range from approximately 190 feet near Island Pond to approximately 600 feet at the summit of Warner Hill. The full extent of the Town's steep slopes can be found in Appendix F.

Development and Population Trends

Derry is home to approximately 33,312 people in 12,962 households.⁶ Located off I-93 on the outskirts of the Boston Metro labor market area, Derry has a distinctive form with a traditional downtown flanked by compact neighborhoods on one side of town and a low-density countryside framed by curving roads, farmsteads, and open land on the other side, in

⁶ U.S. Census Bureau, 2013-2017 American Community Survey, B01003, B11001.

East Derry.⁷ Derry’s population grew dramatically between 1970 and 1990. Since then, Derry’s population has remained steady, fluctuating between 33,000 and 34,000 people. It is projected to exceed 35,000 by 2030 and decline slightly thereafter⁸ (Figure 3) (Retrieved from Derry Master Plan, 2020)

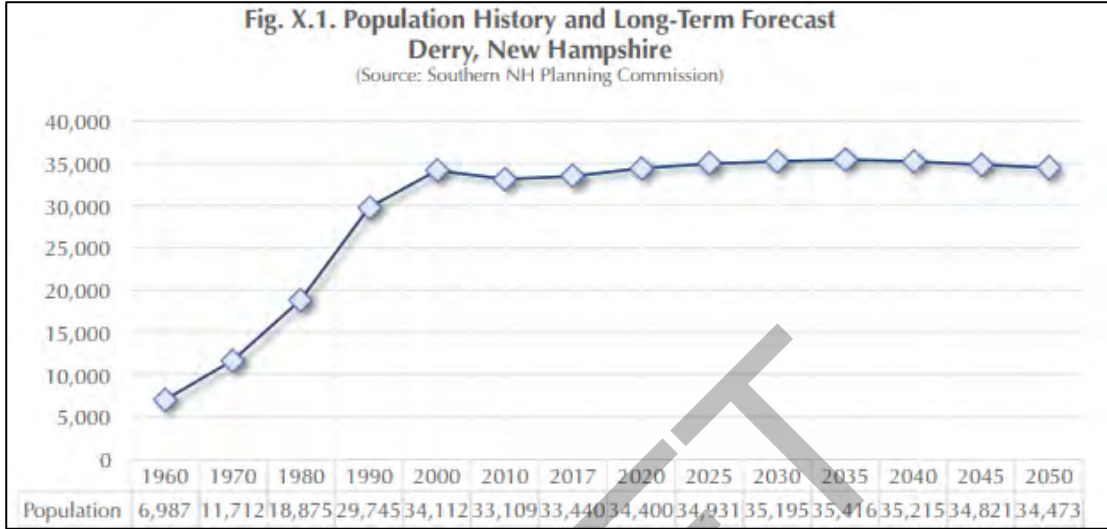


Figure 3: Population History and Long-Term Forecast Derry, NH

Today, much of Derry is developed as low-density residential subdivisions in the western and southern ends of town – areas with relatively good highway access that connects residents to regional employment centers. Along and west of Route 28, however, Derry is a densely settled urban center with a compact downtown and a wide variety of uses. Together, Interstate 93 and State Route 28 have left an indelible imprint on Derry’s development pattern, just as the semi-rural roads and limited utilities on the east side of town help to explain the low-density residential and agricultural character found there (Derry Master Plan, 2020). From 2011-2017, Derry has permitted approximately 227 new residential units.⁹

The western section of Derry, closest to Interstate 93, contains the highest proportion of developed land. Commercially and industrially developed lands are located predominantly in the central and west sections of Town, while East Derry’s land use character is predominantly lower density residential. The I-93 Exit 4A interchange, anticipated to be completed in 2027, provides increased opportunities for economic development in Town. The project will reduce congestion and improve safety along NH 102 from I-93 through Derry’s downtown and promote economic activity. Additionally, the new interchange provides opportunities for active transportation developments downtown such as reduced travel lane widths and improved bicycle and pedestrian facilities (Derry Master Plan, 2020).

Disaster Risk

Derry is prone to a variety of natural, technological, and human-caused hazards, of which flooding poses the greatest risk. Flooding of roads due to changes in land use within the watershed has increased over time. Historically, major floods occur during the spring, fall and winter seasons in Derry. Some of the more severe flooding has occurred in early spring

⁷ Town of Derry, NH Master Plan, 2020

⁸ Southern New Hampshire Planning Commission, *SNHPC Population Projections*

⁹ Town of Derry, Assessor.

because of snowmelt, heavy rains, and ice jams. Derry is susceptible to receiving large volumes of snow from Nor'easters and other storms. Additionally, with increased development, the town's vulnerability to wildfires increases due to less open space and increasing average annual temperatures, which heightens the risk of prolonged droughts and wildfires.

Derry has experienced ongoing, steady development since the 2015 plan update and has been proactive in implementing measures to become a more disaster-resilient community (further outlined in section VI). While the Town is vulnerable to several natural hazards such as flooding and wildfires, its use of the goals and objectives presented in this hazard mitigation plan, its planning and land use activities as well as its emergency operations, ensures its overall vulnerability to natural hazards remains low.

III. DETERMINING HOW MUCH WILL BE AFFECTED

Identifying Vulnerable Facilities

It is important to determine which critical facilities are the most vulnerable and to estimate their potential loss. The first step is to identify the facilities most likely to be damaged in a hazard event. To do this, the location of critical facilities illustrated on Map 4 was compared to the location of various topographical elements, floodplains, roads, and water bodies using GIS (Geographic Information Systems). Vulnerable facilities were identified by comparing their location to possible hazard events. For example, all structures within the 100-year and 500-year floodplains were identified and used in conducting the potential loss analysis for flooding. The following discussion summarizes the potential loss estimates to structures (residential and non-residential) due to natural hazard events.

Flooding

The estimation of flood risk was made following the Total Exposure in Floodplain (TEIF) methodology developed and conducted by FEMA for Region III. In this process, assessing data are joined with GIS building footprints. These building footprints are then overlaid with flood zones to determine the percentage of each in each flood zone. Financial exposure is then calculated proportionally based on the area in the floodplain as a percentage of the overall footprint. The TEIF procedure is typically used when significant data gaps exist that would inhibit more complex models.

Flood zone was determined using FEMA's National Flood Hazard Layer (NFHL), a GIS representation of the Flood Insurance Rate Maps (FIRM). The town maintains no official building footprint GIS layer, so Microsoft's 2018 building footprint layer was used. GIS parcel and assessment data were received from the town in June 2020.

There are shortcomings with this procedure. First, it assumes all the value of a structure is located on its ground floor level. Second, building elevation and the expected elevation of a flood are not considered as building elevation data is not available in the assessing or GIS data. Lastly, indirect effects of damage to infrastructure or disruption of service are not evaluated. However, at a municipal scale it gives a useful baseline, ballpark estimate of a town's property value direct vulnerability to flooding events.

For Derry, approximately 615,400 square feet of structures' footprints are within FEMA flood zones. Around 1/3 of this amount is in the 1% annual chance flood zone. In total, buildings in the 1% annual chance and 0.2% annual chance flood zones account for less than 3% of the

town's overall building footprint. Similar trends are found for property value as well. Less than 1% of Derry's overall built property value has a roughly 1 in 3 chance of flooding during a thirty-year mortgage. However, while the amount of property exposed is a small fraction of the town's total property value, it is many times the amount that has previously applied for flooding assistance.

Total Building Exposure in the Floodplain	Exposure			
	Area of structures (sq. ft)	% of Total Area	Value of structures	% of total assessed value
FEMA Flood Zone (Total)	615,400	2.84%	\$64,979,700	2.62%
1% Annual Chance of Flooding (100-year)	224,500	1.04%	\$19,798,700	0.8%
Floodway	4,200	0.02%	\$207,200	0.01%
Non-Floodway	220,200	1.02%	\$19,591,500	0.79%
0.2% Annual Chance of Flooding (500-year)	391,000	1.81%	\$45,181,000	1.82%
Outside FEMA Flood Zone	21,019,800	97.16%	\$2,417,764,100	97.38%

Table 2: Building Exposure in Flood zones

National Flood Insurance Program

Derry has been participating in the National Flood Insurance Program (NFIP) since April 15, 1981. Flood Insurance Rate Maps and Digital Flood Insurance Rate Maps, effective May 17, 2005, are used for flood insurance purposes and are on file with the Derry Planning Board. The Town of Derry also continues to implement and enforce their Floodplain Development Ordinance (Article VII), which regulates all new construction and substantial improvements within the Special Flood Hazard Areas (SFHAs). Additionally, the town has implemented the following actions related to continued compliance with NFIP:

- Participate in NFIP training offered by the State and/or FEMA (or in other training) that addresses flood hazard planning and management
- Establish mutual aid agreements with neighboring communities to address administering the NFIP following a major storm event.
- Address NFIP monitoring and compliance activities
- Revise/adopt subdivision regulations, erosion control regulations, board of health regulations, etc. to improve floodplain management in the community
- Prepare, distribute, or make available NFIP, insurance and building codes explanatory pamphlets or booklets
- Identify and become knowledgeable of non-compliant structures in the community
- Identify cause of submit-to-rate structures and analyze how to prevent non-compliant structures in the future
- Inspect foundations at time of completion before framing to determine if lowest floor is at or above Base Flood Elevation (BFE), if they are in the floodplain
- Require the use of elevation certificates
- Enhance local officials, builders, developers, local citizens, and other stakeholders' knowledge of how to read and interpret the FIRM
- Work with elected officials, the state and FEMA to correct existing compliance issues and prevent any future NFIP compliance issues through continuous communications, training, and education

As of October 2020, there are 112 NFIP policies in-force in the Town of Derry with \$25,733,100 total insurance in-force. There have been 38 paid losses since 1978 totaling approximately \$192,970¹⁰. The town has 6 residential repetitive loss properties with losses totaling approximately \$117,155.25 (Office of Strategic Initiatives, 2020).

Dam Breach or Failure

Dam breach or failure could cause extensive flooding in Derry. Potential losses will depend on the extent and location of the dam failure or breach. The New Hampshire Department of Environmental Services categorizes dams into one of the following classifications: Non menace, low hazard, significant hazard and high hazard, which are differentiated by the degree of potential damages that a failure of the dam is expected to cause (NHDES.org). A complete description of the dam classifications can be found in section V “Past and Potential Hazards.”

The following is a list of dams in Derry and their hazard classification (Retrieved from the New Hampshire Department of Environmental Services, 2020):

<u>Dam Name</u>	<u>River</u>	<u>Dam Owner</u>	<u>Hazard Classification</u>	<u>Status</u>
Adams Pond Dam	Beaver Brook	Jean M Gagnon Rev Trust	N/A	Exempt
Abdallah Detention Pond	Runoff	Town of Derry	N/A	Exempt
Ballard Pond Mill Dam	Taylor Brook	NHDES Water Division	Significant Hazard	Active
Ballard Pond Upper Dam	Taylor Brook	NHDNCR	Low Hazard	Active
Beacon Hill Estates Det Pond 1	Runoff	Abdallah Construction Corp	Non-Menace Hazard	Active
Beacon Hill Estates Det Pond 2	Runoff	Cap Realty	Non-Menace Hazard	Active
Beaver Brook Dam	Beaver Brook	Town of Derry	Low Hazard	Active
Big Island Pond Walter Stickney Dam	Spickett River	Big Island Pond Corp	Significant Hazard	Active
Branch Beaver Brook	Tr Beaver Brook	Mr. Peter Bangs	N/A	Exempt
Chakarian Farm Pond Dam	Unnamed Stream	Mr. William K Chakarian	N/A	Exempt
Cole Marsh Pond Dam	Drew Brook	Town of Derry	N/A	Exempt
Decarolis Dam	Tr Beaver Brook	Mr. Joseph Decarolis	N/A	Exempt
Derry Meadows Shoppes Dam	Shields Brook	Suso 4 Derry Lp	Low Hazard	Active
Derry Middle School Dam	Runoff	Sau 10	Non-Menace Hazard	Active
Derry Sludge Treatment Lagoon	N/A	Town of Derry	N/A	Combine d
Derry Waste Lagoon Dam	N/A	Town of Derry	Significant Hazard	Active

¹⁰ NH Office of Strategic Initiatives

Detention Pond	Runoff	Young Tate Tate And Dipalma	N/A	Exempt
Drew Woods Det Pond	Runoff	Mpl 2 Inc	N/A	Exempt
Drew Woods I	Runoff	David Webber And Lewis Steven	N/A	Exempt
Drew Woodsdet Pond I	Runoff	Mpl 2 Inc	N/A	Exempt
Dyson Dam	Taylor Brook	Mr. Lawrence Dyson	N/A	Exempt
East Derry Fire Precinct Pond Da	Tr Cunningham Brook	Mr. Frederick Love	Non-Menace Hazard	Active
Ferdinando Dam	Unnamed Stream	Mr. Vincent Ferdinando	N/A	Exempt
Fire Pond	Tr Cunningham Brook	Mr. Louis Bailey	Non-Menace Hazard	Active
Fire Pond	Tr West Running Brook	Mr. Edwin Simonsen	Non-Menace Hazard	Active
Fire Pond	Unnamed Stream	Ms. Eldora Farland	N/A	Exempt
Fire Pond	Unnamed Stream	Hidden Valley Camp	Non-Menace Hazard	Active
Fire Pond	Unnamed Stream	Mr. William R Geissenhainer	Non-Menace Hazard	Active
Fire Pond Dam	Unnamed Stream	East Derry Fire Precinct	Non-Menace Hazard	Active
Fire Pond Dam	Tr Taylor Brook	Mr. Richard True	Non-Menace Hazard	Active
Fire Pond Dam	Unnamed Stream	Mr. William Roy	N/A	Exempt
Hidden Valley Camp Dam	Wilson Brook	Hidden Valley Camp	Non-Menace Hazard	Active
Holland Dam	Shields Brook	Hornes Pond Real Estate Group LLC	Low Hazard	Active
Hoods Pond Dam	Shields Brook	Town of Derry	High Hazard	Active
Maplehaven Detention Pond	Runoff	Jakon Development	N/A	Exempt
Maplehaven Detention Pond	Runoff	Jakon Development	N/A	Exempt
Redfield Estates Pond Dam	Beaver Brook	Redfield Estates Assoc	N/A	Exempt
Walgreens Det Pond	Runoff	Mark Investments Inc	Non-Menace Hazard	Active

Table 3: Dams Derry NH

There has been no dam breach or failure in Derry since the 2015 Plan update.

Hurricanes

Hurricanes occur periodically in the Northeast, but most degrade to tropical storms by the time they reach inland communities such as Derry. These tropical storms can still cause

significant damage to the community due to flooding and strong winds. The assessed value of all residential and commercial structures in Town as of 2020 is \$3,955,581,963. Assuming 1% to 5% damage, a hurricane could result in \$39,555,819 to \$197,779,098 of structure damage.

Tornadoes / High Wind Events

While tornadoes are relatively uncommon in New Hampshire, significant damage can occur depending on where the tornado strikes. New Hampshire is located within Zone 2 for Design Wind Speed for Community Shelters, which is 160 mph. The assessed value of all residential and commercial structures in Town as of 2020 is \$3,955,581,963. Assuming 1% to 5% damage, a hurricane could result in \$39,555,819 to \$197,779,098 of structure damage.

Severe Winter Weather

New Hampshire is periodically impacted by heavy snowstorms and Nor'easters during the months of January and February. The severity of these types of storms vary according to the amount of snow and ice that accumulates during the storm as well as wind velocity. Ice storms often cause widespread power outages and significant damage to trees and power lines. The ice storm of 2008 caused \$15 million worth of damage to the State as a whole. The assessed value of all residential and commercial structures in Town as of 2020 is \$3,955,581,963. Assuming 1% to 5% damage, a severe winter weather event could result in \$39,555,819 to \$197,779,098 of structure damage.

Wildfires

The risk of fire varies depending on the location. Forest fires are more likely to occur during prolonged periods of drought. The entire town of Derry is susceptible to wildfire risk, especially isolated neighborhoods where access by emergency personnel may be more difficult. The assessed value of all residential and commercial structures in Town as of 2020 is \$3,955,581,963. Assuming 1% to 5% damage, a wildfire event could result in \$39,555,819 to \$197,779,098 of structure damage.

Earthquakes

New Hampshire is considered to be an area of moderate seismic hazard. This means that the State could experience large (6.5-7.0 magnitude) earthquakes, but they are not likely to occur as frequently as in a high hazard area like California. The State typically experiences one or two earthquakes per year registering magnitude 2.0 to 3.5 and numerous other smaller ones.¹¹ The entire Town of Derry is susceptible to structural damage from an earthquake. The assessed value of all residential and commercial structures in Town as of 2020 is \$3,955,581,963. Assuming 1% to 5% damage, an earthquake could result in \$39,555,819 to \$197,779,098 of structure damage.

Lightning

The extent of lightning damage will vary according to the structure or area hit. The damage could range from a few thousand dollars to a million plus, depending on the severity of the event. No major lightning damage is known to have occurred in the Town.

Drought

Prolonged periods of drought may increase the risk of wildfires in forested areas and impact town water supplies. The amount of damage incurred will depend on the length and severity

¹¹ State of New Hampshire Multi Hazard Mitigation Plan 2018

of the drought. The Town of Derry, like the rest of the State was impacted by the drought that occurred the Summer of 2016 and is currently experiencing a drought this year in 2020.

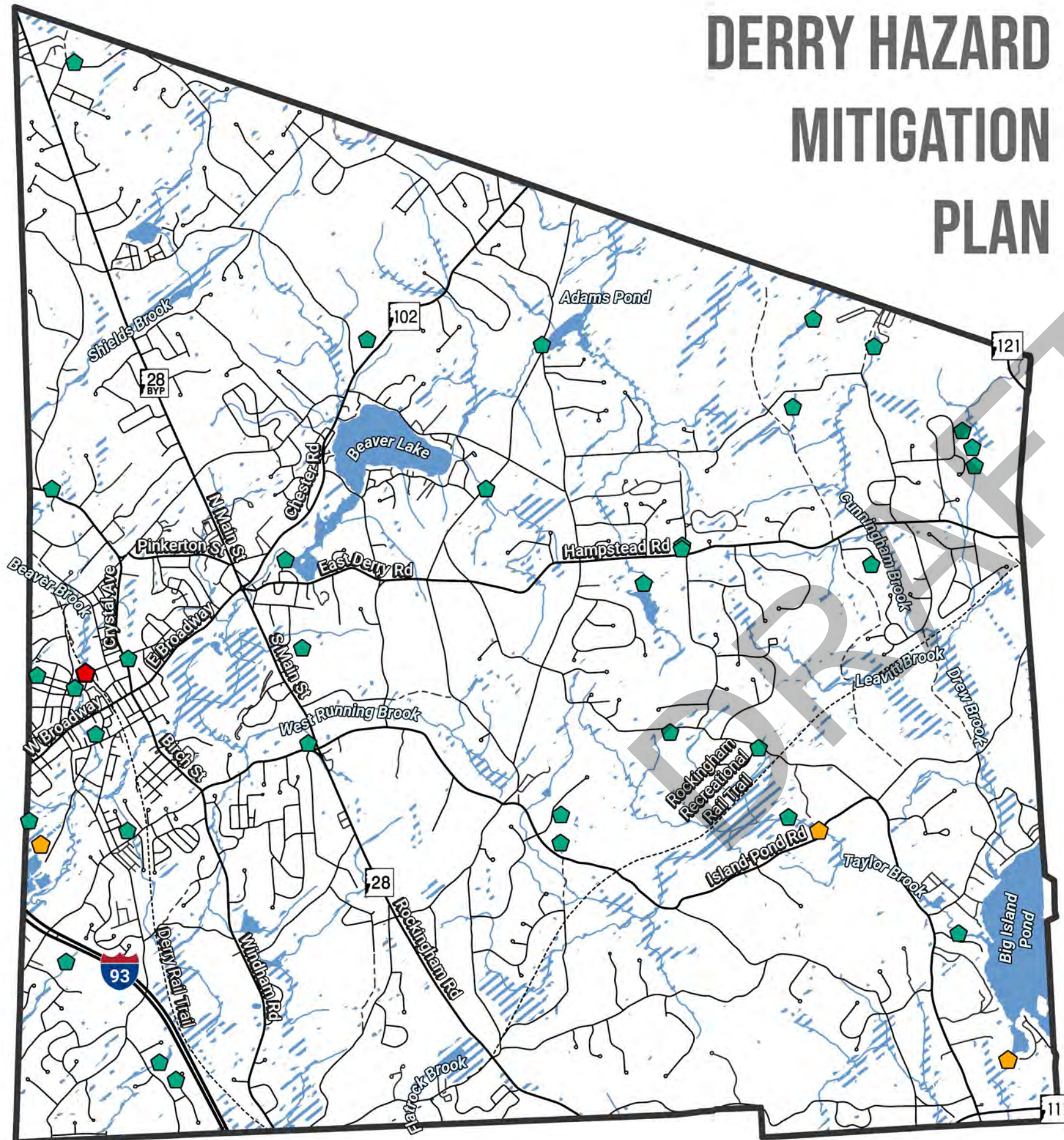
Extreme Temperatures

The entire Town of Derry is susceptible to damage from extreme temperatures. Periods of extreme heat could increase the risk of wildfires and periods of extreme cold might impact water pipes and other infrastructure. Vulnerable populations such as the elderly and homeless in Derry are more susceptible to the impacts of extreme temperatures. The amount of damage will vary depending on the hazard event.

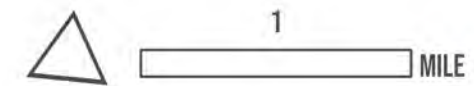
DRAFT

DERRY HAZARD MITIGATION PLAN

Map 1: Dams



- High Hazard
- Significant Hazard
- Other Dams



Created by the Southern New Hampshire Planning Commission, 2020. Sources: Federal Emergency Management Agency; NH Department of Environmental Services; NH Department of Transportation; US Census Bureau; US Geological Survey; US Fish & Wildlife Service.

IV. ASSESSING PROBABILITY, SEVERITY AND RISK

The Committee members completed a risk assessment for the following hazards: inland flooding, drought, earthquakes, extreme temperatures, High wind events, infectious disease, lightning, severe winter weather, solar storms and space weather, tropical and post tropical cyclones and wildfire. The process involved assigning Low, Medium, or High values (numerically 1, 2 or 3) to each hazard type for its possible impact to humans, property, and businesses. (A score of zero was given if the hazard was not applicable). To assess probability, a 1, 2, or 3 value was assigned to each hazard type with respect to the likelihood that the hazard would occur in the next 25 years. Severity was calculated by determining the average of the human, property, and business impacts. Risk was calculated by multiplying severity by probability and low, medium, or high risk was assigned accordingly.

0 – 1.9 Low 2.0 – 3.9 Low-Med 4 – 5.9 Med 6-7.9 Med-High 8 – 9 -High

	Human Impact	Property Impact	Business Impact	Probability	Severity	Relative Threat	Risk
	Probability of Death or Injury	Physical Losses and damages	Interruption of Service	Likelihood this will occur in 25 years	Avg. of Human/Property/Business	Severity x Probability	
Natural Hazards							
Inland Flooding	1	2	1	3	1.3	4	Med
Drought	1	1	1	1	1	1	Low
Earthquake	1	1	1	1	1	1	Low
Extreme Heat	1	1	1	1	1.0	1	Low
Extreme Cold	1	1	1	1	1.0	1	Low
High Wind Events	1	1	1	1	1	1	Low
Infectious Diseases	2	1	1	2	1.3	2.7	Low-Med
Lightning	1	1	1	1	1	1	Low
Heavy Snow	1	1	1	1	1	1	Low
Blizzard	1	1	1	1	1	1	Low
Nor'easter	1	1	1	1	1	1	Low
Ice Storm	1	2	2	3	2	6	Med-High
Solar Storms and Space Weather	1	1	1	1	1.0	1	Low
Tropical and Post Tropical Cyclones	1	1	1	1	1.0	1	Low
Wildfire	1	1	1	1	1.0	1	Low
Technological Hazards							
Aging Infrastructure	1	1	1	1	1.0	1	Low
Conflagration	1	1	1	1	1.0	1	Low
Dam Failure	1	2	1	1	1.3	1.3	Low
Known and Emerging Contaminates	1	1	1	2	1	2	Low-Med
Long-term Utility Outage	1	1	1	2	1	2	Low-Med
Human Caused Hazards							
Cyber Events	1	1	1	2	1.0	2	Low-Med
Mass Casualty Incident	1	1	1	2	1.0	2	Low-Med
Terrorism/Violence	1	1	1	2	1	2	Low-Med
Transport Accident	1	1	1	2	1	2	Low-Med

Table 4: Hazard Risk Assessment

V. PROFILE OF PAST AND POTENTIAL HAZARDS

An important step in planning for natural hazard mitigation is to identify hazards that may affect the Town. Some communities are more susceptible to certain hazards (i.e., flooding near rivers, hurricanes on the seacoast, etc.). Due to topography and location as well as the history of hazard events that have impacted Derry, the following natural hazards were identified and analyzed as part of this plan update:

- Inland flooding
- Drought
- Earthquakes
- Extreme temperatures
- High wind events
- Infectious disease
- Lightning
- Severe winter weather
- Solar storms and space weather
- Tropical and post tropical cyclones
- Wildfire

Technological and human-caused hazards were also discussed as part of this plan update. These include the following:

- Aging infrastructure
- Conflagration
- Dam failure
- Known and emerging contaminants
- Long term utility outage
- Cyber events
- Mass casualty incidents
- Terrorism / violence and
- Transport accidents

Natural hazards that are included in the State of New Hampshire's 2018 Multi-Hazard Mitigation Plan but are not included in this plan update include avalanche, coastal flooding, and landslides. The Town of Derry has no record of landslides or avalanches and little chance of either occurring in Town. Therefore, they were left out of the 2020 plan update. Since Derry is not located on the seacoast, coastal flooding is not an applicable natural hazard.

The following section includes profiles of each of the identified hazards. The profiles include a description of the hazard, the geographic location of each natural hazard (if applicable), the extent of the natural hazard (e.g. magnitude or severity), probability, and past occurrences. Past occurrences of natural hazards were mapped if possible (Map 2: Past and Future Hazards). A summary of natural hazard events having occurred since the 2015 Plan update is located at the end of this section.

Natural Hazards

Inland Flooding

Description: Inland flooding is generally defined as a high flow, overflow, or inundation by water, which causes or threatens damage¹². Flooding results from the overflow of rivers, their tributaries, and streams throughout the State, primarily from high precipitation events (State of New Hampshire Multi-Hazard Mitigation Plan, 2018).

Location: Several areas in Derry are susceptible to flooding events. Development in Derry is concentrated in the vicinity of Beaver Lake and Brook as well as Hornes Pond and Brook. Derry has approximately 100 detention ponds that are designed for 50-year flood hazards. These ponds do not pose a significant risk to the community but have the potential to cause localized flooding problems. The following areas have had flooding problems, including erosion and problem culverts:

Area	Type of Damage and Description	Severity	2020 Update
Old Chester Rd at the fire pond	Erosion of pavement	Severe	Debris plugged - debris still causes minor overtopping
Cemetery Rd at Humphrey Rd	Road and shoulder erosion	Severe	Plugged catch basins - shoulder stabilized with erosion stone
East Derry Rd from Pine Isle Dr. to Schurman Dr.	Shoulder erosion	Severe	Isolated incident with no further issues
Pond Rd at the Beaver Lake Bridge	Shoulder Erosion	Moderate	Dam removed December 2012 - may allow for better flow under bridge
Robin Rd (top half)	Road and shoulder erosion	Moderate	Isolated incident with no further issues
Fordway Bridge	Road and shoulder erosion	Moderate	Bridge replaced in 2011 - still located in floodplain with potential for overtopping
Bowers Rd at the Windham Rd end	Road and shoulder erosion	Moderate	Debris and capacity issues - mitigation still needed
Rt. 102 at Jake's Auto Body (between Beaver Rd and Tsienneto Rd)	Undersized culverts	Moderate	State responsibility - still needs mitigation
Hampstead Rd at Damren Rd	Shoulder Erosion	Moderate	State responsibility - still needs mitigation - undersized culverts
Warner Hill Rd between Hubbard Hill Rd and Hunter	Shoulder Erosion	Moderate	Potential for moderate issues still, due to steep slopes in the area

¹² <http://w1.weather.gov/glossary/index.php?letter=f>

Area	Type of Damage and Description	Severity	2020 Update
Walnut Hill Rd near Partridge Ln	Debris- caused shoulder erosion	Moderate	Isolated incident with no further issues
Old Auburn Rd (south end)	Road and shoulder erosion	Minor	Minor one-time issue
North Shore Rd at Beaver Lake	Road and shoulder erosion	Minor	Minor one-time issue
Florence St at the bridge	Road and shoulder erosion	Minor	Bridge replaced - potential for minor erosion still due to location within a floodplain
Goodhue Rd near Goodhue Extension	Road and shoulder erosion	Minor	Located in floodplain - no improvements made - erosion is minor
Germantown Rd (Private)	Road and shoulder erosion	Minor	Minor issue - Mitigation is a private responsibility
Rockingham Shores Rd (Private)	Road and shoulder erosion	Minor	Minor issue - Mitigation is a private responsibility
South Main St at the bridge	Shoulder erosion	Minor	Minor issues with potential for recurrence
Island Pond Rd between Taryn Rd and Drew Rd	Shoulder Erosion	Minor	Isolated incident with no further issues
Pingree Hill Rd at Old Auburn Rd	Debris clogging catch basin	Minor	Isolated incident with no further issues
Rt. 102 at the Chester Town line	Undersized culvert	Minor	State responsibility - still needs mitigation
Rt. 102 at Emerson Dr.	Undersized culvert	Minor	State responsibility - still needs mitigation
Warner Hill Rd - south of Stoneleigh Dr.	Shoulder erosion	Minor	Isolated incident with no further issues
Adams Pond Rd at Old Chester Rd	Shoulder Erosion	Minor	Isolated incident with no further issues
Hampstead Rd at Fire Station	Shoulder Erosion	Minor	Isolated incident with no further issues
Hampstead Rd at Village Brook Ln	Shoulder Erosion	Minor	State Highway - minor issues
Old Auburn Rd at Bisbee Circle	Shoulder Erosion	Minor	Isolated incident with no further issues

Area	Type of Damage and Description	Severity	2020 Update
Eastman Dr. at Spollett	Dam collapse upstream	Minor	Isolated incident with no further issues
Damren Rd near Hidden Valley Campground	Shoulder Erosion	Minor	Isolated incident with no further issues after debris cleanup

Table 5: Problem Flooding Areas

The following flooding hazards have been mitigated:

Area	Type of Damage and Description	Severity	2020 Update
N High St at Franklin St	Shoulder, road, and culvert erosion	Severe	Structure to be replaced as part of Exit 4A project
North Shore at Island Pond Rd	Road and shoulder erosion	Severe	Bridge to be replaced in 2020
Back Chester Rd at Adam's Pond Dam	Shoulder Erosion	Minor	Dam has been lowered as of 2020
Tsienneto Rd at the intersection of Route 102	Road and shoulder erosion	Minor	Structure to be replaced as part of Exit 4A project

The following potential hazard areas for bridges are of particular concern and may pose a flooding risk:

- Highland Ave Bridge
- West Broadway Bridge
- Birch Street Bridge
- East Derry Road at Thornton Street
- Fordway Extension Bridge

All Special Flood Hazard Areas in the Town of Derry are potentially at risk if a 100-year floodplain event occurs. Concern should be given to the above listed known problem locations. Map 1 displays building footprints and development in Derry within the 100- and 500-year flood plains.

Extent: Where river gauges are present, the magnitude of flooding is ranked, and area-specific forecasts are created using a flood scale that ranges from the Action Stage to Major Flood Stage. The National Weather Service characterizes flood severity to communicate the impact of flooding more effectively as follows:

- Action Stage – Water source is rising, and actions must be taken in preparation for potential significant hydrologic activity. There are no impacts at this stage.
- Minor Flood Stage – Minimal or no property damage, but possibly some public threat (e.g., inundation of roads)
- Moderate Flooding – Some inundation of structures and roads near streams. Some evacuations of people and/or transfer of property to higher elevations

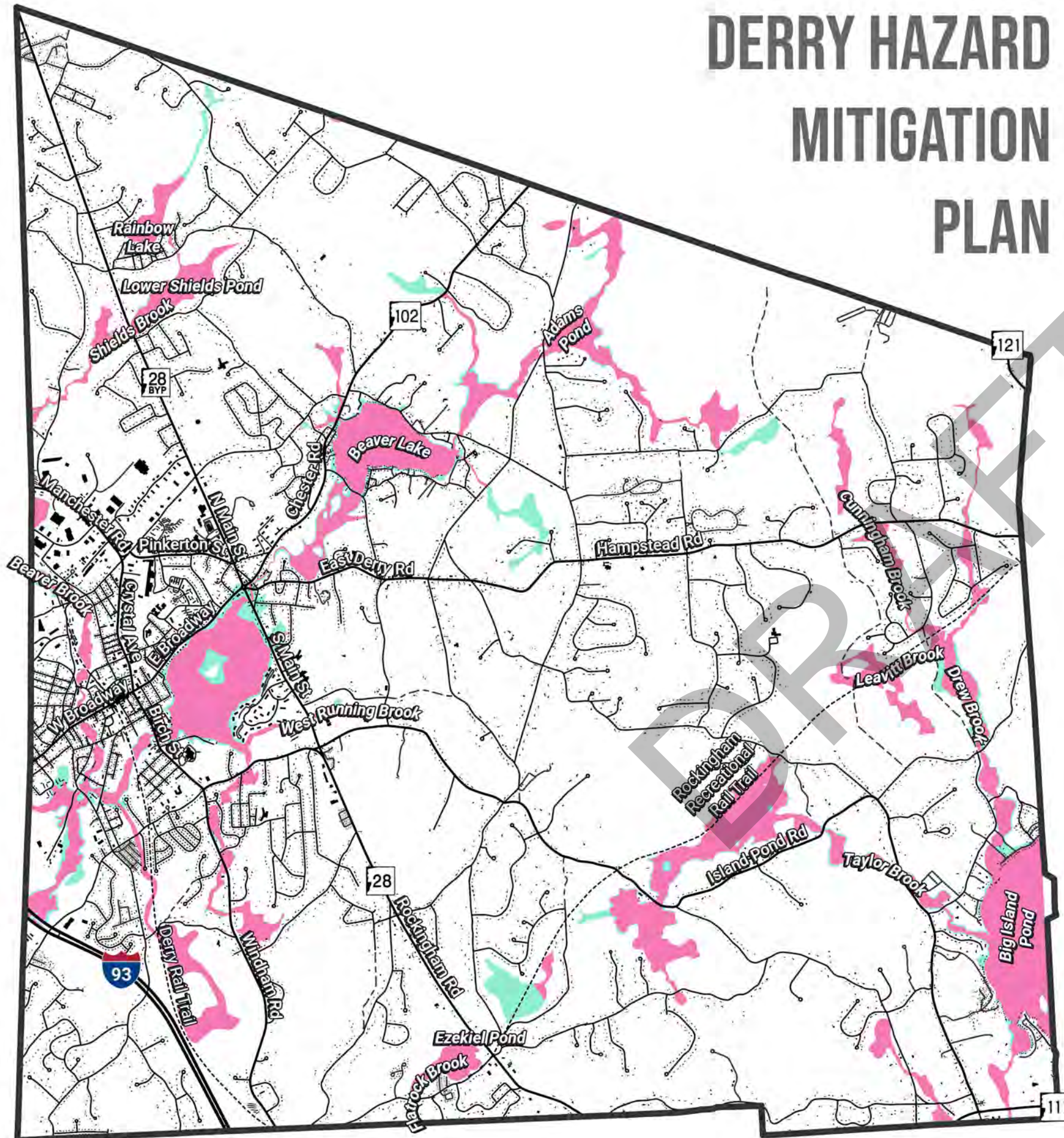
- Major Flooding – Extensive inundation of structures and roads. Significant evacuations of people and/or transfer of property to higher elevations.

Areas that are not monitored by river gauges are not forecasted or measured using a specific scale; therefore, the best way to describe the extent of the hazard of flooding is its speed of onset (how quickly the floodwaters rise) and its duration (how long the area remains inundated with flood waters). Floods can happen slowly over time during a long duration event or they can happen very rapidly (flash flooding). The speed of onset and duration of an inland flooding event is influenced by the size of the channel and contributing watershed area, terrain of the contributing watershed area, intensity and duration of the rainfall or snowmelt, recent rainfall history, and other factors (State of New Hampshire Multi-Hazard Mitigation Plan, 2018).

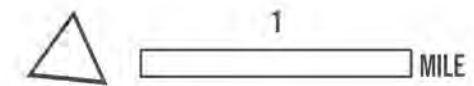
DRAFT

DERRY HAZARD MITIGATION PLAN

Map 2: Flood Zones



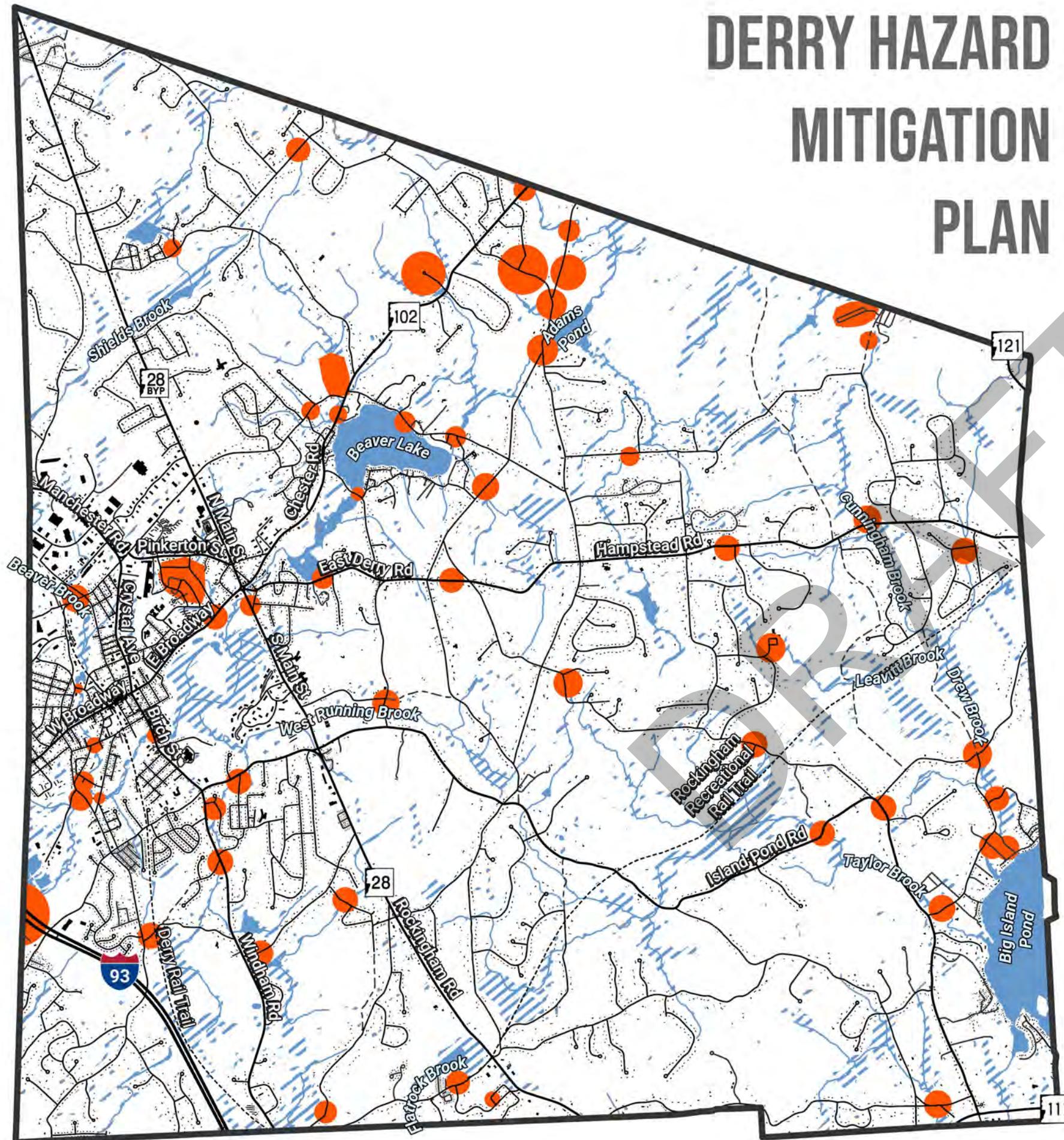
- 1% Annual Chance
- 0.2% Annual Chance



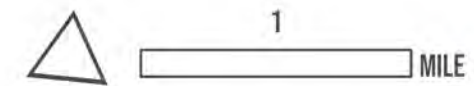
Created by the Southern New Hampshire Planning Commission, 2020. Sources: Federal Emergency Management Agency; NH Department of Transportation; Open Street Maps; US Census Bureau.

DERRY HAZARD MITIGATION PLAN

Map 3: Past Flood Hazards



Orange circle: Past Flooding Events



Created by the Southern New Hampshire Planning Commission, 2020. Sources: NH Department of Environmental Services; NH Department of Transportation; Open Street Maps; Town of Derry; US Census Bureau; US Geological Survey; US Fish & Wildlife Service.

Drought

Description: A drought is the absence of water in a region that occurs slowly due to below-average precipitation over an extended period, resulting in low stream flows, low surface water, and low groundwater levels (State of New Hampshire Multi-Hazard Mitigation Plan, 2018).

New Hampshire breaks the State into five Drought Management Areas: one in the north; one across the central region; and three along the southern portion of the State. Federal agencies have coordinated to develop the National Drought Monitor which classifies the duration and severity of the drought using precipitation, stream flow, and soil moisture data coupled with information provided on a weekly basis from local officials. The New Hampshire Drought Management Team, whose efforts are coordinated by the NH DES, utilizes these maps to help determine which areas are hit the hardest. NH DES also maintains a “Situation Summary” where precipitation, stream flow, groundwater level, lake level and fire danger data from all over the state can be accessed to assess if areas in New Hampshire are being impacted by drought.

Location: All areas in Derry have the potential to be impacted by a drought event. Droughts increase the risk of wildfire, especially in forested areas. In the drought of 2016-17, private wells throughout town were significantly compromised. the US Drought Monitor program classifies drought on a scale of none to D4 (Exceptional Drought). The first two maps in Figure 4 show the average number of weeks each year of D0 (Abnormally Dry) drought or worse (Mild or Worse) and D1 (Moderate Drought) or worse for 2000-2009. The bottom two maps show the same for the period of 2010-2019. In both instances, Southern New Hampshire and the rest of New England show an increase in the average number of weeks of drought each year compared to the previous decade.

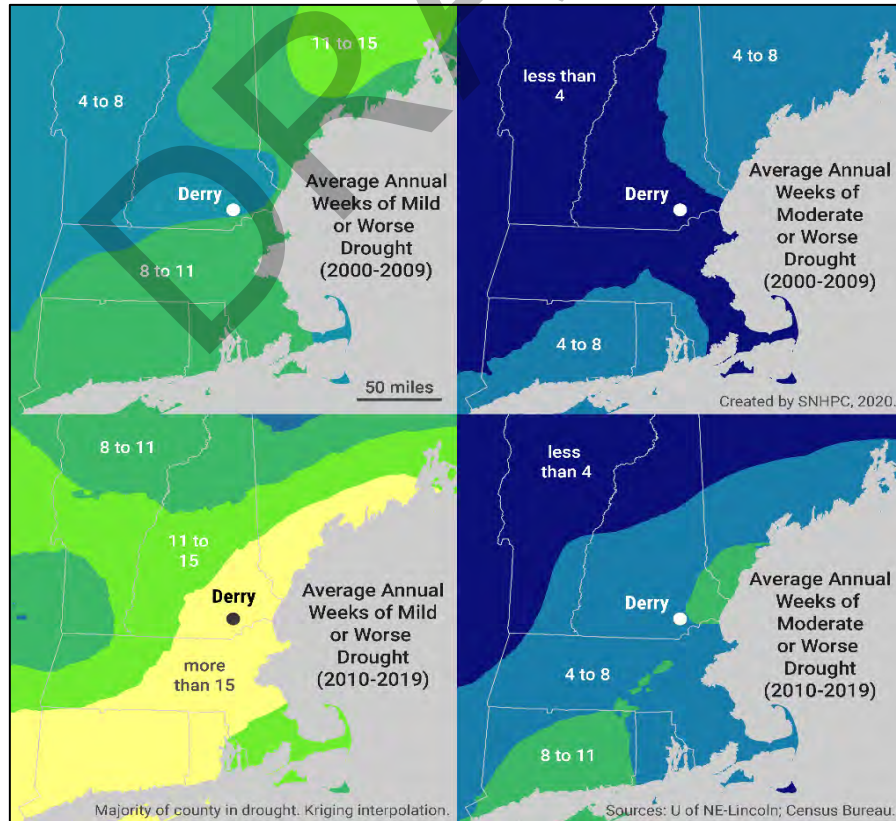


Figure 4: Average Annual Weeks of Mild or Worse and Moderate or Worse Drought 2000-2019

Extent: The severity of a drought is assessed using the US Drought Monitor's intensity scale.

	WATCH D0 Abnormally Dry	ALERT D1 Moderate	WARNING D2 Severe	EMERGENCY D3 Extreme	DISASTER D4 Exceptional
Conditions to be used by NH Drought Management Team as basis for recommendations to the US Drought Monitor					
PRECIPITATION 1-month SPI 3-month SPI 6-month SPI 12-month SPI	<0.0 Not Applicable Not Applicable Not Applicable	Not Applicable <0.0 Not Applicable Not Applicable	Not Applicable <-1.0 Not Applicable Not Applicable	Not Applicable Not Applicable <-1.0 Not Applicable	Not Applicable Not Applicable Not Applicable <-1.0
STREAMFLOW 28-day streamflow 65% normal	Up to 1 Month	1-3 Months	3-6 Months	6-9 Months	>9Months
PALMER INDEX PDSI	Not Applicable	<0.0	<-1.0	<-2.0	<-3.0
GROUNDWATER	Not Applicable	Monthly Levels Drop Below Mean	Monthly Levels Persist Below Monthly Mean		Not Quantified

Figure 5: US Drought Monitor Intensity Scale

Impacts: Droughts can have severe economic, environmental, and social impacts on a community. Examples of potential impacts include¹³:

- Cost of irrigation and drilling new wells.
- Businesses that rely on farming, such as tractor and feed suppliers, may lose income.
- Loss or destruction of fish and wildlife habitat.
- More frequent wildfires.
- Health problems associated with increased dust and/or pollen.
- Health problems associated with poor water quality.

Past Occurrences: In 2016, an extreme drought was declared for the State of New Hampshire, which lasted 47 weeks and affected private wells and water systems in the Town of Derry. Additionally, as of October 2020, the State is experiencing a severe drought, which began in May (U.S. Drought Monitor, 2020). Four areas in Derry have implemented mandatory water restrictions including East Derry/Farmstead, Glen Ridge Rd., Maple Haven Rd., and Richardson Rd. – all whose water is supplied by Pennichuck East Utility Company (NHDES.gov).

Earthquake

Description: The United States Geological Survey (USGS) defines an earthquake as a sudden slip on a fault. Tectonic plates are always slowly moving but can get stuck on edges due to friction. When the stress on the plates overcomes the friction, there is an earthquake that releases an energy wave that travels through the earth's crust¹⁴. The earthquake hazard is anything associated with an earthquake that may affect the normal activities of people, such as surface faulting, ground shaking, landslides, tsunamis, structural damage, etc.

New Hampshire is an area of moderate seismic hazard. This means that the State could experience large (6.5-7.0 magnitude) earthquakes, but they are not likely to occur as frequently as in a high hazard area like California. The State typically experiences one or two

¹³ State of New Hampshire Multi-Hazard Mitigation Plan 2018

¹⁴ <https://www2.usgs.gov/faq/categories/9827/3343>

earthquakes per year registering magnitude 2.0 to 3.5 and numerous other smaller ones (State of New Hampshire Multi-Hazard Mitigation Plan 2018)

Location: All areas in Town have the potential to be affected by an earthquake. While earthquakes are generally mild and rare in New England, there is a relative hotspot of activity located in central New Hampshire which affects the Town of Derry (Figure 6). The risk posed by this hotspot is small, especially compared to other hazards, but its existence should be acknowledged in hazard mitigation planning.

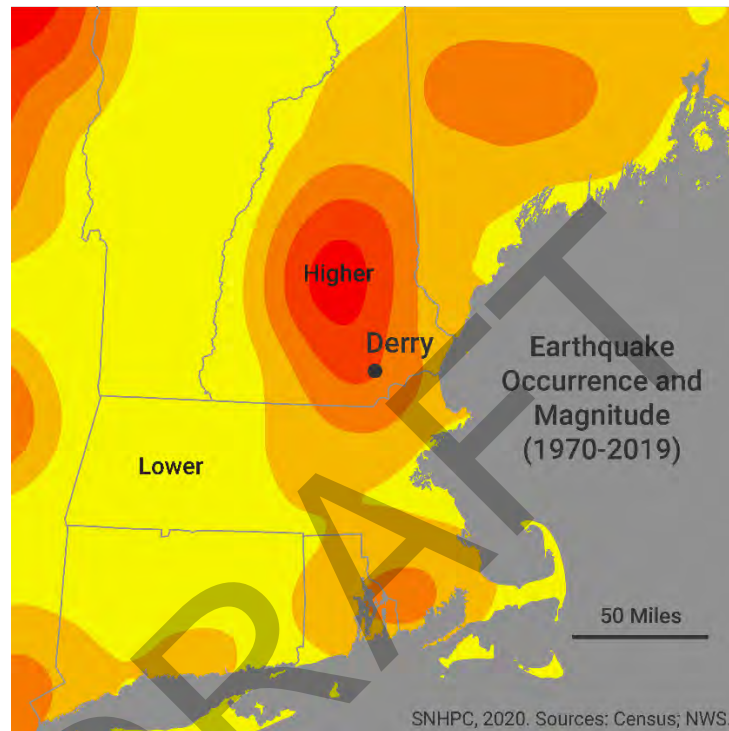


Figure 6: Earthquake Occurrence and Magnitude 1970-2019

Extent: There are two primary ways in which earthquakes are measured: magnitude (the size of the earthquake) and intensity (measure of the shaking and damage, which can vary from location to location). Magnitude is measured in the Moment Magnitude scale (based off the obsolete Richter scale). The Modified Mercalli Intensity (MMI) classifies the perceived feeling of the earthquake. One of New England's more notable seismic zones runs from the Ossipee Mountain area of New Hampshire, through the Auburn area, and continues south toward Boston, Massachusetts. This area has a mean return time of 408 years for a 6.0 Richter scale earthquake or a 39 percent probability of occurrence in 200 years. Additionally, for a 6.5 Richter scale quake, there is a mean return time of 1,060 years or a 17 percent probability of occurrence in 200 years (Pulli). When New England is generalized for earthquake probability estimation, the risk increases from the specific hazard zone noted above. For New England there is an estimated return time of every 10 years for an earthquake with a 4.6 Richter scale magnitude and 1000 years for 7.0 magnitude¹⁵.

In the mid-1930s the Richter Scale, which measures earthquake magnitude, was developed, and adopted as a logarithmic scale based on the amplitude of the seismic waves as measured

¹⁵ State of New Hampshire Multi-Hazard Mitigation Plan 2018

on a seismograph at a standard distance. In the 1970s the Richter Scale was replaced by the Moment Magnitude Scale which captures all different seismic waves from an earthquake which allows for more precise measurement. An increase of 1 on the magnitude scale represents an earthquake that has 10x the energy than an earthquake of the previous magnitude¹⁶

Modified Mercalli Intensity Scale		
Magnitude	Value	Description
1.0 – 3.0	I	Not felt except by a very few under especially favorable conditions.
3.0-3.9	II	Felt only by a few persons at rest, especially on upper floors of buildings.
3.0-3.9	III	Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibrations like the passing of a truck. Duration estimated.
4.0-4.9	IV	Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.
4.0-4.9	V	Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.
5.0-5.9	VI	Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.
5.0-5.9	VII	Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken.
6.0 and higher	VIII	Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned.
6.0 and higher	IX	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
7.0 and higher	X	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.
7.0 and higher	XI	Few, if any (masonry) structures remain standing. Bridges destroyed. Rails bent greatly.
7.0 and higher	XII	Damage total. Lines of sight and level are distorted. Objects thrown into the air.

Table 6: Modified Mercalli Intensity Scale

Past Occurrences: From 1728 to 1989, there were 270 earthquakes in New Hampshire. This is approximately one quake per year. There were six quakes over 4.0 on the Richter scale during the 1900s (Ibid 39-42). The most recent earthquake recorded in New Hampshire was on January 3, 2011, 20 miles NNW of Laconia, with a magnitude of 2.5 on the Richter scale (USGS Earthquake Hazards Program). There have been no earthquakes in the town of Derry since the last plan update.

¹⁶ <https://www.des.nh.gov/organization/commissioner/pip/factsheets/geo/documents/geo-3.pdf>

Extreme Temperatures

1. Extreme Heat

Description: Extreme heat events occur because of above normal temperatures, which often coincide with high relative humidity, that increase the likelihood of heat disorders with prolonged exposure or strenuous activity. This risk comes from the heat and humidity preventing the human body from adequately cooling itself using natural methods; this can result in heat disorders and, if untreated, unconsciousness and eventually death. Heat-related disorders include heat cramps, heat exhaustion, and heat stroke¹⁷. Populations at risk, such as the young and elderly, are more likely to experience a heat-related disorder during a heat event¹⁸. NOAA’s National Weather Service has prepared the following Heat Index identifying likelihood of heat disorders under prolonged exposure or strenuous activity:

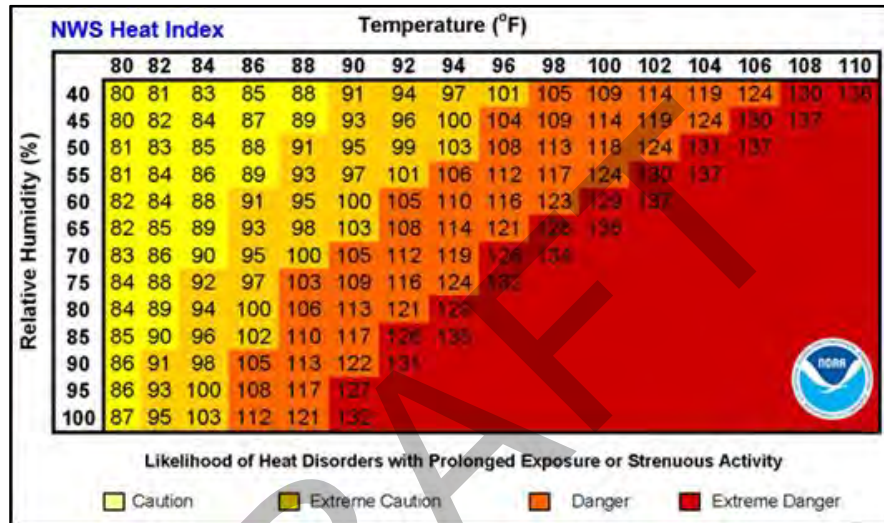


Figure 7: National Weather Service Heat Index

Location: All areas in Town would be affected by an extreme heat event. Those most at risk would be elderly residents. Areas and populations at greater risk are:

- Elderly populations and day care centers identified in the “Areas at Risk” listing at the end of this section.
- Power system may become overburdened.
- Communications negatively affected by power burden.
- Possible railroad derailment due to unstable rails and extreme expansion.

Over time, Derry and the State of New Hampshire have experienced an increase in the average number of hot days (80°F and 90°F) per year. The following graph shows the increase in hot days from 1940 to 2017 (source: NOAA). An increase in extreme heat over time will have significant impacts on the State such as an increased likelihood for drought and increased risk of wildfire.

¹⁷ http://www.nws.noaa.gov/om/heat/heat_index.shtml

¹⁸ State of New Hampshire Multi-Hazard Mitigation Plan 2018

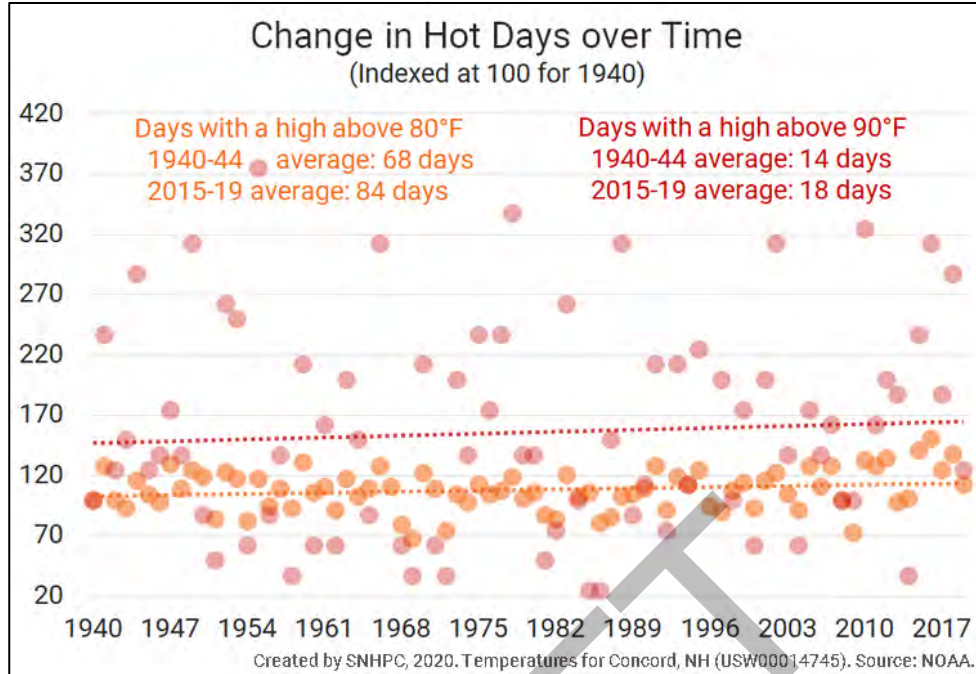


Figure 8: Change in Hot Days Over Time in NH

Extent: Severity/magnitude of extreme heat events relates to how extreme the temperature is, how long it is expected to remain at an extreme, and any exacerbating factors (such as humidity or wind). The National Weather Service has created charts and alert criteria to signal when temperatures are extreme. The following alert criteria was derived from the National Weather Service for extreme heat:

- **Heat Advisory**—Two or more consecutive hours of Heat Index values of 95-99 degrees Fahrenheit for two or more days OR any duration of Heat Index values of 100-104 degrees Fahrenheit. A Heat Advisory is issued within 12 hours of the onset of extremely dangerous heat conditions.
- **Excessive Heat Warning**—Two or more hours with Heat Index values of 105 degrees Fahrenheit or greater. An Excessive Heat Warning is issued within 12 hours of the onset of extremely dangerous heat conditions.
- **Excessive Heat Watches**—Heat watches are issued when conditions are favorable for an excessive heat event in the next 24 to 72 hours. A Watch is used when the risk of a heat wave has increased but its occurrence and timing is still uncertain.
- **Excessive Heat Outlooks**—Issued when the potential exists for an excessive heat event in the next 3-7 days. An Outlook provides information to those who need considerable lead-time to prepare for the event (State of New Hampshire Multi-Hazard Mitigation Plan 2018).

2. Extreme Cold

Description: Extreme Cold events occur during meteorological cold waves, also known as cold snaps, that are caused by the southern transport of arctic airmasses into the Northeast. These events are most common in winter months and increase the likelihood of cold disorders in humans and animals that have prolonged exposure to low ambient temperatures. This effect is exacerbated when there are winds present that effectively lower the temperature that is perceived by the human body, known as the wind chill. The risk comes from when the body is losing heat faster than it can produce it. Wind acts to carry heat away from the body, therefore

amplifying the perceived temperature by the human body and reducing the body's core temperature. Cold disorders can include frostbite and hypothermia¹⁹. NOAA's National Weather Service has prepared the following windchill chart for calculating the dangers from winter winds and freezing temperature:

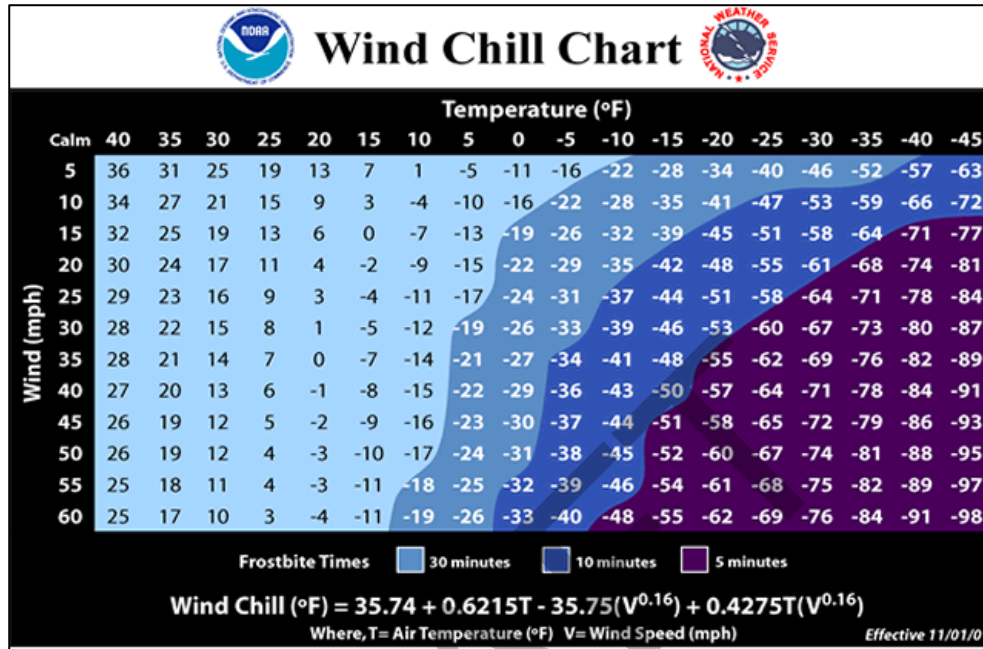


Figure 9: National Weather Service Wind Chill Chart

Location: All areas of Town would be affected by extreme cold.

Extent: Severity/magnitude of extreme temperature events relates to how extreme the temperature is, how long it is expected to remain at an extreme, and any exacerbating factors (such as humidity or wind). The National Weather Service has created charts and alert criteria to signal when temperatures are extreme (State of NH Multi-Hazard Mitigation Plan, 2018). The following alert criteria was derived from the National Weather Service for extreme cold²⁰:

- **Wind Chill Watch:** NWS issues a wind chill watch when dangerously cold wind chill values are possible. As with a warning, adjust your plans to avoid being outside during the coldest parts of the day. Make sure your car has at least a half a tank of gas and update your winter survival kit.
- **Wind Chill Advisory:** NWS issues a wind chill advisory when seasonably cold wind chill values, but not extremely cold values are expected or occurring. Be sure you and your loved one's dress appropriately and cover exposed skin when venturing outdoors. A Wind Chill Advisory is issued for New Hampshire is wind chill values are expected to be -20°F to -29°F and winds are greater than 5 mph.
- **Wind Chill Warning:** NWS issues a wind chill warning when dangerously cold wind chill values are expected or occurring. A Wind Chill Advisory is issued for New Hampshire is wind chill values are expected to be -30°F and winds are greater than 5 mph.

¹⁹ State of New Hampshire Multi-Hazard Mitigation Plan 2018

²⁰ <http://www.nws.noaa.gov/om/cold/ww.shtml>

- **Freeze Watch:** NWS issues a freeze watch when there is a potential for significant, widespread freezing temperatures within the next 24-36 hours. A freeze watch is issued in the autumn until the end of the growing season and in the spring at the start of the growing season.
- **Frost Advisory: Be Aware:** A frost advisory means areas of frost are expected or occurring, posing a threat to sensitive vegetation. **Freeze Warning:** When temperatures are forecasted to go below 32°F for a long period of time, NWS issues a freeze warning. This temperature threshold kills some types of commercial crops and residential plants.
- **Hard Freeze Warning:** NWS issues a hard freeze warning when temperatures are expected to drop below 28°F for an extended period of time, killing most types of commercial crops and residential plants.

Past Occurrences: All extreme temperature events having impacted the Town of Derry and the State since 2015 can be found in Table 7:

High Wind Events

Description:

The State of New Hampshire experiences two types of high wind events that may result from other severe storms and may occur at any time of the year:

- **Tornadoes:** A tornado is a narrow, violently rotating column of air that extends from the base of a thunderstorm to the ground. Because wind is invisible, it is hard to see a tornado unless it forms a condensation funnel made up of water droplets, dust, and debris. Tornadoes are the most violent of all atmospheric storms²¹.
- **Straight-line winds:** This term describes any thunderstorm wind that is not associated with rotation and is usually used to differentiate from tornadic winds. There are several sub types of straight-line winds.²²
 - **Downdraft** – small-scale column of air that rapidly sinks towards the ground
 - **Downburst** – result of a downdraft, referred to as a macroburst when the area affected is greater than 2.5 miles and microburst when less than 2.5 miles.
 - **Gust Front**- leading edge of rain-cooled air that clashes with warmer thunderstorm inflow. Characterized by wind shift, temperature drop, and gusty winds in front of a thunderstorm
 - **Derecho** - widespread, long-lived windstorm that is associated with a band of rapidly moving showers or thunderstorms. A typical derecho consists of numerous microbursts, downbursts, and downburst clusters. If the wind damage swath



Downed tree, Island Pond Road source: Derry Fire Dept.

²¹ <http://www.nssl.noaa.gov/education/svrwx101/tornadoes/>

²² <http://www.nssl.noaa.gov/education/svrwx101/wind/types/>

extends more than 240 miles and includes wind gusts of at least 58 mph or greater along most of its length, then the event may be classified as a derecho²³.

Location: All areas in Town are at risk for high wind events. The town has experienced high concentrated winds in the past. Wind shears at Beaver Lake snapped 18-inch diameter trees in 2001. This causes problems with communication towers, and large trees adjacent to power lines also caused problems.

Extent: Tornadoes are measured based on the 3 second gust wind speed of the rotational winds. The Fujita Scale was developed at the University of Chicago in 1971 by Tetsuya Theodore Fujita in coordination with what is now known as NOAA’s Storm Prediction Center to categorize each tornado by its intensity and estimated wind speeds. the scale was updated in 2007 to what is now known as the Enhanced Fujita Scale (EF-Scale). The EF-Scale is now the standard scale for measuring tornadoes in the United States and in Canada.²⁴

Enhanced Fujita Scale	
EF Number	3 Second Gust (MPH)
0	65-85
1	86-110
2	111-135
3	136-165
4	166-200
5	Over 200

Figure 10: Enhanced Fujita Scale

Downbursts are primarily based on their size, but consideration is also given to duration and wind speed (State of New Hampshire Multi-Hazard Mitigation Plan 2018).

Downbursts		
	Microburst	Macroburst
Size	Less than 2.5 Miles	Greater than 2.5 Miles
Duration	5-15 Minutes	5-30 Minutes
Wind speed (3 second gust - MPH)	up to 168 miles per hour	Damaging winds causing widespread damage, possibly as high as 134 mph ¹²³

Figure 11: Downburst Scale

Past Occurrences: Although not typically thought of as an area that is susceptible to tornadic activity, the State experiences at least one confirmed tornado annually and numerous straight-line wind events each year (State of New Hampshire Multi-Hazard Mitigation Plan, 2018). The most recent recorded high wind event was a microburst that caused damage to trees and homes in Gilmanton in 2018. There have been no significant recorded high wind events in the Town of Derry since the 2015 Plan update.

Infectious Diseases

Description: Infectious diseases are illnesses caused by organisms—such as bacteria, viruses, fungi, or parasites. Many organisms live in and on our bodies. They are normally harmless or even helpful, but under certain conditions, some organisms may cause disease. Some infectious diseases can be passed from person to person, some are transmitted by bites from

²³ State of New Hampshire Multi-Hazard Mitigation Plan 2018

²⁴ <http://www.spc.noaa.gov/efscale/>

insects or animals, and others are acquired by ingesting contaminated food or water or being exposed to organisms in the environment. Signs and symptoms vary depending on the organism causing the infection, but often include fever and fatigue. Mild infections get better on their own without treatment, while some life-threatening infections may require hospitalization.²⁵

Location: All areas and residents in Derry are susceptible to an infectious disease outbreak.

Extent: The magnitude and severity of infectious diseases is described by its speed of onset (how quickly people become sick or cases are reported) and how widespread the infection is. Some infectious diseases are inherently more dangerous and deadly than others, but the best way to describe the extent of infectious diseases relates to the disease occurrence.²⁶

- *Endemic* – Constant presence and/or usual prevalence of a disease or infection agent in a population within a geographic area
- *Hyperendemic* – The persistent, high levels of disease occurrence
- *Cluster* – Aggregation of cases grouped in place and time that are suspected to be greater than the number expected even though the expected number may not be known
- *Epidemic* – An increase, usually sudden, in the number of cases of a disease above what is normally expected
- *Outbreak* – The same as epidemic, but over a much smaller geographical area
- *Pandemic* – Epidemic that has spread over several countries or continents, usually affecting many people (State of New Hampshire Multi-Hazard Mitigation Plan 2018).

Past Occurrences: Every year, New Hampshire experiences a variety of outbreaks, some of which lead to an epidemic (State of New Hampshire Multi-Hazard Mitigation Plan, 2018). Foodborne outbreaks, gastrointestinal, respiratory, and other types of illness occur regularly throughout the State. In 2017-2018, the State experienced a particularly virulent flu season. The current COVID-19 pandemic of 2020 (DR-4516) is having a significant impact on the Town's departments and residents. Town department buildings are open to the public but limited in how many people may access the buildings. Public schools have moved to online learning and the Derry Public Library is accessible by appointment only. Many town services have moved to online and drive-thru only.

Lightning

Description: Lightning is a visible electric discharge produced by a thunderstorm. The discharge may occur within or between clouds, between a cloud and the air, between a cloud and the ground, or between the ground and a cloud.²⁷

Location: All structures, forested areas and recreational areas in Town are susceptible to lightning damage. The northeast part of Town is the most vulnerable. The treatment plant, the tall white pines at Beaver Lake, the cell tower at Central Fire Station, the Police Station communication towers, and the Warner Hill tower may be especially susceptible to lightning damage.

Extent: Lightning can be measured to determine how likely it may be for starting fires. Using a Level system of 1 to 6 corresponding with storm development and the number of lightning

²⁵ <http://www.mayoclinic.org/diseases-conditions/infectious-diseases/home/ovc-20168649>

²⁶ <https://www.cdc.gov/ophss/csels/dsepd/ss1978/lesson1/section11.html>

²⁷ http://www.lightningsafety.noaa.gov/science/science_thunder.htm

strikes, the Lightning Activity level (LAL) measures the magnitude of lightning strikes as displayed Figure 11, Lightning Activity Level (LAL).²⁸

Level	LAL Cloud and Storm Development	Cloud to Ground Strikes per 5 Minutes	Cloud to Ground Strikes per 15 Minutes
LAL 1	No thunderstorms	n/a	n/a
LAL 2	Isolated thunderstorms. Light rain will occasionally reach the ground. Lightning is very infrequent, 1 to 5 cloud to ground strikes in a =5-minute period.	1 to 5	1 to 8
LAL 3	Widely scattered thunderstorms. Light to moderate rain will reach the ground. Lightning is infrequent, 6 to 10 cloud to ground strikes in a 5-minute period.	6 to 10	9 to 15
LAL 4	Scattered thunderstorms. Moderate rain is commonly produced. Lightning is frequent, 11 to 15 cloud to ground strikes in a 5-minute period.	11 to 15	16 to 25
LAL 5	Numerous thunderstorms. Rainfall is moderate to heavy. Lightning is frequent and intense, greater than 15 cloud to ground strikes in a 5-minute period.	>15	>25
LAL 6	Dry lightning (same as LAL 3 but without rain). This type of lightning has the potential for extreme fire activity and is normally highlighted in fire weather forecasts with a Red Flag Warning.	6 to 10	9 to 15

Figure 12: Lightning Activity Level (LAL)

Past Occurrences: Lightning storms in New Hampshire occur annually and frequently result in minor power outages/surges, strikes near and to buildings which can result in isolated fires, electrical damage, damage to powerlines and transformers, and have started several wildfires in the state (State of New Hampshire Multi-Hazard Mitigation Plan, 2018). In 2019, lightning struck a gas line and started a fire in a single-family home on Squamscott Avenue in Derry (Union Leader, 2019).

Severe Winter Weather

Description: The State of New Hampshire experiences four types of severe weather during the winter months:

- *Heavy Snow*
 In forecasts, the amount of snow that is expected to fall is expressed as a range of values, such as 10-12". There can be considerable uncertainty regarding snowfall values during heavy snowstorms and phrases such as "...up to 20 inches" or "...12 inches or more" can be utilized. Heavy snow is generally defined as²⁹:
 - Snowfall accumulating to 4" or more in depth in 12 hours or less; or
 - Snowfall accumulating to 6" or more in depth in 24 hours or less.
- *Blizzard*
 A blizzard is a snowstorm with the following conditions that is expected to prevail for a period of 3 hours or longer³⁰:

²⁸ State of New Hampshire Multi-Hazard Mitigation Plan 2018

²⁹ <http://forecast.weather.gov/glossary.php?word=HEAVY%20SNOW>

³⁰ <http://w1.weather.gov/glossary/index.php?letter=b>

- Sustained wind or frequent gusts to 35mph or greater; AND,
- Considerable falling and/or blowing snow that frequently reduces visibility to less than ¼ mile
- *Nor'easter*
 A Nor'easter is a large cyclonic storm that tracks north/northeastward along the East Coast of North America. It is so named due to the northeasterly prevailing wind direction that occurs during the storm. While these storms may occur at any time of the year, they are most frequent and severe during the months of September through April. Nor'easters usually develop off the east coast between Georgia and New Jersey, travel northeastward, and intensify in the New England region. Nor'easters nearly always bring precipitation in the form of heavy rain and/or snow, as well as gale force winds, rough seas, and coastal flooding³¹.
- Ice Storm
 Ice storms occur due to persistent freezing rain, which may form thick layers of ice on the Earth's surface.

Location: All areas in Derry are susceptible to damage from severe winter weather events. Recent severe winter weather event declarations can be found in Table _ at the end of this section.

Extent: NOAA has developed the Regional Snowfall Index (RSI) which is a snowfall scale that uses area of snowfall amount of snowfall, and population to attempt to quantify the societal impacts of a snowstorm³². This RSI scale can assist in the severity rating of blizzards as well.

Category	RSI Value	Description	Approximate % of Storms
0	0-1	N/A	54%
1	1-3	Notable	25%
2	3-6	Significant	13%
3	6-10	Major	5%
4	10-18	Crippling	2%
5	18+	Extreme	1%

Figure 13: NOAA Regional Snowfall Index (RSI)

Past Occurrences: A list of major disaster declarations for severe winter weather can be found in table 7 at the end of the section. While the Town usually experiences severe winter weather events annually, it has not been significantly impacted by such an event since the 2015 plan update. The Town's maintenance, highway and public works departments are adequately prepared for severe winter weather and work to prevent damage to structures, roads, and residents during these types of storm events.

Solar storms and space weather

Description: The term space weather is relatively new and describes the dynamic conditions in the Earth's outer space environment, like how the terms "climate" and "weather" refer to the conditions in the Earth's lower atmosphere. Space weather includes all conditions and events on the sun, in the solar wind, in near-Earth space, and in our upper atmosphere that can affect space-borne and ground based technological systems³³.

³¹ <http://www.nws.noaa.gov/om/winter/noreaster.shtml>

³² <https://www.ncdc.noaa.gov/snow-and-ice/rsi/overview>

³³ https://www.nasa.gov/mission_pages/sunearth/spaceweather/index.html#q12

Location: While no significant damage has occurred from solar storms or space weather in Town, areas that would be most susceptible to damage would be those with heavy reliance on technological communication, radio operations and GPS. These would be the Town's emergency management, fire, and police departments.

DRAFT

Extent:
Geomagnetic Storms

Scale	Description	Effect	Physical Measure	Average Frequency (1 cycle = 11 years)
G 5	Extreme	<p>Power systems: Widespread voltage control problems and protective system problems can occur, some grid systems may experience complete collapse or blackouts. Transformers may experience damage.</p> <p>Spacecraft operations: May experience extensive surface charging, problems with orientation, uplink/downlink and tracking satellites.</p> <p>Other systems: Pipeline currents can reach hundreds of amps, HF (high frequency) radio propagation may be impossible in many areas for one to two days, satellite navigation may be degraded for days, low-frequency radio navigation can be out for hours, and aurora has been seen as low as Florida and southern Texas (typically 40° geomagnetic lat.).</p>	Kp = 9	4 per cycle (4 days per cycle)
G 4	Severe	<p>Power systems: Possible widespread voltage control problems and some protective systems will mistakenly trip out key assets from the grid.</p> <p>Spacecraft operations: May experience surface charging and tracking problems, corrections may be needed for orientation problems.</p> <p>Other systems: Induced pipeline currents affect preventive measures, HF radio propagation sporadic, satellite navigation degraded for hours, low-frequency radio navigation disrupted, and aurora has been seen as low as Alabama and northern California (typically 45° geomagnetic lat.).</p>	Kp = 8, including a 9-	100 per cycle (60 days per cycle)
G 3	Strong	<p>Power systems: Voltage corrections may be required, false alarms triggered on some protection devices.</p> <p>Spacecraft operations: Surface charging may occur on satellite components, drag may increase on low-Earth-orbit satellites, and corrections may be needed for orientation problems.</p> <p>Other systems: Intermittent satellite navigation and low-frequency radio navigation problems may occur, HF radio may be intermittent, and aurora has been seen as low as Illinois and Oregon (typically 50° geomagnetic lat.).</p>	Kp = 7	200 per cycle (130 days per cycle)
G 2	Moderate	<p>Power systems: High-latitude power systems may experience voltage alarms, long-duration storms may cause transformer damage.</p> <p>Spacecraft operations: Corrective actions to orientation may be required by ground control; possible changes in drag affect orbit predictions.</p> <p>Other systems: HF radio propagation can fade at higher latitudes, and aurora has been seen as low as New York and Idaho (typically 55° geomagnetic lat.).</p>	Kp = 6	600 per cycle (360 days per cycle)
G 1	Minor	<p>Power systems: Weak power grid fluctuations can occur.</p> <p>Spacecraft operations: Minor impact on satellite operations possible.</p> <p>Other systems: Migratory animals are affected at this and higher levels; aurora is commonly visible at high latitudes (northern Michigan and Maine).</p>	Kp = 5	1700 per cycle (900 days per cycle)

Figure 14: Geomagnetic Storm Scale

Solar Radiation Storms

Scale	Description	Effect	Physical measure (Flux level of ≥ 10 MeV particles)	Average Frequency (1 cycle = 11 years)
S 5	Extreme	<p>Biological: Unavoidable high radiation hazard to astronauts on EVA (extra-vehicular activity); passengers and crew in high-flying aircraft at high latitudes may be exposed to radiation risk.</p> <p>Satellite operations: Satellites may be rendered useless, memory impacts can cause loss of control, may cause serious noise in image data, star-trackers may be unable to locate sources; permanent damage to solar panels possible.</p> <p>Other systems: Complete blackout of HF (high frequency) communications possible through the polar regions, and position errors make navigation operations extremely difficult.</p>	10^5	Fewer than 1 per cycle
S 4	Severe	<p>Biological: Unavoidable radiation hazard to astronauts on EVA; passengers and crew in high-flying aircraft at high latitudes may be exposed to radiation risk.</p> <p>Satellite operations: May experience memory device problems and noise on imaging systems; star-tracker problems may cause orientation problems, and solar panel efficiency can be degraded.</p> <p>Other systems: Blackout of HF radio communications through the polar regions and increased navigation errors over several days are likely.</p>	10^4	3 per cycle
S 3	Strong	<p>Biological: Radiation hazard avoidance recommended for astronauts on EVA; passengers and crew in high-flying aircraft at high latitudes may be exposed to radiation risk.</p> <p>Satellite operations: Single-event upsets, noise in imaging systems, and slight reduction of efficiency in solar panel are likely.</p> <p>Other systems: Degraded HF radio propagation through the polar regions and navigation position errors likely.</p>	10^3	10 per cycle
S 2	Moderate	<p>Biological: Passengers and crew in high-flying aircraft at high latitudes may be exposed to elevated radiation risk.</p> <p>Satellite operations: Infrequent single-event upsets possible.</p> <p>Other systems: Small effects on HF propagation through the polar regions and navigation at polar cap locations possibly affected.</p>	10^2	25 per cycle
S 1	Minor	<p>Biological: None.</p> <p>Satellite operations: None.</p> <p>Other systems: Minor impacts on HF radio in the polar regions.</p>	10	50 per cycle

Figure 15: Solar Radiation Storm Scale

Radio Blackout

Scale	Description	Effect	Physical measure	Average Frequency (1 cycle = 11 years)
R 5	Extreme	<p>HF Radio: Complete HF (high frequency) radio blackout on the entire sunlit side of the Earth lasting for a number of hours. This results in no HF radio contact with mariners and en route aviators in this sector.</p> <p>Navigation: Low-frequency navigation signals used by maritime and general aviation systems experience outages on the sunlit side of the Earth for many hours, causing loss in positioning. Increased satellite navigation errors in positioning for several hours on the sunlit side of Earth, which may spread into the night side.</p>	X20 (2×10^{-3})	Less than 1 per cycle
R 4	Severe	<p>HF Radio: HF radio communication blackout on most of the sunlit side of Earth for one to two hours. HF radio contact lost during this time.</p> <p>Navigation: Outages of low-frequency navigation signals cause increased error in positioning for one to two hours. Minor disruptions of satellite navigation possible on the sunlit side of Earth.</p>	X10 (10^{-3})	8 per cycle (8 days per cycle)
R 3	Strong	<p>HF Radio: Wide area blackout of HF radio communication, loss of radio contact for about an hour on sunlit side of Earth.</p> <p>Navigation: Low-frequency navigation signals degraded for about an hour.</p>	X1 (10^{-4})	175 per cycle (140 days per cycle)
R 2	Moderate	<p>HF Radio: Limited blackout of HF radio communication on sunlit side, loss of radio contact for tens of minutes.</p> <p>Navigation: Degradation of low-frequency navigation signals for tens of minutes.</p>	M5 (5×10^{-5})	350 per cycle (300 days per cycle)
R 1	Minor	<p>HF Radio: Weak or minor degradation of HF radio communication on sunlit side, occasional loss of radio contact.</p> <p>Navigation: Low-frequency navigation signals degraded for brief intervals.</p>	M1 (10^{-5})	2000 per cycle (950 days per cycle)

Figure 16: Radio Blackout Scale

Past Occurrences: There have been no previous occurrences of solar storms or space weather that have impacted the Town of Derry to the Committee's knowledge.

Tropical and Post-Tropical Cyclones

Description: A tropical cyclone is the generic term for a non-frontal synoptic scale low-pressure system over tropical or sub-tropical waters with organized convection (i.e. thunderstorm activity) and defined cyclonic surface wind circulation. Once formed, a tropical

cyclone is maintained by the extraction of heat energy from the ocean at high temperature and heat export at the low temperatures of the upper troposphere³⁴.

Location: All areas in Town are at risk for damage from a tropical and post tropical cyclone. Inland communities such as Derry are less susceptible to hurricanes and other tropical storm systems than coastal areas. However, as Tropical Storm Irene and Hurricane Sandy demonstrated in 2011 and 2012, cyclones can have significant impacts inland due to high rainfall and flash flooding. The following figure demonstrates lower hurricane activity in Derry from 1990 – 2019.

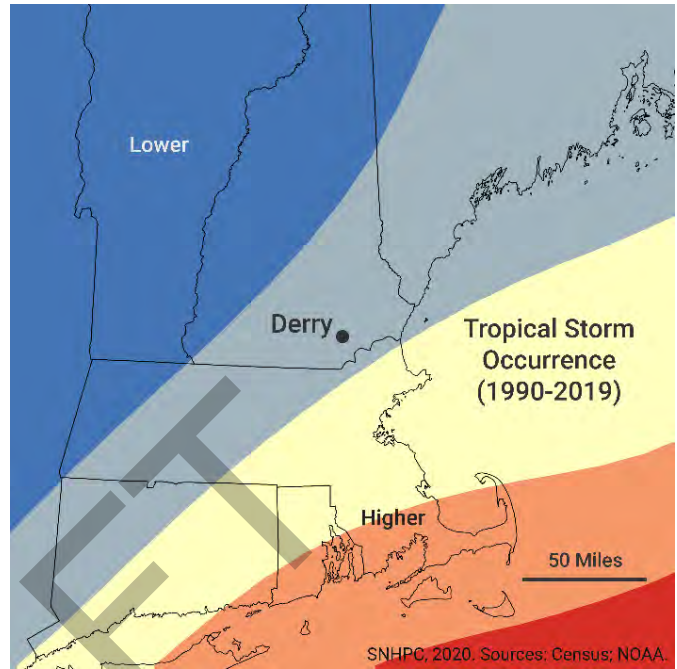


Figure 17: Tropical Storm Occurrence 1990-2019

Extent: The Saffir-Simpson Hurricane Wind Scale is a 1 to 5 rating based on a hurricane's sustained wind speed. This scale estimates potential property damage. Hurricanes reaching Category 3 and higher are considered major hurricanes because of their potential for significant loss of life and damage. Category 1 and 2 storms are still dangerous, however, and require preventative measures³⁵

Category	Definition	Effects
1	Winds 74-95 mph	Very dangerous winds will produce some damage: Well-constructed frame homes could have damage to roof, shingles, vinyl siding and gutters. Large branches of trees will snap, and shallowly rooted trees may be toppled. Extensive damage to power lines and poles likely will result in power outages that could last a few to several days.
2	Winds 96-110 mph	Extremely dangerous winds will cause extensive damage: Well-constructed frame homes could sustain major roof and siding damage. Many shallowly rooted trees will be snapped or uprooted and block numerous roads. Near total power loss is expected with outages that could last from several days to weeks.
3	Winds 111-129 mph	Devastating damage will occur: Well-built framed homes may incur major damage or removal of roof decking and gable ends. Many trees will be snapped or uprooted, blocking numerous roads. Electricity and water will be unavailable for several days to weeks after the storm passes.
4	Winds 130-156 mph	Catastrophic damage will occur: Well-built framed homes can sustain severe damage with loss of most of the roof structure and/or some exterior walls. Most trees will be snapped or uprooted, and power poles downed. Fallen trees and power poles will isolate residential areas. Power outages will last weeks to possibly months. Most of the area will be uninhabitable for weeks or months.

³⁴ https://courseware.e-education.psu.edu/courses/meteo241/images/Section1/tropical_cyclones0103.html

³⁵ <http://www.nhc.noaa.gov/aboutsshws.php>

5	Winds greater than 157 mph	Catastrophic damage will occur: A high percentage of framed homes will be destroyed, with total roof failure and wall collapse. Fallen trees and power poles will isolate residential areas. Power outages will last for weeks to possibly months. Most of the area will be uninhabitable for weeks or months.
---	----------------------------	--

Figure 18: The Saffir-Simpson Hurricane Wind Scale

Past Occurrences: Tropical Storm Irene and Hurricane Sandy were the last cyclone events to impact the Town of Derry. There have been no impacts from tropical or post-tropical Cyclones since the 2015 plan update.

Wildfire

Description: A wildfire is any non-structural fire, other than prescribed fire, that occurs in the Wildland. Wildland here is defined as consisting of vegetation or natural fuels³⁶. Wildfires can be referred to as brushfires, wildland fires, or grass fires depending on the location and what is burning.³⁷

Location: Several areas of the Town of Derry are especially susceptible to wildfires, including the following areas: Kilrea Road; Windham Road; Kendall Pond Road; power lines off Route 28 Bypass; Weber Forest area; and the swamp off Berry Road. Areas where off-highway recreational vehicle sparks can cause fires are susceptible. All new developments are also at risk (when trees are cut down, soil dries, leaving dead grass), and there is a moderate risk for homes located within forested areas.

The following areas sustained damage from wildfires in the past 10 years and are susceptible to them again in the future:

- Strawberry Hill
- English Range Rd (Power Lines)
- Arrowhead Rd
- Steven Dr.
- Kilrea Rd
- Island Pond Rd at the ledges
- Symphony Lane (recent large brush fire)
- Franklin St. Extension

Extent: Currently, there is not a universally adopted scale for measuring wildfires within the State of New Hampshire. There are numerous factors that can be used to describe the severity and complexity of a wildfire:

- Acreage of the fire (size)
- Topography and landscape
- Amount of time required to extinguish the fire
- Environmental factors (drought or wind)
- Damages to urban infrastructure along the WUI, damages to utility infrastructure, or other severe environmental damages (State of New Hampshire Multi-Hazard Mitigation Plan 2018).

National Wildfire Coordinating Group (NWCG) Size Fire Classification	
Class A	1/4 acre or less

³⁶ https://www.nwcg.gov/glossary/a-z#letter_w

³⁷ State of New Hampshire Multi-Hazard Mitigation Plan 2018

Class B	More than 1/4 acre, but less than 10 acres
Class C	10 acres or more, but less than 100 acres
Class D	100 acres or more, but less than 300 acres
Class E	300 acres or more, but less than 1,000 acres
Class F	1,000 acres or more, but less than 5,000 acres
Class G	5,000 acres or more

Figure 19: National Wildfire Coordinating Group (NWCG) Fire Size Classification

Urban fire hazards

Derry, with a population of 33,667 (US Census Bureau) and 931 persons per square miles is the second largest and densest town in the Southern New Hampshire Planning Commission Region. This places Derry at an increased risk of urban wildfires. A conflagration in 1960 destroyed 13 structures, including Chelmsford Shoe. Today, vacant, and uninhabited buildings are susceptible to fire hazards on Broadway in the downtown area.

Isolated homes

Isolated homes are more susceptible to the impacts of wildfire due to the challenges of reaching them with fire-fighting capabilities. Isolated homes are a concern for New Hampshire, as it is heavily forested and there has been an increase in the urban-wildlife interface as towns develop and grow.

There are several areas in Derry with isolated residential areas and individual residential units including homes on Jackman Rd at Rockingham County Recreational Trail, Waterman Hill Road and Morrison Road.

Other areas of isolated homes include:

- Island Pond
- Morrison Road
- Escumbuit Island
- Jackman Road
- Featherbed Lane
- Walnut Hill Rd
- Halls Village Rd
- Worthley Rd
- Island Pond Rd
- Whitneys Grove

Past Occurrences: There have been no significant wild or urban fire events in Derry since the 2015 plan update.

Technological Hazards

Aging Infrastructure

Definition: The continued regression of the State's physical systems including, but not limited to roads and bridges, culverts, utilities, water, and sewage.³⁸

Like states throughout the Nation, New Hampshire suffers from aging infrastructure. The American Society of Civil Engineers released its 2017 report card bestowing the State with a C – rating overall.³⁹ The report further identifies that the increase in annual number of vehicle miles traveled has led to more rapid deterioration of roads and bridges. The average lifespan for a bridge is around fifty years, and the current average age of state-owned bridges in New Hampshire is 52-56 years (State of New Hampshire Multi-Hazard Mitigation Plan 2018).

Dam failure

Definition: Dam failure is defined as the sudden, rapid, and uncontrolled release of impounded water.⁴⁰ Within the State of New Hampshire dams are categorized into one of four classifications, which are differentiated by the degree of potential damages that a failure of the dam is expected to cause. The classifications are designated as Non-Menace, Low Hazard, Significant Hazard, and High Hazard (State of New Hampshire Multi-Hazard Mitigation Plan 2018).

Non-Menace (NM) structure means a dam that is not a menace because it is in a location and of a size that failure or mis-operation of the dam would not result in probable loss of life or loss to property, provided the dam is:

- Less than six feet in height if it has a storage capacity greater than 50 acre-feet; or
- Less than 25 feet in height if it has a storage capacity of 15 to 50 acre-feet.

Low Hazard (L) structure means a dam that has a low hazard potential because it is in a location and of a size that failure or mis-operation of the dam would result in any of the following:

- No possible loss of life
- Low economic loss to structures or property.
- Structural damage to a town or city road or private road accessing property other than the dam owner's that could render the road impassable or otherwise interrupt public safety services.
- The release of liquid industrial, agricultural, or commercial wastes, septage, or contaminated sediment if the storage capacity is less than two-acre-feet and is
- located more than 250 feet from a water body or water course.
- Reversible environmental losses to environmentally sensitive sites.

Significant Hazard (S) structure means a dam that has a significant hazard potential because it is in a location and of a size that failure or mis-operation of the dam would result in any of the following:

- No probable loss of lives.
- Major economic loss to structures or property.

³⁸ State of New Hampshire Multi-Hazard Mitigation Plan 2018

³⁹ <https://www.infrastructurereportcard.org/state-item/new-hampshire/>

⁴⁰ National Oceanic and Atmospheric Administration (NOAA), Hydrological Terminology (2014)

- Structural damage to a Class I or Class II road that could render the road impassable or otherwise interrupt public safety services.
- Major environmental or public health losses, including one or more of the following:
- Damage to a public water system, as defined by RSA 485:1-a, XV, which will take longer than 48 hours to repair.
- The release of liquid industrial, agricultural, or commercial wastes, septage, sewage, or contaminated sediments if the storage capacity is 2 acre-feet or more.
- Damage to an environmentally sensitive site that does not meet the definition of reversible environmental losses (State of New Hampshire Multi-Hazard Mitigation Plan 2018).

Location: Derry maintains four functioning dams, all of which serve to impound lakes and ponds, and control floodwater. The Hood Pond Dam, located at the southern end of the pond, is managed by the Town of Derry and is currently in a state of disrepair. In January 2019, the Derry Town Council voted to approve a bond that included \$250,000 to improve the dam structure. The Beaver Lake (Meadow) Dam and Beaver Brook Dam (downstream of the lake dam) both control water flowing from the lake southwestward through the downtown of Derry, the Town of Londonderry, and eventually to the Merrimack River (at Lowell, Massachusetts). The Ballard Pond Dam impounds the water of Ballard Pond and controls the flow of water into the pond's outlet, Taylor Brook.⁴¹

DRAFT

⁴¹ Derry Master Plan, 2020

Conflagration

Description: A large and destructive fire that threatens human life, animal life, health, and/or property. It may also be described as a blaze or simply a (large) fire. A conflagration can begin accidentally, be naturally caused (wildfire), or intentionally created (arson).⁴²

Location: Due to the relatively low density of Derry's downtown, the hazard mitigation committee rated the threat of conflagration as having low probability to occur and cause damage in Town.

Known and Emerging Contaminants

Description: Contaminants in drinking water include naturally occurring contaminants associated with the geology in each region and known man-made contaminants associated with nearby land use activities. Some contaminants are considered emerging contaminants. Emerging contaminants are chemicals that historically have not been monitored in drinking water due to the lack of laboratory capabilities to detect the compounds or a lack of knowledge about the use of certain compounds and their potential to cause human health impacts. Emerging contaminants are particularly concerning to the public because the potential health impacts of these are sometimes uncertain.⁴³

Long-term Utility Outage

Description: A long-term utility outage is defined as a prolonged absence of any type of public utility that is caused by infrastructure failure, cyber-attack, supply depletion, distribution disruption, water source contamination, or a natural, human-caused or technological disaster (State of New Hampshire Multi-Hazard Mitigation Plan 2018). The State of New Hampshire considers a long-term utility outage as one lasting a month or more.

Human-caused Hazards

Cyber Events

Description: The Department of Homeland Security (DHS) defines a cyber incident as an event occurring on or conducted through a computer network that actually or imminently jeopardizes the confidentiality, integrity, or availability of computers, information or communications systems or networks, physical or virtual infrastructure controlled by computers or information systems, or information resident thereon.⁴⁴

The State of New Hampshire continues to increase its reliance on computers and the internet. With this upturn in dependence comes the escalated risk for a cyber event to occur. Potential cyber event targets include but are not limited to: critical infrastructure; the public and private sector; and New Hampshire citizens via cyberattacks such as security breaches, spear phishing, and social media fraud (State of New Hampshire Multi-Hazard Mitigation Plan 2018).

Mass Casualty Incident

Description: Any large number of casualties produced in a relatively short period of time, usually as the result of a single incident such as a military aircraft accident, hurricane, flood, earthquake, or armed attack that exceeds local logistic support capabilities.⁴⁵

Terrorism/Violence

⁴² State of New Hampshire Multi-Hazard Mitigation Plan, 2018

⁴³ State of New Hampshire Multi-Hazard Mitigation Plan 2018

⁴⁴ https://www.us-cert.gov/sites/default/files/ncirp/National_Cyber_Incident_Response_Plan.pdf

⁴⁵ <https://apps.usfa.fema.gov/thesaurus/main/termDetail?id=1530&letter=M>

Description: Premeditated, politically motivated violence perpetrated against noncombatant targets by subnational groups or clandestine agent.⁴⁶

According to the Federal Bureau of Investigation (FBI), the term terrorism can be subcategorized into two categories:

- *International Terrorism:* Perpetrated by individuals and/or groups inspired by or associated with designated foreign terrorist organizations or nations (state-sponsored).
- *Domestic Terrorism:* Perpetrated by individuals and/or groups inspired by or associated with primarily U.S.-based movements that espouse extremist ideologies of a political, religious, social, racial, or environmental nature.⁴⁷

Transport Accident

Description: A transport accident is any accident that occurs during transportation. Specifically, for this Plan, it refers to an aviation, rail, shipping, tractor trailer, or vehicle accident.⁴⁸

The Town participates in planning for this type of hazard due to Derry’s proximity to the Manchester-Boston Regional Airport. An Aircraft Emergency Mitigation Plan has been developed and is being utilized by the airport for aircraft emergencies. A regional response plan is needed so surrounding towns can work with the airport to plan for aircraft emergencies that might affect them.

Summary of Past Occurrences:

The following table lists all the natural hazard events having occurred and impacted the Town of Derry since the 2015 hazard mitigation plan update:

Hazard Type	Significant Natural Hazards impacting Derry since 2015 Plan Update	Notes
Avalanche	None	No significant, recorded avalanche events in Town.
Dam Failure	None	There have been no recorded events of dam failure in Town since the 2015 Plan update.
Drought	2016 – 2017, 2020	Extreme drought declared throughout the State; noticeable impact to residents’ private wells in the Town of Derry. As of October 2020, the State is experiencing a severe drought.
Earthquake	None	No recorded earthquakes from 2014 – 2020 in Town
Extreme Heat	September 2017	High temperature records set across New Hampshire; no significant impact to the Town of Derry.
	One Day winter heat wave, February 2018	High temperature records set across New Hampshire; the Town implemented cooling stations for its residents at municipal buildings– otherwise, no significant impact to the Town.
Extreme Cold	December 2017	Record low temperatures set across New Hampshire; the Town implemented warming stations in municipal buildings but otherwise, no significant impact to the Town.
High Wind Events	None	No significant recorded high wind events in town since the 2015 plan update.

⁴⁶ Title 22 of the US Code, Section 2656f(d):

⁴⁷ <https://www.fbi.gov/investigate/terrorism>

⁴⁸ State of New Hampshire Multi-Hazard Mitigation Plan 2018

Infectious Diseases	2017 – 2018, 2020	<ul style="list-style-type: none"> • A particularly virulent flu season impacted the State of New Hampshire. 63 adult influenza-related deaths were identified in 2017-18 • New Hampshire Covid-19 Pandemic (DR-4516) Incident period: January 20, 2020 and continuing <i>Major Disaster Declaration declared on April 03, 2020</i>
Inland Flood	None	Previous significant flooding events were mapped if possible; see Map 2: Past Flooding Events. No significant flooding events have occurred and caused damage in Derry since the 2015 plan update.
Landslide	None	There have been no recorded landslides in Derry since the 2015 plan update.
Lightning	2019	Lightning struck a gas line near a single-family home on Squamscott Avenue, causing a fire to start in the basement of the house.
Severe winter weather	January 2 – 3, 2014	Heavy snowfall across the State; minor impact to the Town (applies to all following winter weather events). The town has not been significantly affected by a severe winter weather event since the 2015 plan update. The Town's maintenance, highway and public works departments are adequately prepared for severe winter weather and work to prevent damage to structures, roads, and residents during storm events.
	February 5, 2014	Heavy snowfall across the State; minor impact to the Town
	January 26 – 29, 2015	DR-4209; Heavy snowfall across the State
	February 14, 2015	Heavy snowfall across the State
	December 29, 2016	Heavy snowfall across the State
	February 9, 2017	Heavy snowfall across the State
	March 14, 2017	DR-4316; Heavy snowfall across the State
	January 4, 2018	Heavy snowfall across the State
	March 1 – 9, 2018	DR-4370; Heavy snow and coastal flooding
	March 13, 2018	Heavy snowfall across the State
Solar storms and space weather	None	There have been no significant solar storms or space weather events in the Town of Derry.
Tropical and post tropical cyclones	None	The Town has not been significantly impacted by tropical or post-tropical cyclone activity since the 2015 plan update.
Wildfire	None	The Town has not experienced a significant wildfire since the 2015 plan update.

Table 7: Summary of Natural Hazard Past Occurrences

VI. CLIMATE CHANGE IN SOUTHERN NEW HAMPSHIRE

As stated in FEMA's 2017 Incorporating Climate Change into State Hazard Mitigation Planning, Region I Phase I Report: "The scientific evidence is clear: The Earth's climate is warming. It is also very clear that the effects of climate change pose real and significant threats to community safety, resilience, and quality of life. Determining how climate change and, more specifically, future temperature and precipitation trends will affect the probability,

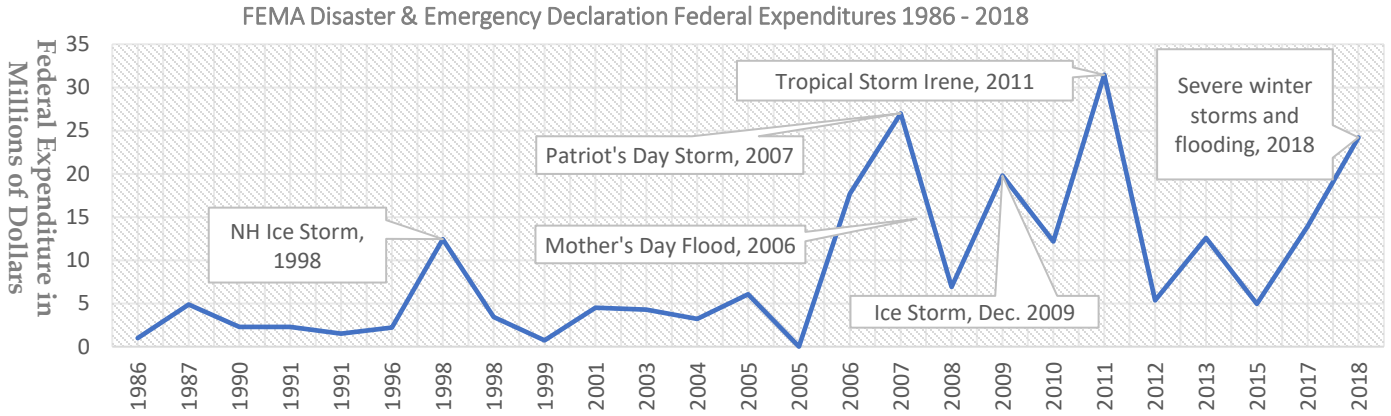


Figure 21: FEMA Disaster & Emergency Declaration, Federal Expenditures 1986-2018

This illustrates that extreme precipitation events have increased in frequency, intensity, and cost over time. This further exacerbates the need to increase community mitigation efforts in order to save money, protect the community and reduce disruption to services.

Extreme Temperatures

Climate change will also affect extreme temperature trends across the region and throughout the state. While the number of hot days has increased only slightly across southern NH since 1960, the number of cold days has decreased and temperature on the coldest day of the year has increased significantly, reflecting the greater warming the region has experienced during the winter compared to other seasons.⁵¹ The NOAA State climate summary states that even in a scenario with lower GHG emissions that the present day, average annual temperatures are projected to exceed historical record levels by the middle of the 21st century (State of NH Multi-Hazard Mitigation Plan, 2018). The following graphs illustrate the increase in maximum and minimum daily temperatures in New Hampshire for both winter and summer from 1940 – 2019 (source: NOAA).

⁵¹ Climate Change in Southern New Hampshire: Past Present, and Future 2016

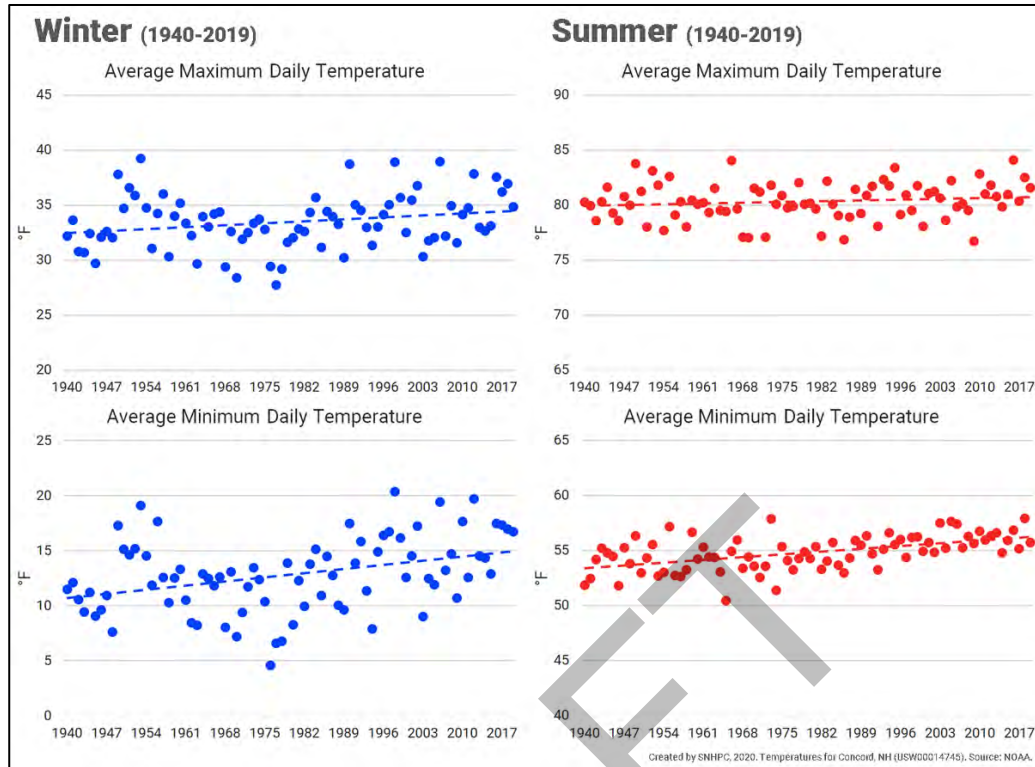


Figure 22: Maximum and Minimum Daily Temperatures Record for Winter and Summer

An increase in extreme temperature events will have profound impacts on the region and state's residents, natural resources, and economy. Prolonged periods of extreme heat will increase the frequency and magnitude of heat waves and increase the risk of drought. This affects the agriculture sector by lengthening growing seasons and affecting livestock. While a lengthier growing season might seem beneficial, it is possible that a significant change in the length of a growing season could alter the ecology of the landscape across New Hampshire.⁵² With an increase in the number of hot days, the state is also experiencing shorter, warmer winters. This affects communities that rely on winter tourism such as skiing and other winter recreational activities for economic activity. Additionally, the state's vulnerable populations such as the homeless and an increasing elderly population are most susceptible to an increase in extreme temperatures. These sensitive populations, including those with access and functional needs, often have limited mobility and would be unable to seek out cooler environments in a climate scenario that brings a significant increase in the number of days with extreme heat⁵³.

The projected changes in the climate of southern New Hampshire over the next century will continue to impact our environment, ecosystem services, economy, and society in a myriad of ways.⁵⁴ The inevitability of these impacts due to a changing climate accentuates the need for communities to adopt and enforce local decision-making tools to prepare for and reduce the impacts associated with a changing climate. Along with its multi-hazard mitigation plan, the

⁵² Huntington, T. G. (2004) Climate change, growing season length, and transpiration: plant response could alter hydrologic regime

⁵³ State of New Hampshire Multi-Hazard Mitigation Plan, 2018

⁵⁴ ⁵⁴ Climate Change in Southern New Hampshire: Past Present, and Future 2016

Town of Derry has been proactive in planning for future climate events through several initiatives including the following:

- Creating a Net Zero Task Force, which focuses on conserving energy in the Town's municipal buildings and schools
- Adopting a Green Building and Vehicle ordinance, which promotes and incentivizes the use and construction of environmentally friendly building methods and technology
- Developing a Stormwater Management Program that includes a stormwater ordinance to improve the quality of stormwater runoff and control the effects of runoff due to increased development
- Incentivizing property owners for the installation of solar and wind technology⁵⁵.

DRAFT

⁵⁵ Derry Master Plan, 2020

VII. CRITICAL FACILITIES

A critical facility is defined as a building, structure, or location which:

- Is vital to the hazard response effort,
- Maintains an existing level of protection from hazards for the community,
- Would create a secondary disaster if a hazard were to impact it.

The Critical Facilities List for the Town of Derry has been identified using the following three categories:

Category 1 - Emergency Response Facilities & Services: The Town has identified the Emergency Response Facilities and Services as the highest priority regarding protection from natural and man-made hazards.

Category 2 - Non-Emergency Response Facilities & Areas at Risk: The town has identified these facilities and areas, which are not needed to respond at the time of a natural disaster but could be threatened if a natural disaster were to occur. These are also considered essential for the everyday operation of Derry.

Category 3 – Commercial Economic Impact Areas: Includes people and facilities that need to be protected in event of a disaster and those organizations and businesses with more than 25 employees.

Type of Facility	Address
CATEGORY 1 – Emergency Response Facilities and Services	
Police Department	1 Municipal Drive
Emergency Management	14 Manning Street
Emergency Fuel Facilities	NHDOT, Kendall Pond Road
Derry Wastewater Treatment Plant	Transfer Lane off Fordway
Derry Municipal Building	14 Manning Street
Fire Department	131 East Broadway
	190 Warner Hill Road
	74 Hampstead Road
	1 English Range Road
Post Office	24 Tsiennetto Road
	50 East Derry Road
Shelters	Derry Village Elementary School, 28 South Main Street
	East Derry Memorial School, 18 Dubeau Drive
	Ernest P. Barka Elementary School, 21 Eastgate Road
	Hood Middle School, 5 Hood Road
	Marion Gerrish Community Center, 39 West Broadway
	Pinkerton Academy, 5 Pinkerton Street
	South Range Elementary School, 1 Drury Lane
	Veterans Hall, 31 West Broadway

	West Running Brook School, 1 West Running Brook Lane
Evacuation Routes	Windham Road
	U.S. I-93
	North High Street
	NH Route 28 Bypass
	NH Route 28
	NH Route 111
	NH Route 102
	Kendall Pond Road
	Island Pond Road
	Hampstead Road, E. Derry
Hospitals/Ambulance	Parkland Medical Center
	Catholic Medical Center, Manchester
	Elliot Hospital, Manchester Trauma Center
	Southern NH Medical Center, Nashua
Initial Response Spill Information	Southeast NH Hazardous Material Mutual Aid District
Wireless Communication Facilities	46 Floyd Road
	131 East Broadway
	Kendall Pond Road
	10 Beacon Hill Road
	Warden's Drive
	66 Kendall Pond Road
	78 Warner Hill Road
	69 Bypass 28
Radio Towers	8 Lawrence Road
	Radio Station WDER
	Warner Hill - two private and state-owned
Emergency Communication Towers	Gaita Drive
	Heritage Lane
	Kendall Pond Road
	Parkland Medical Center
	Pinkerton Academy
Backup Power Sources	Aurora Nursing Home, 20 Chester Road
	Beaver Lake Lodge Assisted Living Facility, 38 North Shore Road
	Derry Fire Department Headquarters, 131 East Broadway
	Derry Fire Department Station 2, 190 Warner Hill Road
	Derry Fire Station #3, 1 English Range Road
	Derry Fire Station #4, 74 Hampstead Road
	Derry Municipal Center, 14 Manning Street
	Derry Police Department, 1 Municipal Drive
	Derry Public Works Highway Garage, Transfer Lane

	Integrated Health Services, 8 Peabody Road
	Parkland Medical Center, 1 Parkland Drive
	Pinkerton Academy Field House, North Main Street
	Veterans Hall, 31 West Broadway (portable) 432-6136
	West Running Brook School, 1 West Running Brook Lane (lights only)

Table 8: Emergency Response Facilities and Services

Table 9: Non-Emergency Response Facilities & Areas at Risk

Type of Facility	Address
CATEGORY 2: Non-Emergency Response Facilities & Areas at Risk	
Public Water Systems	Annie Oakley Mobile Home Park, Windham Depot Road
	Autumn Woods, English Range Road
	Barkland Acres Associates, Barkland Acres
	Beaver Lake Avenue
	Beaver Lake Mobile Home Park and Cottages
	Big W (The), Route 28 Bypass
	Birchwood Vineyards, 199 Rockingham Road
	Calvalry Christian Worship Center, 145 Hampstead Road
	Derry Water Dept., Route 28
	Drew Woods, Olson Road, East Derry
	East Derry Memorial Elementary School, Dubeau Drive
	Frost Residents Co-op, 139 Rockingham Road
	Hidden Valley Campground, 81 Damren Road
	Hillside Plaza, Route 28
	Hubbard Hill, Warner Hill Road
	Maple Haven, Damren Road
	Meadowbrook, Adams Pond Road
	Metro Mart, 158 Rockingham Road
	Morningside Drive Water Associates, Morningside Drive
	New Leis Garden, Route 28
	Old Coach Village, 3 Ezekiel Road
	Over the Rainbow Preschool, 223 Rockingham Road
	Peaceful Acres, 100 Rockingham Road
	Peu/Farmstead Acres, Senter Cove Road
	Peu/Maple Hill Acres, Bedard Ave/Route 28
	Peu/Oakwood Terrace, Fordway Extension
	Rand Shepard Hill, Londonderry Lane/Route 102
Redfield Estates, Redfield Circle	
Richardson Estates, Richardson Drive	
Robert Frost Farm, Route 28	
Robert Frost Motor Inn, Route 28	
Willow Bend, Willow Street	

	Woodlands at Derry, Gervaise Drive
Sewer Pumping Stations	A Street Pump Station, A Street
	Beaver Lake Pump Station #1, Route 102
	Beaver Lake Pump Station #2, Orchard Drive
	Beaver Lake Pump Station #3, North Shore Road
	Beaver Lake Pump Station #4, Pond Road
	Derry Village Pump Station, East Broadway
	Effluent Pump Station, Transfer Lane
	Main Pump Station, Transfer Lane
Private Pump Stations	Aladdin Village Pump Station, Aladdin Circle
	Kendall Pond Industrial Site, Kendall Pond Road
Wastewater Treatment Plant	52 Transfer Lane
Electrical Power Substations	Scobie Pond Road Substation
	Ash Street substation
Major Highways/Roadways	U.S. I-93
	Route 28
	NH Route 28 Bypass
	NH Route 102
	NH Route 111
	NH Route 121
Schools	Derry Village Elementary School, 28 South Main Street
	East Derry Memorial Elementary School, 18 Dubeau Drive
	Ernest P. Barka Elementary School, 21 Eastgate Road
	Gilbert H. Hood Middle School, 5 Hood Road
	Grinnell Elementary School, 6 Grinnell Road
	NEXT Charter School, 5 Hood Road
	Pinkerton Academy, 5 Pinkerton Street
	South Range Elementary School, 1 Drury Lane
	West Running Brook Middle School, 1 West Running Brook Lane
Childcare Centers	Broadway Learning Academy, 6 West Broadway, Unit S1
	Clubhouse Day Care, 11 & 13 Peabody Road
	Derry Boys and Girls Club, 40 Hampstead Road
	Derry Head Start, 1 Hood Road
	Derry Montessori, 654 East Broadway
	Explore and Create Family Daycare, 6 Bedard Avenue
	Goddard School, 12 Tsienneto Road
	Nutfield Cooperative, 47 East Derry Road
	Over the Rainbow Preschool, 223 Rockingham Road
	Riana's Sunshine Academy, 40 Lawrence Road
	Sonshine Preschool and Kindergarten, 53 North Main Street
	Stepping Stones School, 1 Partridge Lane

	Wonder Years Learning Center, 39 Birch Street
	Woods Edge Nature Preschool, 145 Hampstead Road
Adult Daycare Centers	Birch Heights Retirement Community, 7 Kendall Pond Road
	Living Innovations, 34 Route 111, Suites 1-3
Churches	Abundant Grace, 127 Rockingham Road
	Bridgeway Christian church, 48 Rockingham Road
	Calvary Christian Worship Center, 145 Hampstead Road
	Central Congregational Church, 14 Crescent Street
	Church of Latter Day Saints, 46 Adams Pond Road
	Church of Transfiguration, 1 Hood Road
	Derry Seventh Day Adventist Church, 7 Brook Road
	Etz Hayim Synagogue, 1.5 Hood Road
	First Baptist Church, 2 Crystal Avenue
	First Church of Christ Scientist, Boyd Road
	First Parish Church, 47 East Derry road
	Journey Church, 7 Tinkham
	Lifeway Church, 52 East Derry Road
	St. Lukes United Methodist Church, 63 East Broadway
	Trinity Assemby of God, 53 North Main Street
Elderly Housing	70 Fordway (13 units)
	Chase Mill Condominiums (36 units), 7 Chester Road
	Chelmsford Hardy Place, 14 South Avenue
	Covey Run (24 units), 81 North High Street
	Derry House (22 units), 10 West Broadway
	Derry Meadows (50 units), 1A Robin Court
	Lifestyle Homes (30 units) 42 Tsiennetor Road
	Nutfield Heights (80 units), 3 Hood Road
	Pillsbury Square (28 units), 12 West Broadway
Recreation Areas	Albert W. Doolittle Conservation Area, Beaver Lake Area
	Alexander-Carr Playground, Town of Derry Parks and Recreation
	Ballard Road Town Forest, Town of Derry
	Ballard State Forest, NHDRED
	Bastek Field, Town of Derry Parks and Recreation
	Beaver Lake, NH Dept. of Fish & Game
	Boys and Girls Club of Greater Derry
	Buckley Field, Derry Cooperative School District
	Derry Conservation Area A, Town of Derry
	Derry Conservation Area B, Town of Derry
	Derry Railroad Bed, Town of Derry
	Derry Village School, Derry Cooperative School District
	Ernest P. Barka Elementary School, 21 Eastgate Road

	Escumbuit Campground
	Gallien's Town Beach, Town of Derry Recreation & Parks
	Grinnell Elementary School, Derry Coop. School District
	Hidden Valley Campground
	Hood Middle School, Derry Cooperative School District
	Hood Park, Town of Derry Parks and Recreation
	Hoodcroft Country Club
	Humphrey Road Fields/Don Ball Park, Town of Derry Recreation & Parks
	MacGregor Park, Town of Derry Parks and Recreation
	Marion Gerrish Community Center, Town of Derry
	Ohara Field, Town of Derry Parks and Recreation
	Pinkerton Academy, 5 Pinkerton Street
	Robert Frost Historic Site, NHDRED
	Rockingham Recreation Trail, NH Dept. of Resources and Economic Development
	Ryder Fields, Town of Derry Recreation & Parks
	Smith Field, Town of Derry Parks and Recreation
	South Range School, Derry Cooperative School District
	Veterans Field, Town of Derry Recreation & Parks
	Veterans Memorial Hall, Town of Derry Recreation & Parks
	West Running Brook School, Derry Coop. School District
Unique or Historic Resources	Adams Female Academy
	Adams Memorial Building, West Broadway
	Alan Shepard House, East Derry Road
	East Derry Historic District
	First Parish Church, East Derry Road
	Matthew Thornton House, 2 Thornton Street
	Pinkerton Academy
	Robert Frost Homestead
	Taylor Library, East Derry Road
	Taylor Mill at Ballard State Forest
	Upper Village Hall (vacant), 52 E Derry Road
Lodges and Community Centers	Halcyon, 11 Central Street
	Marion Gerrish Community Center, 39 West Broadway
	Veterans of Foreign War, 18 Railroad Avenue
Solid Waste/Municipal Recycling Facility and Transfer Station	Derry Transfer Station, Transfer Lane
Incinerators	Parkland Medical Center Infectious Waste, One Parkland Drive

Table 10: Commercial Economic Impact Areas

Name	Address
CATEGORY 3: Commercial Economic Impact Areas	
14 Tsienneto Medical Park	14A & B Tsienneto Road
Aldi	30 Manchester Road
Applebee's	14 Manchester Road
Aurora Nursing Home	20 Chester Road
Autostore Systems	3 Corporate Park Drive, Unit 1
Benson's Lumber & Hardware Inc.	6 Martin Street
Benson's Ski & Sport Shop	6 Martin Street
Bentley Chevrolet-Buick-Geo Inc.	50 North Main Street
Birch Heights Retirement Community	7 Kendall Pond Road
Birchwood Vineyards	199 Rockingham Road
Bud Lundgren Construction	57 Chester Road
Carlco	22 Manchester Road #10
Crotched Mountain Residential	16 NH Route 111 #3
CVS	48 East Broadway
Dal-tile	52 Kendall Pond Road
Derry Adult Education Center	5 Hood Road
Derry Fire Department	131 East Broadway
Derry News	46 West Broadway
Derry Pizza & Restaurant	111 W Broadway
Derry Police Department	1 Municipal Drive
Derry Public Works Department	14 Manning Street
Derry Village Elementary School	28 South Main Street
Dunkin' Donuts	5 Crystal Avenue
East Derry School	18 Dubeau Road
Enterprise Bank	47 Crystal Avenue
Ernest P. Barka Elementary School	21 Eastgate Road
Fireye Inc.	3 Manchester Road
First Student Inc.	33 Chester Road
Gentex Corp.	5 Tinkham Avenue
Gilbert H. Hood Middle School	5 Hood Road
Groundhog Landscaping	8 Bowers Road
Hawk Quality Products	99 South Main Street
Hill Packaging	Franklin Street
Hood Commons	Route 28 & Crystal Avenue
Innovation Liquidation	6A Street
Integrated Health Services	8 Peabody Road
Intelitek	7 Tsienneto Road
Irving Gas Station	55 Bypass 28

J & F Farms	120 Chester Road
Liquid Blue	6 Linlew Drive
McDonald's	93 Crystal Avenue
Meadow Shoppes	35 Manchester Road (Route 28)
Monkey Sports	30 Manchester Road
MTE Turf & Equip	Franklin Street
Mutual Sales	2 Corporate Park Drive
NH Boring	40 Fordway Extension
Ocean State Job Lots	30 Manchester Road
Overlook Medical Building	6 Tsienneto Road
Parkland Eldercare	1 Parkland Drive
Parkland Medical Center	1 Parkland Drive
Paul the Plumber	111 Franklin Street
People's United Bank	51 Crystal Avenue
PICA Manufacturing	4 Ash Street, Ext.
Pinkerton Academy	5 Pinkerton Street
Pitcher Associate Inc.	9 Tinkham Avenue
Public Works Dept. Hwy. Garage	Transfer Lane
Rite Aid Pharmacy	39 Birch Street
River Bank	51 Crystal Avenue
RJ Carbones Wholesale Floral Distr.	3 Corporate Park Drive, Unit 2
Rosencrantz & Son	Route 28 / Rockingham Road
Sal's Just Pizza	2 Lenox Road
Shaw's Supermarket	50 Crystal Avenue
Simpson's Painting Inc.	131 Rockingham Road
South Range School	1 Drury Lane
Speedway Gas Station	50 Birch Street
Studio Labs/Events United	11 A Street
T & S Landscaping & Lawn Care	253 Rockingham Road
T-Bones	39 Crystal Avenue
Total Air Supply	1 B Street
Tri-K	20 A Street
Trinity Assembly of God	53 North Main Street
Tuff Shed	52 Kendall Pond Road
Tupelo Music Hall	10 A Street
U.S. Post Office	24 Tsienneto Road
Wendy's	56 Crystal Avenue
West Running Brook Middle School	West Running Brook Lane
Woodpro	3 Corporate Drive

Hazardous Materials Facilities in the Town of Derry

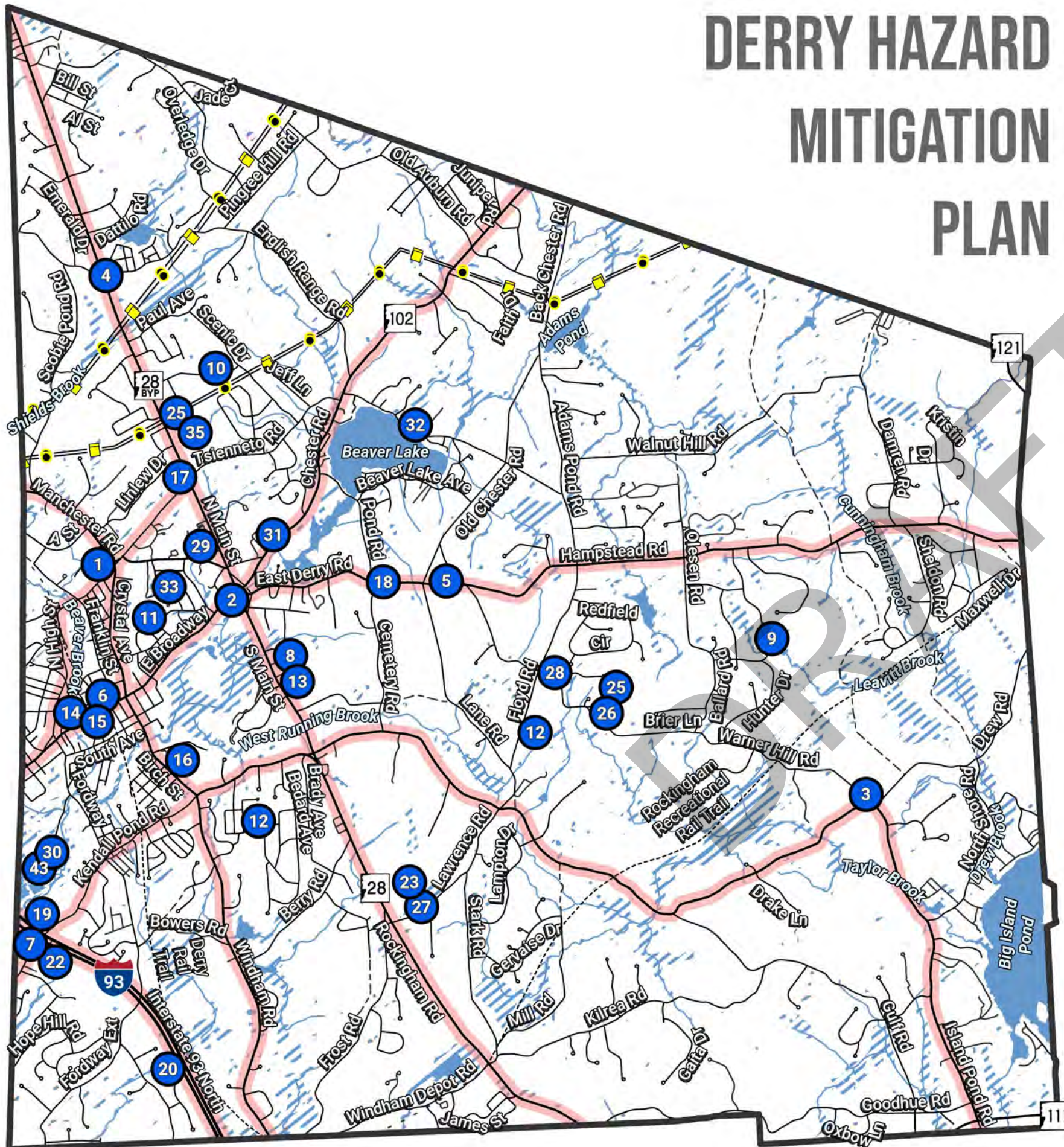
Name	Address
Above Ground Storage Tanks	
Cedar Point Communications	16 Rt 111
Derry Fire Precinct	74 Hampstead Road
Eversource Ash Street Substation	5 Ash Street
Eversource High Street Substation	52 N High Street
Eversource Scobie Pond 12kv Substation	38 Scobie Pond Road
Fairpoint Communications	52 E Broadway
First Student Inc. 20619	33 Chester Road
M-R Wood Recycling	29 Scobie Pond Road
NH Boring Inc. FMR Derry DPW	40 Fordway
NHDOT PS 528	59 Kendall Pond Road
Scobie 115 KV Substation	Scobie Pond Road
Valvoline Instant Oil Change	50 Crystal Ave
Weber Auto & Truck Parts Inc.	133 Island Pond Road
Active Hazardous Waste Generators	
Automotive Custom & Collision LLC	241 Rockingham Road
Auto shop Services & Second Car Inc.	181 Rockingham Road
Banister Family Dentistry	1 Birch Street
Bentley Chevrolet Inc.	50 N Main Street
Birch Street Collision Inc.	34 Birch Street
Brooks Properties	16 Rte. 111
C & D Universal Finishes	3 Nutfield Ct
Carlco	22 Manchester Road
CVS Pharmacy 0593	48 E Broadway
Derry Transfer Station	43 Transfer Lane
Derry, Town of	1 Transfer Lane
E Derry Village Improvement Soc.	52 E Derry Road
Eversource	16 A St.
Express Auto Body & Collision	15 Central Street
Fireye Inc.	3 Manchester Road
First Student Inc. 20619	33 Chester Road
Getty Station 55211	6 Danforth Circle
Gibbs Oil Gas Station	59 Crystal Ave
Granite Industrial Gases	49 N High Street
Granite State Analytical	22 Manchester Road
Granite State Dock and Marine	238 Rockingham Road
Hawk Quality Products Inc.	125 Rockingham Road
Huntsman International LLC	52 Kendall Pond Rd
J & F Farms Inc.	120 Chester Road

Jakes Auto Body	80 Chester Road
James Collins Inc.	41 Windham Road
Jiffy Lube	6 Ashleigh Drive
Karl Gschwind Machine Wks Inc.	6 Tinkham Ave
Lahey Center	6 Tsienneto Rd Unit 101
Lincs Auto Body	35 Maple Street
Meineke Car Care	7 Crystal Ave
Mobil 2537	2 S Main Street
N E Tanya Fisheries Inc.	35 Maple Street
Nel-Pech Labs Inc.	4 Ash St Ext
Parkland Medical Center	1 Parkland Dr.
Pete's Garage	353 Island Pond Road
Pinkerton Academy	5 Pinkerton Street
Professional Image Dry Cleaners	11 Manchester Street
Rite Aid 10264	20 Crystal Ave
Rite Aid 3310	52 Rockingham Road
Riverside Cleaners LLC	Crystal Ave
RS Brakes N More	36 Scobie Pond Road
Sanmina Sci Corporation	6 Linlew Drive
Shaw's 7483	55 Crystal Ave
Spacetown Auto Body Inc.	66 Scobie Pond Rd
Stevens Foreign Car	89 W Broadway
Sullivan Tire	4 Ashleigh Drive
Tractor Supply co 1372	55 Crystal Ave
Tri-K	20 A Street
Valvoline Instant Oil Change	50 Crystal Ave
Vincent's Auto Inc.	172 Rockingham Street
W E Auto Body	154 Rockingham Road
W P Realty	55 Crystal Ave
Wal-Mart Supercenter 1753	11 Ashleigh Drive
Weber Auto & Truck Parts Inc.	135 Island Pond Road

Table 11: Hazardous Materials Facilities in Derry

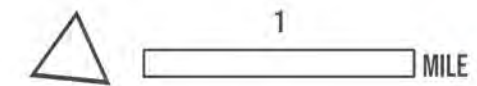
DERRY HAZARD MITIGATION PLAN

Map 4: Critical Facilities



- | | |
|--|---|
| 1. Derry Police Department | 19. Transfer Station Cell Tower |
| 2. Fire Department Headquarters | 20. 10 Beacon Hill Rd Cell Tower |
| 3. Fire Department Station 2 | 21. 46 Floyd Rd Cell Tower |
| 4. Fire Department Station 3 | 22. 66 Kendall Pond Rd Cell Tower |
| 5. Fire Department Station 4 | 23. 8 Lawrence Rd Cell Tower |
| 6. Derry Municipal Center | 25. Wardens Dr Cell Tower |
| 7. Patrol Shed 528 | 25. 69 Londonderry Tpke Cell Tower |
| 8. Derry Village Elementary School | 26. 78 Warner Hill Rd Cell Tower |
| 9. East Derry Memorial Elementary School | 27. Radio Station WDER |
| 10. Ernest P. Barka Elementary School | 28. Warner Hill State/Private Radio Tower |
| 11. Gilbert H Hood Middle School | 29. Pinkerton Academy |
| 12. South Range Elementary School | 30. Derry Public Works Garage |
| 13. West Running Brook Middle School | 31. Aurora Senior Living of Derry |
| 14. Marion Gerrish Community Center | 32. Beaver Lake Lodge Assisted Living |
| 15. Veterans Hall | 33. Pleasant Valley Nursing Center |
| 16. Parkland Medical Center | 34. Derry Wastewater Treatment Plant |
| 17. Derry Post Office | 35. Water Tower |
| 18. East Derry Post Office | |

-  Evacuation Routes
-  High-Voltage Transmission Lines



Created by the Southern New Hampshire Planning Commission, 2020. Sources: Google Maps; NH Department of Transportation; Town of Derry; University of NH; US Census Bureau; US Geological Survey; US Fish & Wildlife Service.

VIII. EXISTING MITIGATION STRATEGIES AND PROPOSED IMPROVEMENTS

Description of Existing Programs

The Derry Hazard Mitigation Committee identified existing strategies that support hazard mitigation efforts, which is presented in Existing Protection Matrix at the end of this section. This matrix includes the existing protection program, the area of town affected, the enforcing department or agency, the effectiveness of the existing program and the identified improvements or changes needed for the program.

Floodplain Development District (zoning)

The Floodplain Development District applies to all lands designated as Special Flood Hazard Areas by FEMA in its *Flood Insurance Study for the Town of Derry, NH*, together with the associated Flood Insurance Rate Maps dated May 17, 2005. The code enforcement officer shall review all building permit applications for new construction or substantial improvements to determine whether proposed building sites will be reasonably safe from flooding.

Conservation Corridor Overlay District (zoning)

The Conservation Corridor Overlay District regulates land use in important wetland and watershed areas to prevent the destruction of watersheds and wetlands. The District provides flood protection, recharge of groundwater supply, and augmentation of stream flow, and the protection of the community against the costs that may be incurred when unsuitable development occurs in swamps, marshes, along watercourses, or in areas subject to floods.

Wetlands Conservation Overlay District (zoning)

The Wetlands Conservation Overlay District regulates the uses allowed on lands subject to standing water or extended periods of a high-water table. It applies to areas of Town that contain marshes, ponds, bogs, lakes, streams, and rivers, as well as soils defined as poorly or very poorly drained by the National Cooperative Soil Survey conducted by the U.S. Department of Agriculture Soil Conservation Service. The District includes areas of poorly drained soil that are 2,000 square feet or larger, and that exhibit a predominance of 50 percent or more wetland vegetation; all areas of very poorly drained soils; areas of any wetland of any size if contiguous to surface waters such as lakes, ponds and streams; and areas designated as bogs regardless of size.

Groundwater Resource Conservation District (zoning)

The Groundwater Resource Conservation District was adopted to protect, preserve, and maintain existing and potential groundwater supply and groundwater recharge areas within known aquifers from adverse development, land use practices or depletion. This is to be accomplished by regulating land uses that would contribute polluted water and pollutants to designated aquifers identified as being needed for present and future public and private water supplies. The District includes areas designated as having high and medium potential to yield groundwater as shown on the Town of Derry Groundwater Conservation District map on file with the Planning Board.

Earth Removal Regulations (zoning)

Earth Removal Regulations minimize safety hazards created by open excavations; safeguard the public health and welfare; preserve the natural assets of soil, water, forests and wildlife; maintain aesthetic features of the environment; prevent land and water pollution; and promote soil stabilization.

Manufactured Housing Park District (zoning)

The purpose of the Manufactured Housing Park District is to allow the use of manufactured housing units under conditions that are intended to enhance affordable housing opportunities.

Emergency Operations Plan

Derry maintains an Emergency Operations Plan. The latest update of this plan was during 2016 and describes the Town Department's responsibilities and outlines personnel and equipment available during an emergency.

Evacuation and Notification

The *Derry Emergency Operations Plan* addresses evacuation procedures for emergency notification and evacuation routes to be taken. State designated evacuation routes have been identified for I-93 in and around the Town of Derry with signage for guidance to motorists.

State Dam Program

Derry maintains Low and Significant hazard class dams in coordination with the State Dam Program.

Road Design Standards

Derry maintains road design regulations (NH Department of Transportation standards) as part of the Town's Subdivision Regulations. Land Development Control Regulations control the peak rate of discharge of stormwater runoff from development under post-development conditions. The discharge shall not exceed that of the predevelopment condition unless it can be demonstrated that no off-site adverse impacts will result, or appropriate flowage easements have been secured.

Shoreland Water Quality Protection Act

The New Hampshire Shoreland Protection Act, adopted during 1994 and last updated during 2011, establishes minimum standards for the future subdivision, use, and development of all shorelands within 250 feet of the state's public waters. When repairs, improvements or expansions are proposed to existing development, the law requires that these alterations be consistent with the intent of the Act. The N.H. Department of Environmental Services is responsible for enforcing the standards within the protected shoreland unless a community adopts an ordinance or shoreland provisions that are equal to or more stringent than the Act.

Best Management Practices

The State has established Best Management Practices for erosion and sediment control. These BMPs are methods, measures, or practices to prevent or reduce water pollution, including, but not limited to, structural and nonstructural controls, operation and maintenance procedures, and other requirements and scheduling and distribution of activities. Usually, BMPs are applied as a system of practices rather than a single practice. BMPs are selected based on site-specific conditions that reflect natural background conditions.

Back-Up Electrical Generators

Publicly owned back-up electrical generator locations are noted in Section II.

Town Radio System

The Town has developed a radio system with a goal of interoperability between all emergency responders.

Hazardous Materials Regulations

The Town of Derry enforces State regulations regarding hazardous materials. The town of Derry's Fire Department participates in the Southeastern NH HazMat District.

Regulation of Travel Trailers and Motor Homes

Travel trailers and motor homes can be stored on private property and only used on a temporary basis of 30 days for visiting relatives.

International Building Code and Local Building Code

The Town enforces the IBC and the local building code. These codes will regulate construction, setting a minimum standard of protection for building occupants.

Steep Slopes and Class VI Roads

Steep slopes and construction thereon are regulated by the Town's subdivision ordinance. The State has regulations for Class VI roads, which the Town enforces. The Town's regulations are set to prevent erosion, mudslides, and other events.

Comprehensive Emergency Management Planning for Schools

Comprehensive Emergency Management Planning for Schools is available from the NH Division of Homeland Security and Emergency Management. CEMPS outlines training for schoolteachers, administrators, and students on actions to be taken during an emergency at school. The school district will continue to implement this program.

Existing Protection Matrix

The Derry Hazard Mitigation Plan Committee has developed a summary matrix of existing strategies that support hazard mitigation efforts, which is presented on the following pages. This matrix, a summary of the preceding information, includes the type of existing protection (Column 1), a description of the existing protection (Column 2), the area of town affected (Column 3), the effectiveness and/or enforcement of the strategy (Columns 4 & 5), and the identified improvements or changes needed (Column 6).

Existing Protection Policies, Programs and Proposed Improvements for the Town of Derry

TYPE OF EXISTING PROTECTION	DESCRIPTION	AREA OF TOWN COVERED	EFFECTIVENESS AND/OR ENFORCEMENT	Effectiveness	IMPROVEMENTS OR CHANGES NEEDED 2020 Update
Floodplain Development District (Zoning Ordinance)	Guides development in the floodplain to minimize or prevent any increased risk to existing properties in the Special Flood Hazard Areas	All lands designated as special flood hazard areas by FEMA	Building & Code Enforcement Planning Department Conservation Commission (CC)	Good	Ordinance meets all state/federal requirements. Local authority is responsible for enforcing this ordinance. It is periodically reviewed and updated as required. Ordinance is working as prescribed.
Wetlands Conservation Overlay District (Zoning Ordinance)	Protects aquifers and wetlands and includes 150-foot wetlands buffer beyond the boundary of each prime wetland	All lands within the Wetlands Overlay District	Building & Code Enforcement Planning Board CC	Good	Ordinance meets all state/federal requirements. Local authority is responsible for enforcing this ordinance. It is periodically reviewed and updated as required. Ordinance is working as prescribed.
Conservation Corridor Overlay District (Zoning Ordinance)	Regulates uses in wetland and watershed areas that are within the 100-year flood zone to minimize flood hazard and adverse effects of development on the environment	All lands within the CCOD	Building & Code Enforcement Planning Board CC	Good	Ordinance meets all state/federal requirements. Local authority is responsible for enforcing this ordinance. It is periodically reviewed and updated as required. Ordinance is working as prescribed.
Groundwater Resource Conservation District (Zoning Ordinance)	Protect groundwater supply and recharge areas from adverse development or depletion	Areas with high and medium potential to yield groundwater shown on the Derry Groundwater Conservation District Map	Planning Board Building, Code & Health Enforcement CC	Good	Ordinance meets all state/federal requirements. Local authority is responsible for enforcing this ordinance. It is periodically reviewed and updated as required. Ordinance is working as prescribed.

TYPE OF EXISTING PROTECTION	DESCRIPTION	AREA OF TOWN COVERED	EFFECTIVENESS AND/OR ENFORCEMENT	Effectiveness	IMPROVEMENTS OR CHANGES NEEDED 2020 Update
Earth Removal Regulations	Minimize safety hazards created by open excavations	All areas of Town	Planning Board Code Enforcement	Good	Ordinance meets all state/federal requirements. Local authority is responsible for enforcing this ordinance. It is periodically reviewed and updated as required. Ordinance is working as prescribed.
Manufactured Housing Park District	Regulates MHPs and units within parks to minimize potential damage during a natural hazard event	All lands within the District	Planning Board Building & Code Enforcement	Good	Ordinance meets all state/federal requirements. Local authority is responsible for enforcing this ordinance. It is periodically reviewed and updated as required.
Emergency Operations Plan	Describes Town departmental & personnel duties & equipment available during an emergency	All areas of Town	Last updated in 2016	Excellent	Ordinance is working as prescribed. Plan meets all state/federal requirements Reviewed/updated Biannually – last update in 2016

TYPE OF EXISTING PROTECTION	DESCRIPTION	AREA OF TOWN COVERED	EFFECTIVENESS AND/OR ENFORCEMENT	Effectiveness	IMPROVEMENTS OR CHANGES NEEDED 2020 Update
Evacuation and notification	Evacuation procedures with emergency notification and routes to be taken	All areas of Town	Contained within <i>Emergency Operations Plan</i> , last updated 2016	Excellent	Plan meets all state/federal requirements Updated as needed within the EOP update process. EOP last updated in 2016. Now have a code Red System, a portable electronic Reader Board phone and a fixed Reader Phone. Also, have a portable radio-controlled sign, a hotline for issues with fire dispatchers, a well-check program, school system Emergency Evacuation Route on 93, Cable Access TV, and an AM radio station (1610)
NH State Dam Program	Maintenance of Low and Significant Hazard Class dams in coordination with the State Dam Program	All low and significant hazard class dams in Derry	NHDES	Good	Program meets all state/federal requirements. Program is working as described.
Road Design Standards	NH DOT Standards and Town standards	All new subdivisions	Planning Board Public Works	Excellent	Regulations and standards meet all state/federal requirements. Local authority is responsible for enforcing these regulations/standards. They are periodically reviewed and updated as required and are working as prescribed. Paving and maintenance is on-going. New subdivisions required to create a granite curb for better drainage.

TYPE OF EXISTING PROTECTION	DESCRIPTION	AREA OF TOWN COVERED	EFFECTIVENESS AND/OR ENFORCEMENT	Effectiveness	IMPROVEMENTS OR CHANGES NEEDED 2020 Update
Shoreland and Water Quality Protection Act	Standards for use of all shorelands within 250 feet of public waters to protect streambanks and water quality from the adverse effects of development. Last updated in 2011.	All property within 250 feet of public waters	Planning Board CC Code Enforcement NH Dept. of Env. Services	Good	Regulation meets all state/federal requirements. Regulation is working as prescribed.
Best Management Practices	State guidelines for erosion and sediment control; protection of natural environment & prevention potential damage due to poor construction methods	All areas of Town	State of NH DPW (Town) CC Code Enforcement	Good	Program meets all state/federal requirements. Program is working as described
Generators	Back-up power for schools and other emergency facilities	See Section II	Emergency Management	Excellent	Purchased portable emergency generator and have electrical switch wiring. West Running Brook complete in addition to Pinkerton Academy Gym complete and fully operational. Considering generators for major intersections in town and all water satellite systems have generators currently.

TYPE OF EXISTING PROTECTION	DESCRIPTION	AREA OF TOWN COVERED	EFFECTIVENESS AND/OR ENFORCEMENT	Effectiveness	IMPROVEMENTS OR CHANGES NEEDED 2020 Update
Town Radio System	Communications between fire, police, public works, emergency services	All areas of Town	Emergency Personnel	Excellent	Communications Center upgrade complete. Fire, Police and EOC radio communication system upgrade complete. Public Works is on a different bandwidth and communication is done mainly by cellphone contractors. No further changes planned at this time. It will cost an estimated \$300,000 to fund portables.
Hazardous Materials Regulations	State regulations administered by Town; Derry Fire Department is a part of the Southeastern NH Haz-Mat District	Entire Town	Police Dept. Fire Depts.	Good	Completed the Regional Emergency Planning Committee (REPC) for the region. The Town of Derry is a Member.
Motor Homes/Travel Trailers	Allowed to be parked, but not used for dwelling per town regulations to protect the safety of residents	All areas of Town	Planning Board Building & Code Enforcement	Good	Ordinance meets all state/federal requirements. Local authority is responsible for enforcing this ordinance. It is periodically reviewed and updated as required. Ordinance is working as prescribed.
IBC and local building codes	Regulates construction of buildings to set a minimum standard of protection to building occupants	All areas of Town	Building & Code Enforcement Fire Dept.	Good	No further changes needed at this time as ordinance meets all state/federal requirements. There have been updates to the 2015 Building Codes.

TYPE OF EXISTING PROTECTION	DESCRIPTION	AREA OF TOWN COVERED	EFFECTIVENESS AND/OR ENFORCEMENT	Effectiveness	IMPROVEMENTS OR CHANGES NEEDED 2020 Update
Comprehensive Emergency Management Planning for Schools (CEMPS)	Education for schoolteachers, administrators and children for emergency situations	All Schools in Derry	Derry School Department	Good	Continue to implement program (NHHSEM and Town budget) Ongoing, plans are executed and evaluated multiple times per year, including Pinkerton Academy. Joint training between town and schools. An upgraded emergency plan is in progress.
Steep Slopes Regulations	Subdivision Regulations set standards to prevent erosion, mudslides, etc.	Slopes over 15% and Class VI roads	Town Council Planning Board Public Works	Good	No further changes needed at this time. Regulations working as prescribed.
Elevation Certificates	Required for Certificate of Occupancy for all new construction/substantial improvements in Special Flood Hazard Areas SFHAs	100-year Floodplain/SFHA	Building & Code Enforcement	Good	Completed coordinating flood insurance rate maps with FEMA. Local authority is responsible for enforcing this ordinance. It is periodically reviewed and updated as required. Ordinance is working as prescribed.
HazMat Response Team	Continued dependence on mutual aid; Derry Fire Department is a part of the Southeastern NH HazMat District	All areas of Town	Southern New Hampshire HazMat Mutual Aid Team	Excellent	Plan meets all state/federal requirements. Program is working as described. It is a long-running and very active program.

TYPE OF EXISTING PROTECTION	DESCRIPTION	AREA OF TOWN COVERED	EFFECTIVENESS AND/OR ENFORCEMENT	Effectiveness	IMPROVEMENTS OR CHANGES NEEDED 2020 Update
GIS System	System for map production and data analysis for Town departments	All areas of Town	IT/GIS Dept. of Public Works	Excellent	<ul style="list-style-type: none"> • Complete drainage system mapping • Coordinate GIS with utility companies for circuits and poles as capability allows.
Telecommunication Overlay District (Zoning Ordinance)	Includes regulations for telecommunications towers, including height, material & design requirements	District-wide	Building & Code Enforcement Dept. of Public Works, Planning Department	Good	Still need to complete update of ordinance through Planning subcommittee. Estimated completion within 2 years.
Wellhead Protection Program	To protect underground water sources from contamination	Wellhead areas	NH DRED CC	Good	Wellhead Protection area updated every 3 years as required as well as distribution of educational mailings Program is working as described

TYPE OF EXISTING PROTECTION	DESCRIPTION	AREA OF TOWN COVERED	EFFECTIVENESS AND/OR ENFORCEMENT	Effectiveness	IMPROVEMENTS OR CHANGES NEEDED 2020 Update
Community Notification System	Allows Town to telephone residents regarding emergency and non-emergency situations	All parts of Town (for listed phone numbers only)	All Town Departments	Excellent	Go beyond town's 911 and use Code Red. Completed notification system and is working as described. Town has five mobile message boards throughout Town, deployed as needed, and Town radio system has been upgraded.

Table 12: Existing Protection Policies, Programs and Proposed Improvements for Derry

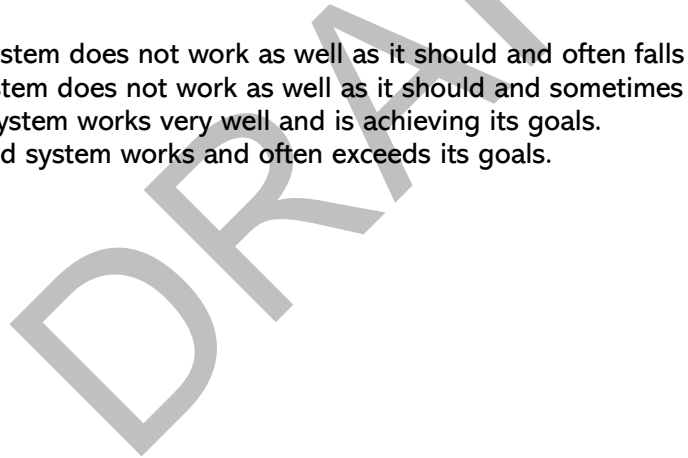
Rating Definitions:

Poor - The policy, plan or mutual aid system does not work as well as it should and often falls short of meeting its goals.

Fair - The policy, plan or mutual aid system does not work as well as it should and sometimes falls short of meeting its goals.

Good - The policy, plan or mutual aid system works very well and is achieving its goals.

Excellent - The policy, plan or mutual aid system works and often exceeds its goals.



IX. SUMMARY OF MITIGATION STRATEGIES AND PRIORITIZATION

The following mitigation strategies are aimed at reducing the potential impact of significant hazard events on the community and its infrastructure. The Derry Hazard Mitigation Committee reviewed all mitigation strategies from the 2015 plan, identified whether they were completed, ongoing, or should be deferred. New mitigation action strategies were then identified. A summary of existing and new strategies can be found in the following matrix:

2015 Mitigation Action	Status since 2015 Plan	Explanation of Status
1. Continue to maintain current snow removal equipment and upgrade as needed to cope with snow emergencies.	Completed	Ongoing; Town continues to seek funding sources for equipment and upgrades equipment as needed. Since 2015, additional snow removal trucks have been purchased with increased prevalence of snowstorms.
2. Implement drills and exercises for emergencies with elected officials.	Deleted	Deleted; no exercises implemented with elected officials. Action items #2 and #3 have been consolidated for 2020 Action Plan.
3. Encourage emergency management training exercises and coordination between schools and Derry BEM.	Completed	Ongoing; PD and EMD routinely conduct active shooter drills in schools and town facilities.
4. Continue to prohibit construction in the floodplain during review & permitting processes.	Completed	Ongoing; the Town currently implements zoning ordinance that prohibits construction in floodplains.
5. Continue to implement a public awareness program for emergency management and hazard mitigation.	Completed	Ongoing; Town provides emergency preparedness information on its websites.
6. Encourage locating underground utilities for redevelopment.	Completed	Ongoing in coordination with planning and zoning departments as needed.
7. Continue to participate and comply with the NFIP and consider participation in the CRS.	Completed	Ongoing, Town is part of NFIP and is considering participating in CRS.
8. Continue to purchase / lease emergency vehicles and equipment to update and expand existing supply.	Completed	Ongoing; town purchases and leases emergency equipment and vehicles as needed.
9. Continue to identify and remove hazardous trees in the right of way.	Completed	Ongoing as needed in coordination with Eversource Utilities.
10. Improve drainage structures at Folsom and N. High Street as well as Tsienneto Rd. and NH Rt. 102.	Deferred	Structures will be completed as part of Exit 4A update by NHDOT.
11. Continue to implement culvert analysis for inventory and condition assessment.	Completed	Ongoing; DPW conducts culvert analysis as needed. Culvert inventory is documented in SNHPC's 2020 Vulnerability Assessment (Appendix E);
12. Continue to implement a culvert maintenance system.	Completed	Ongoing as needed with new or aging structures.
13. Identify funding source for an additional portable generator that can be used in emergencies.	Completed	Ongoing; existing structures have been upgraded. New portable generator purchase in current CIP
14. Continue maintenance program for detention/retention ponds.	Completed	Ongoing as part of routine maintenance program
15. Continue to encourage property owners to elevate structures in the floodplain, especially	Completed	Ongoing in coordination with planning and zoning departments

insured and repetitive loss properties.		
16. Encourage Conservation Commission to become active in acquiring flood-prone properties.	Completed	Ongoing coordination with the Conservation Commission
17. Continue to pursue funding for the upgrade of the DPW Radio system for compatibility with FD and PD.	Completed	Ongoing; PD & FD communications systems have been upgraded since 2015 and other town systems are upgraded as needed.
18. Test and develop staffing plan for Pinkerton Academy Emergency Shelter Ops	Completed	Completed and ongoing; plan is implemented and updated as needed.
19. Complete Blighted Properties Ordinance.	Completed	Completed and deleted from 2020 action plan. Town implements action through existing property maintenance ordinance.
20. Continue to pursue GIS data for utility infrastructure such as electric poles/circuits in Town.	Completed	Completed and ongoing; GIS data is continuously updated as needed.
21. Continue current plan to control the potential for waterborne illnesses from standing water; disseminate hazard information.	Completed	Ongoing; Town currently implements a mosquito control program, which is a newly identified action item for 2020 plan update.
22. Complete update Telecom Overlay ordinance.	Deferred	Action has not been completed but Town plans on addressing action item as part of 2020 plan update.
23. Install visual river gauges at known points of repetitive floods.	Deferred	Will not be completed by the town but is expected to be addressed with Exit 4A project by NHDOT.
24. Continue to evaluate feasibility of adoption of Class VI road regulations.	Deleted	Town has not implemented action item and has no plan to do so in the future.
25. Implement public outreach campaign to property owners along flood-prone areas.	Completed	Ongoing; the Town reaches out to residents when there is a flood emergency and posts hazard information on town websites.
26. Increase coordination with Eversource Utilities in pruning tree limbs around powerlines.	New	
27. Promote installation of underground powerlines and utilities.	New	
28. Implement procedures identified in town's damage assessment report and EOP to determine extent and impact of natural disasters on people and property.	New	
29. Improve community surveillance capabilities and implement safeguards to reduce the spread of disease in the event of an epidemic.	New	
30. Ensure town maintains an adequate supply of PPE for potential disease/virus outbreaks.	New	
31. Maintain mosquito control and public education program in Town to monitor for EEE and West Nile Virus	New	
32. Increase and improve sanitation and disinfecting capabilities in schools and town facilities during outbreaks and peak transmission seasons.	New	
33. Continue monitoring for PFAS and arsenic in town water supplies in coordination with NHDES.	New	

34. Provide training opportunities to municipal staff on cyber security and threats.	New	
35. Continue providing trainings and active shooter drills in schools and municipal buildings.	New	
36. Maintain coordination with regional hazmat team in monitoring potential terror or violence threats.	New	

Table 13: Summary of Mitigation Strategies and Prioritization

Prioritization of Mitigation Strategies

The goal of each mitigation strategy identified in the previous table is to reduce the severity of damage caused by significant hazard events. To determine the effectiveness of each strategy in accomplishing this goal, a set of criteria known as the STAPLEE, was applied to evaluate each strategy. The STAPLEE method analyzes the Social, Technical, Administrative, Political, Legal, Economic and Environmental aspects of a project and is commonly used by public administration officials and planners for making planning decisions. The following questions were asked about the proposed mitigation strategies and discussed in the table below:

- **Social:** Is the proposed strategy socially acceptable to the community? Are there equity issues involved that would mean that one segment of the community is treated unfairly?
- **Technical:** Will the proposed strategy work? Will it create more problems than it solves?
- **Administrative:** Can the community implement the strategy? Is there someone to coordinate and lead the effort?
- **Political:** Is the strategy politically acceptable? Is there public support both to implement and to maintain the project?
- **Legal:** Is the community authorized to implement the proposed strategy? Is there a clear legal basis or precedent for this activity?
- **Economic:** What are the costs and benefits of this strategy? Does the cost seem reasonable for the size of the problem and the likely benefits?
- **Environmental:** How will the strategy impact the environment? Will the strategy need environmental regulatory approvals?

Each mitigation strategy was evaluated and assigned a score (Good = 3, Average = 2, Poor = 1) based on the above criteria. An evaluation of each strategy can be found in the table below. Each strategy was evaluated and prioritized according to the final score. The highest scoring strategies were determined to be of most importance, economically, socially, environmentally, and politically.

STAPLEE Ranking Matrix

Staplee Chart Mitigation Strategy	Is it socially acceptable?	Is it technically feasible & potentially successful?	Is it administratively workable?	Is it politically acceptable?	Is there legal authority to implement?	Is it economically beneficial?	Is it environmentally beneficial?	Total Score
	1. Continue to maintain current snow removal equipment and upgrade as needed to cope with snow emergencies.	3	3	3	2.5	3	3	2
2. Implement emergency drills and exercises in town facilities and schools and increase coordination between schools and Derry BEM.	3	3	3	3	3	3	3	21
3. Continue to prohibit construction in the floodplain during review & permitting processes.	3	3	3	3	3	3	3	21
4. Continue to implement a public awareness program for emergency management and hazard mitigation	3	3	3	3	3	3	3	21
5. Encourage locating underground utilities for redevelopment.	3	3	3	3	3	3	3	21
6. Continue to participate and comply with the NFIP and consider participation in the CRS.	3	3	3	3	3	3	3	21
7. Continue to purchase / lease emergency vehicles and equipment to update and expand existing supply.	3	3	3	3	3	3	3	21
8. Continue to identify and remove hazardous trees in the right of way.	3	3	3	2	3	3	3	20
9. Improve drainage structures at Folsom and N. High Street as well as Tsienneto Rd. and NH Rt. 102.	3	3	3	3	3	3	3	21
10. Continue to implement culvert analysis for inventory and condition assessment	3	3	3	3	3	3	3	21
11. Continue to implement a culvert maintenance system	3	3	3	3	3	3	3	21
12. Identify funding source for an additional portable generator that can be used in emergencies	3	3	3	3	3	3	3	21
13. Continue maintenance program for	3	3	3	3	3	3	3	21

detention/retention ponds									
14. Continue to encourage property owners to elevate structures in the floodplain, especially insured and repetitive loss properties	3	3	3	3	3	3	3	3	21
15. Encourage Conservation Commission to become active in acquiring flood-prone properties	3	3	3	3	3	3	3	3	21
16. Continue to pursue funding for the upgrade of the DPW Radio system for compatibility with FD and PD	3	3	3	3	3	3	3	3	21
17. Test and develop staffing plan for Pinkerton Academy Emergency Shelter Ops	3	3	3	3	3	3	3	3	21
18. Continue to pursue GIS data for utility infrastructure such as electric poles/circuits in Town	3	3	3	3	2	3	3	3	20
19. Continue current plan to control the potential for waterborne illnesses from standing water; disseminate hazard information	3	3	3	3	3	3	3	3	21
20. Complete update Telecom Overlay ordinance	3	3	3	3	3	3	2	3	20
21. Install visual river gauges at known points of repetitive floods	3	3	3	3	3	3	3	3	21
22. Implement public outreach campaign to property owners along flood-prone areas	3	3	3	3	3	3	3	3	21
23. Increase coordination with Eversource Utilities in pruning tree limbs around powerlines.	3	3	3	3	3	3	3	3	21
24. Promote installation of underground powerlines and utilities.	3	3	3	3	3	3	3	3	21
25. Implement procedures identified in town's damage assessment report and EOP to determine extent and impact of natural disasters on people and property.	3	3	3	3	3	3	3	3	21
26. Improve community surveillance capabilities and implement safeguards to reduce the spread of disease in the event of an epidemic.	3	3	3	3	3	3	3	3	21
27. Ensure town maintains an adequate supply of PPE for potential disease/virus outbreaks.	3	3	3	3	3	3	3	3	21
28. Maintain mosquito control and public education program in Town to monitor for EEE and West Nile Virus	3	3	3	3	3	3	3	3	21
29. Increase and improve sanitation and disinfecting capabilities in schools and town facilities during outbreaks and peak transmission seasons.	3	3	3	3	3	3	2	3	20
30. Continue monitoring for PFAS and arsenic in town water supplies in coordination with NHDES	3	3	3	3	3	3	3	3	21
31. Provide training opportunities to municipal staff on cyber security and threats.	3	3	3	3	3	3	3	3	21
32. Continue providing trainings and active shooter drills in schools and municipal buildings.	3	3	3	3	3	3	3	3	21

33. Maintain coordination with regional hazmat team in monitoring potential terror or violence threats.	3	3	3	3	3	3	3	21
---	---	---	---	---	---	---	---	----

Table 14: STAPLEE Ranking Matrix

X. PRIORITIZED IMPLEMENTATION SCHEDULE AND ACTION PLAN

The Derry Hazard Mitigation Committee created an implementation schedule for the new and existing mitigation strategies utilizing the following questions as a guiding framework:

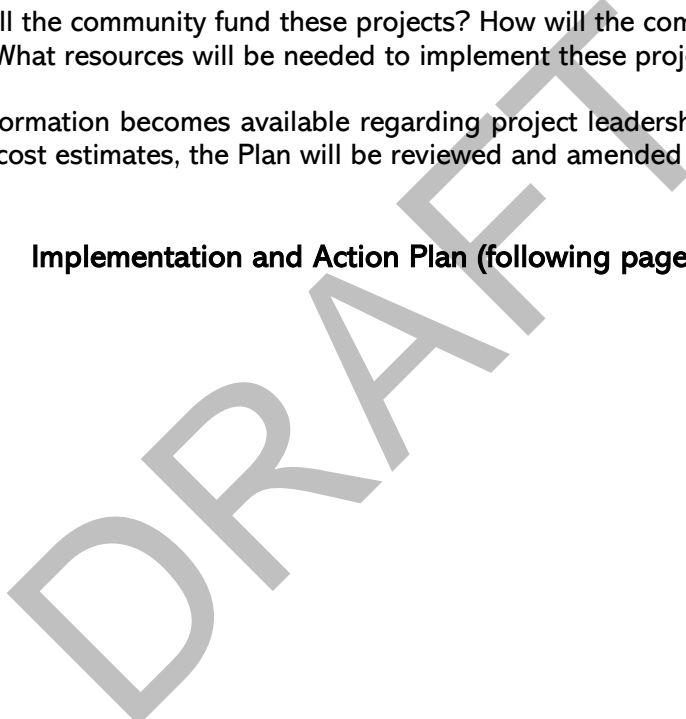
WHO? Who will lead the implementation efforts? Who will put together funding requests and applications?

WHEN? When will these actions be implemented, and in what order?

HOW? How will the community fund these projects? How will the community implement these projects? What resources will be needed to implement these projects?

As additional information becomes available regarding project leadership, timeline, funding sources, and/or cost estimates, the Plan will be reviewed and amended accordingly.

Implementation and Action Plan (following page):



Mitigation Action	Hazard Addressed	Who (Leadership)	When (Timeframe)	Cost/Funding source	Status
1. Implement emergency drills and exercises in town facilities and schools and increase coordination between schools and Derry BEM.	All hazards	EMD, PD, FD	Medium term	Low cost, EMD Budget, grants	Completed and ongoing; PD and EMD routinely conduct active shooter drills in schools and town facilities.
2. Continue to prohibit construction in the floodplain during review & permitting processes.	Inland flooding	EMD, P&Z, CE	Short term	No cost, staff time	Completed and ongoing with zoning ordinance that prohibits construction in floodplains
3. Continue to implement a public awareness program for emergency management and hazard mitigation.	All hazards	EMD, PD, FD, CERT, IT	Short term	No cost, staff time	Ongoing; Town provides emergency preparedness information on its websites.
4. Encourage locating underground utilities for redevelopment.	All hazards	EMD, Utilities, PB	Short term	No cost, staff time	Completed and ongoing in coordination with planning and zoning departments.
5. Continue to participate and comply with the NFIP and consider participation in the CRS.	Flood	CE, P&Z	Short term	No cost	Completed and ongoing, Town is part of NFIP and is considering participating in CRS
6. Continue to purchase / lease emergency vehicles and equipment to update and expand existing supply.	All hazards	EMD, PD, FD, DPW	Short term	High cost, Town budget	Completed and ongoing as needed
7. Improve drainage structures at Folsom and N. High Street as well as Tsienneto Rd. and NH Rt. 102.	Inland flood	DPW	Long term	High cost, federal funding	Deferred; Structures will be completed as part of Exit 4A update by NHDOT.
8. Continue to implement culvert analysis for inventory and condition assessment.	Inland flood	EMD, DPW	Short term	Medium cost, DPW budget	Completed and ongoing as needed; Culvert inventory is documented in SNHPC's 2020 Vulnerability Assessment (Appendix_);

9. Continue to implement a culvert maintenance system.	Inland flood	DPW	Short term	Low cost, DPW budget	Completed and ongoing as needed with the identification of new or aging structures.
10. Identify funding source for an additional portable generator that can be used in emergencies.	Inland flood	EMD, FD, PD	Long term	No cost, staff time	Completed and ongoing; existing structures have been upgraded. New portable generator purchase in currently CIP
11. Continue maintenance program for detention/retention ponds.	Inland flood	DPW, CC	Short term	Low cost, DPW budget	Completed and ongoing with routine maintenance program
12. Continue to encourage property owners to elevate structures in the floodplain, especially insured and repetitive loss properties.	Inland flood	CE, P&Z	Short term	Low cost, Town Budget, FMAP	Completed and ongoing in coordination with planning and zoning departments
13. Encourage Conservation Commission to become active in acquiring flood-prone properties.	Inland flood	Conservation Commission, Town Council	Medium term	Low cost; Land Use Change Tax	Completed and ongoing as needed in coordination with the Conservation Commission
14. Continue to pursue funding for the upgrade of the DPW Radio system for compatibility with FD and PD.	All hazards	EMD, DPW	Medium term	High cost, EMD & DPW budgets	Completed and ongoing; PD & FD communications systems have been upgraded since 2015 and are continuously upgraded as needed.
15. Test and develop staffing plan for Pinkerton Academy Emergency Shelter Ops.	All hazards	EMD, DPW	Medium term	Low cost; EMD budget	Completed and ongoing as needed
16. Continue current plan to control the potential for waterborne illnesses from standing water; disseminate hazard information.	Infectious Disease	CE, DPW, Health Dept.	Short term	Low cost, EMD budget	Completed and ongoing; town currently implements a mosquito control program

17. Install visual river gauges at known points of repetitive floods.	Inland flood	EMD, DPW	Short term	Federal funding	Deferred; will not be completed by the town but is expected to be addressed with Exit 4A project by NHDOT.
18. Implement public outreach campaign to property owners along flood-prone areas.	Inland flood	CE, EMD	Medium term	Low cost, EMD budget	Completed and ongoing; the Town reaches out to residents when there is a flood emergency.
19. Increase coordination with Eversource Utilities in pruning tree limbs around powerlines.	Severe winter weather (ice storm), high wind events	DPW	Short term	Low cost, town budget	NEW: Action item added to 2020 Plan
20. Promote installation of underground powerlines and utilities.	Ice storm	DPW	Long term	High cost	NEW: Action item added to 2020 Plan
21. Implement procedures identified in town's damage assessment report and EOP to determine extent and impact of natural disasters on people and property.	All Hazards	FD, PD, EMD	Medium term	Medium cost, staff time	NEW: Action item added to 2020 Plan
22. Improve community surveillance capabilities and implement safeguards to reduce the spread of disease in the event of an epidemic.	Infectious Disease	FD, PD, EMD	Long term	Low cost	NEW: Action item added to 2020 Plan
23. Ensure town maintains an adequate supply of PPE for potential disease/virus outbreaks.	Infectious Disease	FD, EMD	Short term	Medium cost, town budget	NEW: Action item added to 2020 Plan
24. Maintain mosquito control and public education program in Town to monitor for EEE and West Nile Virus	Infectious Disease	Public Health Dept.	Short term	Medium cost, town budget	NEW: Action item added to 2020 Plan
25. Continue monitoring for PFAS and arsenic in town water supplies in coordination with NHDES.	Known and Emerging contaminants	FD, NHDES	Long term	Low cost	NEW: Action item added to 2020 Plan

26. Provide training opportunities to municipal staff on cyber security and threats.	Cyber event	PD, FD, IT	Short term	Low cost, staff time	NEW: Action item added to 2020 Plan
27. Continue providing trainings and active shooter drills in schools and municipal buildings.	MCI	PD, FD	Short term	Low cost, staff time	NEW: Action item added to 2020 Plan
28. Maintain coordination with regional hazmat team in monitoring potential terror or violence threats.	Terror/violence	FD	Medium term	No cost	NEW: Action item added to 2020 Plan
29. Continue to identify and remove hazardous trees in the Right of Way	Severe winter weather and high wind events	DPW	Short term	Medium cost, DPW budget	Completed and ongoing in coordination with Eversource Utilities
30. Continue to pursue GIS data for utility infrastructure such as electric poles/circuits in Town	All hazards	GIS Dept., EMD	Short term	Low cost, EMD budget	Completed ongoing; updated as needed
31. Complete update Telecom Overlay ordinance	All hazards	Planning Dept.	Medium term	No cost, staff time	Deferred; action has not been completed but moved to 2020 action plan
32. Increase and improve sanitation and disinfecting capabilities in schools and town facilities during outbreaks and peak transmission seasons.	Infectious Disease	Public health dept. FD	Medium term	Medium cost, town budget	NEW: Action item added to 2020 Plan
33. Continue to maintain current snow removal equipment and upgrade as needed to cope with snow emergencies.	Heavy Snow	EMD	Short term	High cost, town budget	Completed and ongoing in accordance with town budget

Table 15: 2020 Action Plan

Timeframe Key:

Short term – 1 year or less

Medium term – 2 to 4 years

Long term – 5 years or longer

Cost Key:

Low cost - < \$10,000

Medium cost - \$10,000 - \$100,000

High cost - \$100,000 or greater

Summary of Acronyms in the Prioritized Implementation Schedule:

- CE = Code Enforcement
- CERT = Comprehensive Emergency Response Team
- ConCom = Conservation Commission
- CRS = Community Rating System
- DPW= Department of Public Works
- FD = Fire Department
- EM = Emergency Management
- EMD = Emergency Management Director
- FEMA= Federal Emergency Management Agency
- FMAP= Flood Mitigation Assistance Program (see Appendix F)
- IT = Information Technology
- PB = Planning Board
- PD = Police Department
- PDM= Pre-Disaster Mitigation Program (see Appendix F)
- P&Z = Planning and Zoning
- NH DOT = New Hampshire Department of Transportation
- NH HSEM= New Hampshire Homeland Security and Emergency Management

XI. ADMINISTRATIVE PROCEDURES REGARDING ADOPTION, EVALUATION AND MONITORING OF THE PLAN

Incorporating hazard mitigation considerations into the thought processes and decision making that comprise local planning reinforces community sustainability and strengthens community planning programs. It ensures that the community survives natural disasters so that it can grow and develop as it was envisioned."

—Michael J. Armstrong
Associate Director for Mitigation, FEMA

Incorporating the Plan into Existing Planning Mechanisms

Upon completion and approval by FEMA and the State of New Hampshire, the Plan will be adopted as a standalone document for the Town and as an appendix in the Town's Emergency Operations Plan (EOP). An update of the EOP is ongoing; future updates to the EOP will incorporate this Plan as a referenced appendix, but the two plans will always be printed as separated documents. The EOP is subject to annual review.

The Town has utilized the Hazard Mitigation Plan in the past by citing emergency operations requests within the Capital Improvement Program (CIP), specifically as it relates to mitigation strategies within the Plan, annual updates to the Emergency Operations Plan, and budget requests by Town departments such as highway, police, fire, and community development. The Plan will continue to be consulted when town departments submit their request for inclusion in the CIP. The Capital Improvements Committee is responsible for updating the CIP annually, presenting the document to the Planning Board for adoption, and forwarding it to the Town Council for inclusion in their annual budget process. The Town Council, in conjunction with Derry Emergency Management will determine which items can and should be added to the annual budget based on the inclusion in the CIP, the Town's annual budget and other possible sources of funding. Portions of this Plan should be referenced when updating the Town's Master Plan. Considerations about future land use and proximity to current and potential hazard areas need to be inherently part of the planning process. NH RSA 674:2 (d) gives towns the authority to include a natural hazards section, which documents the physical characteristics, severity, and extent of any potential natural hazards to the community, within the framework of a Master Plan.

Monitoring, Evaluating and Updating the Plan

Adoption

Upon notification that NHHSEM has conditionally approved this Plan, a public hearing will be held, and the Derry Town Council will formally adopt the Derry Hazard Mitigation Plan as an official statement of town policy. In the future, this Plan may constitute a new section of the Derry Master Plan, in accordance with RSA 674:2. The public hearing shall be properly posted and advertised by the Town in accordance with New Hampshire state law. Documentation that the Derry Town Council have formally adopted can be found at the beginning of the Plan.

Adoption of the Derry Hazard Mitigation Plan demonstrates the Town's commitment to hazard mitigation. It also qualifies the municipality for federal, state, and local funding and prepares the public for what is expected of the community before and after a natural hazard event occurs.

Following adoption, the Hazard Mitigation Committee and the Town Council shall seek to incorporate the mitigation actions identified in the Prioritized Implementation Schedule of Section VIII of the Plan into other planning mechanisms, including the Town's Master Plan.

Monitoring, Evaluating and Updates

The Derry Hazard Mitigation Plan shall be monitored and evaluated annually to track progress in implementing the mitigation strategies and actions as well as updating the goals and objectives of the Plan. The Derry Town Council's administrative assistant shall be responsible for initiating this review and scheduling an annual meeting of the Hazard Mitigation Committee. The Derry Emergency Management Director shall be responsible for ensuring that the Plan is updated for FEMA approval at least every 5 years. In addition to reviewing Hazard Mitigation Committee members' progress on projects, the strategy for the following year will be reviewed and new projects will be selected for implementation at the annual meeting.

The Derry Town Council's administrative assistant will conduct updates in coordination with the Hazard Mitigation Committee and Derry Town Council. Updates should be made to the Plan every three to five years⁵⁶ to accommodate actions that have failed or are not considered feasible after a review for their consistency with STAPLEE, the timeframe, the community's priorities, and funding resources. Priorities that were not ranked high, but identified as potential mitigation strategies, should be reviewed as well during the monitoring and update of this Plan to determine feasibility of future implementation. At that time, any other items identified during the annual meetings will be updated in the Plan, including, but not limited to, goals, objectives, identification of past hazard events, and the inventory of town assets vulnerable to hazards.

Keeping with the process of adopting the Derry Hazard Mitigation Plan, a public hearing to receive comment on the Plan maintenance and updating shall be held during the review period, and the Town Council will adopt the final product.

During the budget process each year, department heads shall be responsible for considering hazard mitigation actions that need to be implemented as well as forwarding new actions that might be necessary to the Town Council's administrative assistant for inclusion in the annual plan review. The plan will be considered for incorporation into the community's Town Operating Budget, capital improvement plan considerations, and/or other planning mechanisms.

Continued Public Involvement

The public will continue to be invited and encouraged to be involved during this process at monitoring, evaluation, and update meetings. All meetings involving implementation or updates of the Plan shall be open to the public as is required by RSA 91-A and notices of the meetings will be posted at least 24 hours in advance in a minimum of two locations, such as the town offices and library. To gain additional public involvement, draft copies of the amended Hazard Mitigation Plan will be made available at two public locations for review and comment. The document should be left for a minimum of two weeks and then all comments will be considered in drafting final revisions.

⁵⁶ FEMA Disaster Mitigation Act of 2000 44 CFR Part 201.6(d)(3) mandates "Plans must be reviewed, revised if appropriate, and resubmitted for approval within five years to continue to be eligible for HMGP project grant funding." (Federal Register Vol. 36, No. 38, Feb 26, 2002, Rules and Regulations, p8852)

APPENDIX A. BIBLIOGRAPHY AND RESOURCES

- "2000 To 2017 Active Shooter Incidents." *FBI*, FBI, 8 Sept. 2016, www.fbi.gov/file-repository/active-shooter-incidents-2000-2017.pdf/view.
- "Basic Information on PFAS." *EPA*, Environmental Protection Agency, 6 Dec. 2018, www.epa.gov/pfas/basic-information-pfas.
- Center, Storm Prediction. "NOAA's NWS Storm Prediction Center." *Storm Prediction Center*, NOAA's National Weather Service, 1 Jan. 2001, www.spc.noaa.gov/efscale/.
- "Disasters." Disasters | FEMA.gov, www.fema.gov/disasters.
- "Earthquake Glossary." *U.S. Geological Survey*, earthquake.usgs.gov/learn/glossary/?term=earthquake.
- "Economic and Labor Market Information Bureau." *Economic & Labor Market Information Bureau | NH Employment Security*, www.nhes.nh.gov/elmi/.
- Exchange, The. "Series: New Hampshire's Aging, Underfunded Infrastructure." *New Hampshire Public Radio*, www.nhpr.org/post/series-new-hampshires-aging-underfunded-infrastructure#stream/O.
- "Federal Insurance & Mitigation Administration." *Federal Insurance & Mitigation Administration | FEMA.gov*, www.fema.gov/what-mitigation/federal-insurance-mitigation-administration.
- FEMA. "Fire/Emergency Medical Services Department Operational Considerations and Guide for Active Shooter and Mass Casualty Incidents." *Usfa.fema.gov*, Sept. 2013, www.usfa.fema.gov/downloads/pdf/publications/active_shooter_guide.pdf.
- "Glossary A-Z." *NWCG*, www.nwcg.gov/glossary/a-z#letter_w.
- Heat Safety Tips and Resources: National Weather Service. (n.d.). Retrieved from <https://www.weather.gov/safety/heat>
- Infectious Diseases: Symptoms and Causes . (n.d.). Retrieved from <https://www.mayoclinic.org/diseases-conditions/infectious-diseases/symptoms-causes/syc-20351173>
- "Institute of Hazardous Materials Management." *Institute of Hazardous Materials Management*, www.ihmm.org/.
- Ironcore. "New Hampshire." *ASCE's 2017 Infrastructure Report Card*, www.infrastructurereportcard.org/state-item/New-Hampshire/.
- "National Centers for Environmental Information." *National Climatic Data Center*, www.ncdc.noaa.gov/.

NATIONAL CYBER INCIDENT RESPONSE PLAN. Homeland Security, 2016, NATIONAL CYBER INCIDENT RESPONSE PLAN, www.us-cert.gov/sites/default/files/ncirp/National_Cyber_Incident_Response_Plan.pdf.

National Weather Service Manual 10-950. (2019, November 26). Retrieved from <http://www.nws.noaa.gov/directives/sym/pd01009050curr.pdf>

National Weather Service – National Hurricane Center. "The Saffir-Simpson Hurricane Scale." <http://www.nhc.noaa.gov/aboutsshs.shtml>

Noaa. "Glossary." *NOAA's National Weather Service*, 1 Nov. 2004, w1.weather.gov/glossary/index.php?letter=b.

Noaa. "Glossary." *NOAA's National Weather Service*, 1 Nov. 2004, w1.weather.gov/glossary/index.php?letter=f.

NOAA's National Weather Service - Glossary, forecast.weather.gov/glossary.php?word=HEAVY%2BSNOW.

NOAA's National Weather Service: Guide to Hydrologic Information on the Web.

Northeast States Emergency Consortium, nsec.org/.

"Part III Federal Emergency Management Agency: 44 CFR Parts 201 and 206 Hazard Mitigation Planning and Hazard Mitigation Grant Program; Interim Final Rule." *FEDERAL REGISTER*, Feb. 2002, www.fema.gov/pdf/help/fr02-4321.pdf.

Quick Guide to the Stages of Tropical Cyclones. (n.d.). Retrieved from https://courseware.education.psu.edu/courses/meteo241/Images/Section1/tropical_cyclones0103.html

Saffir-Simpson Hurricane Wind Scale. (n.d.). Retrieved from <https://www.nhc.noaa.gov/aboutsshws.php>

Solar Storms and Space Weather: Frequently Asked Questions. (n.d.). Retrieved from https://www.nasa.gov/mission_pages/sunearth/spaceweather/index.html#q12

State of New Hampshire Multi-Hazard Mitigation Plan. New Hampshire Homeland Security Emergency Management, 2018, *State of New Hampshire Multi-Hazard Mitigation Plan*, prd.blogs.nh.gov/dos/hsem/wp-content/uploads/2015/11/State-of-New-Hampshire-Multi-Hazard-Mitigation-Plan-Update-2018_FINAL.pdf.

"Tornado Basics." *NOAA National Severe Storms Laboratory*, www.nssl.noaa.gov/education/svrwx101/tornadoes/.

"U.S. Geological Survey." *USGS.gov | Science for a Changing World*, www.usgs.gov/.

"Understanding Your Risks: Identifying Hazards and Estimating Losses." *State and Local Mitigation Planning: How-to Guide*, Fema, Aug. 2001, www.fema.gov/media-library-data/20130726-1521-20490-4917/howto2.pdf.

“Understanding Your Risks: Identifying Hazards and Estimating Losses.” *Understanding Your Risks: Identifying Hazards and Estimating Losses* / *FEMA.gov*, www.fema.gov/media-library/assets/documents/4241.

US Department of Commerce, and Noaa. “Flood Safety Tips and Resources.” *National Weather Service*, NOAA's National Weather Service, 27 Mar. 2019, www.weather.gov/safety/flood.

US Department of Commerce, and Noaa. “Lightning Safety Tips and Resources.” *National Weather Service*, NOAA's National Weather Service, 8 May 2019, www.weather.gov/safety/lightning.

US Department of Commerce, and Noaa. “Lightning Safety Tips and Resources.” *National Weather Service*, NOAA's National Weather Service, 8 May 2019, www.weather.gov/safety/lightning.

US Department of Commerce, and Noaa. “Winter.” *National Weather Service*, NOAA's National Weather Service, 17 Apr. 2019, www.weather.gov/safety/winter.

U.S. Fire Administration: Mass Casualties. (n.d.). Retrieved from <https://apps.usfa.fema.gov/thesaurus/main/termDetail?id=1530&letter=M>

USGS.gov. “Contact USGS.” *Contact USGS*, answers.usgs.gov/.

Welcome - Drought Management Program - NH Department of Environmental Services, www.des.nh.gov/organization/divisions/water/dam/drought/

Agencies:

New Hampshire Homeland Security and Emergency Management		(603) 271-2231
Federal Emergency Management Agency		1-877-336-2734
NH Regional Planning Commissions:		
	Central NH Regional Planning Commission	226-6020
	Lakes Region Planning Commission	279-8171
	Nashua Regional Planning Commission	424-2240
	North Country Council	444-6303
	Rockingham Planning Commission	778-0885
	Southern New Hampshire Planning Commission	669-4664
	Southwest Region Planning Commission	357-0557
	Strafford Regional Planning Commission	742-2523
	Upper Valley Lake Sunapee Regional Planning Commission	448-1680
NH Executive Department:		
	New Hampshire Office of Energy and Planning	(603) 271-2155
NH Department of Cultural Resources		(603) 271-2392
	Division of Historical Resources	603-271-3483
NH Department of Environmental Services		(603) 271-3503
	Air Resources	271-1386

	Waste Management	271-2925
	Water Conservation	271-0659
	Dam Safety & Maintenance	271-3406
NH Fish and Game Department		(603) 271-3421
NH Department of Resources and Economic Development		(603) 271-2411
	Division of Economic Development	(603) 271-2591
	Division of Forests and Lands	(603) 271-2214
	Division of Parks and Recreation	(603) 271-3556
NH Department of Transportation		(603) 271-3734
U.S. Department of Commerce		(202) 482-2000
	National Oceanic and Atmospheric Administration	1-301-713-1208
	National Weather Service; Gray, Maine	207-688-3216
U.S. Department of the Interior		
	U.S. Fish and Wildlife Service	1-800-344-9453
	U.S. Geological Survey	1-888-275-8747
U.S. Department of Agriculture		

DRAFT

APPENDIX B: TECHNICAL AND FINANCIAL ASSISTANCE FOR HAZARD MITIGATION

This matrix provides information about key all-hazards grant programs from the Departments of Homeland Security, Justice, Transportation, Health and Human Services, and Education, under which state, local, and tribal governments, first responders, and the public are eligible to receive preparedness, response, recovery, mitigation, and prevention assistance.

Agency	Office/ Directorate	Program	Purpose	Funding Beneficiaries
Programs to prepare the Nation to address the consequences of natural and man-made disasters and emergencies.				
Department of Homeland Security	<i>Border and Transportation Security Directorate</i>	State Homeland Security Grant Program www.ojp.usdoj.gov	This core assistance program provides funds to build capabilities at the state and local levels and to implement the goals and objectives included in state homeland security strategies and initiatives in the State Preparedness Report.	State governments
	<i>Emergency Preparedness and Response Directorate</i>	Emergency Management Performance Grants www.fema.gov http://www.fema.gov/government/grant/index.shtm	To assist State and local governments in enhancing and sustaining all-hazards emergency management capabilities.	States with pass through to local emergency management organizations
	<i>Emergency Preparedness and Response Directorate</i>	Assistance to Firefighters Grant Program www.usfa.fema.gov/grants http://www.firegrantsupport.com/afg/	The primary goal of the Assistance to Firefighters Grants (AFG) is to meet the firefighting and emergency response needs of fire departments and nonaffiliated emergency medical services organizations.	Local, State, and Regional Fire Departments and agencies.
	<i>Emergency Preparedness and Response Directorate</i>	State and Local Emergency Operation Centers (EOCs) www.fema.gov http://www.fema.gov/government/grant/index.shtm	To improve emergency management and preparedness capabilities by supporting flexible, sustainable, secure, and interoperable Emergency Operations Centers (EOCs) with a focus on addressing identified deficiencies and needs.	States; local governments may be sub-grantees of the State
	<i>Emergency Preparedness and Response Directorate</i>	Citizen Corps www.citizencorps.gov	To bring community and government leaders together to coordinate community involvement in emergency preparedness, planning, mitigation, response and recovery.	States with a pass through to local governments

Agency	Office/ Directorate	Program	Purpose	Funding Beneficiaries
Department of Homeland Security	<i>Emergency Preparedness and Response Directorate</i>	National Fire Academy Training Grants www.fema.gov	To provide financial assistance to State Fire Training Systems for the delivery of a variety of National Fire Academy courses/programs.	State fire training organizations
	<i>Emergency Preparedness and Response Directorate</i>	Emergency Management Institute Training Assistance www.fema.gov	To defray travel and per diem expenses of State, local and tribal emergency management personnel who attend training courses conducted by the Emergency Management Institute, at the Emmitsburg, Maryland facility; Bluemont, Virginia facility; and selected off-site locations. Its purpose is to improve emergency management practices among State, local and tribal government managers, in response to emergencies and disasters. Programs embody the Comprehensive Emergency Management System by unifying the elements of management common to all emergencies: planning, preparedness, mitigation, response, and recovery.	State, local, and tribal emergency managers
	<i>Emergency Preparedness and Response Directorate</i>	Hazardous Materials Assistance Program (CERCLA Implementation)	Provide technical and financial assistance through the States to support State, local and tribal governments in oil and hazardous materials emergency planning and exercising. To support the Comprehensive Hazardous Materials (HAZMAT) Emergency Response – Capability Assessment Program (CHER-CAP) activities.	State, local, and tribal governments, state emergency response committees, local emergency planning commissions
	<i>Emergency Preparedness and Response Directorate</i>	Interoperable Communications Equipment Grant http://www.fema.gov/government/grant/index.shtm	To provide governance, planning, training and exercise, and equipment funding to States, Territories, and local and tribal governments to carry out initiatives to improve interoperable emergency communications, including communications in collective response to natural disasters, acts of terrorism, and other man-made disasters.	N/A

Agency	Office/ Directorate	Program	Purpose	Funding Beneficiaries
Department of Homeland Security	<i>Emergency Preparedness and Response Directorate</i>	Chemical Stockpile Emergency Preparedness Program www.fema.gov	A cooperative agreement to enhance emergency preparedness capabilities of the States and local communities at each of the eight chemical agent stockpile storage facilities. The purpose of the program is to assist States and local communities in efforts to improve their capacity to plan for and respond to accidents associated with the storage of chemical warfare materials.	State and local governments and the general public in the vicinity of the eight chemical agent stockpile storage facilities.
	<i>National Preparedness Directorate</i>	Metropolitan Medical Response System http://www.fema.gov/mmrs	To provide contractual funding to the 124 largest metropolitan jurisdictions to sustain and enhance the integrated medical response plans to a WMD terrorist attack.	Local governments
Department of Justice	<i>Office of Domestic Preparedness</i>	State Domestic Preparedness Equipment Support Program http://www.ojp.usdoj.gov/odp/equipment.htm	Funding will be provided to enhance first responder capabilities, and to provide for equipment purchases and exercise planning activities for response to Weapons of Mass Destruction (WMD) domestic terrorist incidents.	State and local governments
	<i>Office of Community Oriented Police Services (COPS)</i>	COPS Interoperable Communications Technology Program www.cops.usdoj.gov	To facilitate communications interoperability public safety responders at the state and local level.	Tribal, State, and local law enforcement agencies
Department of Health and Human Services		Public Health and Social Services Emergency Fund www.hhs.gov	To continue to prepare our nation's public health system and hospitals for possible mass casualty events, and to accelerate research into new treatments and diagnostic tools to cope with possible bioterrorism incidents.	Individuals, families, Federal, State, and local government agencies and emergency health care providers
	<i>Health Resources and Services Administration</i>	State Rural Hospital Flexibility Program www.ruralhealth.hrsa.gov	To help States work with rural communities and hospitals to develop and implement a rural health plan, designate critical access hospitals (CAHs), develop integrated networks of care, improve emergency medical services and improve quality, service and organizational performance.	States with at least one hospital in a non-metropolitan region

Agency	Office/ Directorate	Program	Purpose	Funding Beneficiaries
Department of Health and Human Services	<i>Health Resources and Services Administration</i>	EMS for Children www.hrsa.gov	To support demonstration projects for the expansion and improvement of emergency medical services for children who need treatment for trauma or critical care. It is expected that maximum distribution of projects among the States will be made and that priority will be given to projects targeted toward populations with special needs, including Native Americans, minorities, and the disabled.	State governments and schools of medicine
	<i>National Institute of Health</i>	Superfund Hazardous Substances Basic Research and Education www.nih.gov	To establish and support an innovative program of basic research and training consisting of multi-project, interdisciplinary efforts that may include each of the following: (1) Methods and technologies to detect hazardous substances in the environment; (2) advance techniques for the detection, assessment, and evaluation of the effects of hazardous substances on humans; (3) methods to assess the risks to human health presented by hazardous substances; and (4) and basic biological, chemical, and physical methods to reduce the amount and toxicity of hazardous substances.	Any public or private entity involved in the detection, assessment, evaluation, and treatment of hazardous substances; and State and local governments
	<i>Centers for Disease Control</i>	Immunization Research, Demonstration, Public Information and Education www.cdc.gov	To assist States, political subdivisions of States, and other public and private nonprofit entities to conduct research, demonstrations, projects, and provide public information on vaccine-preventable diseases and conditions.	States and nonprofits organizations
	Centers for Disease Control	Surveillance of Hazardous Substance Emergency Events www.atsdr.cdc.gov	To assist State health departments in developing a State-based surveillance system for monitoring hazardous substance emergency events. This surveillance system will allow the State health department to better understand the public health impact of hazardous substance emergencies by developing, implementing, and evaluating a State-based surveillance system.	State, local, territorial, and tribal public health departments

Agency	Office/ Directorate	Program	Purpose	Funding Beneficiaries
Department of Health and Human Services	<i>Centers for Disease Control</i>	Human Health Studies, Applied Research and Development www.atsdr.cdc.gov	To solicit scientific proposals designed to answer public health questions arising from situations commonly encountered at hazardous waste sites. The objective of this research program is to fill gaps in knowledge regarding human health effects of hazardous substances identified during the conduct of ATSDR's health assessments, consultations, toxicological profiles, and health studies, including but not limited to those health conditions prioritized by ATSDR.	State health departments
Department of Education	Office of Safe and Drug free Schools (OSDFS)	Readiness and Emergency Management for Schools http://www.ed.gov/programs/dvpemergencyresponse/index.html/	This grant program supports efforts by LEAs to improve and strengthen their school emergency management plans, including training school personnel and students in emergency management procedures; communicating with parents about emergency plans and procedures; and coordinating with local law enforcement, public safety, public health, and mental health agencies.	School Districts
Department of Transportation	<i>Pipeline and Hazardous Materials Safety Administration (PHMSA)</i>	Hazardous Materials Emergency Preparedness Training and Planning Grants http://phmsa.dot.gov/hazmat/grants	Increase state, local, territorial, and Native American tribal effectiveness to safely and efficiently handle HazMat accidents and incidents; enhance implementation of the Emergency Planning and Community Right-to-Know Act of 1986; and encourage a comprehensive approach to emergency planning and training by incorporating response to transportation standards.	States, local, territorial, tribal governments.
Programs to coordinate Federal response efforts and to assist states, localities, and tribes in responding to disasters and emergencies.				
Department of Homeland Security	<i>Emergency Preparedness and Response Directorate</i>	Urban Search and Rescue www.fema.gov	To expand the capabilities of existing Urban Search and Rescue Task Forces.	28 existing US&R Task Forces
Programs to provide assistance to States, localities, tribes, and the public to alleviate suffering and hardship resulting from Presidentially declared disasters and emergencies caused by all types of hazards.				

Agency	Office/ Directorate	Program	Purpose	Funding Beneficiaries
Department of Homeland Security	Emergency Preparedness and Response Directorate	Individuals and Households Program http://www.fema.gov/assistance/process/guide.shtm	To provide assistance to individuals and families who have been affected by natural or man-made Presidentially declared disasters. Funding provided from the Disaster Relief Fund.	Individuals and Families
	Emergency Preparedness and Response Directorate	Public Assistance http://www.fema.gov/government/grant/pa/index.shtm	To provide assistance to states, localities, tribes, and certain non-profit organizations affected by natural or man-made Presidentially declared disasters. Funding provided from the Disaster Relief Fund	State, local and tribal governments; private non-profit organizations
	Emergency Preparedness and Response Directorate	Fire Management Assistance Grant Program http://www.fema.gov/government/grant/fmagp/index.shtm	Provide funds to States, local, and tribal governments for the mitigation, management, and control of wildland fires posing serious threats to improved property.	State, local and tribal governments
Small Business Administration	Office of Disaster Assistance	Disaster Loan Program http://www.sba.gov/services/disasterassistance/	To offer financial assistance to those who are trying to rebuild their homes and businesses in the aftermath of a disaster.	Individuals, families, private sector
Department of Justice	Office for Victims of Crime	Antiterrorism and Emergency Assistance Program http://www.ojp.usdoj.gov/ovc/publications/infores/terrorism/	To provide assistance programs for victims of mass violence and terrorism occurring within and outside the United States and a compensation program for victims of international terrorism.	Public and private nonprofit victim assistance agencies
Programs to reduce or eliminate future risk to lives and property from disasters.				
Department of Homeland Security	Emergency Preparedness and Response Directorate	Hazard Mitigation Grant Program http://www.fema.gov/government/grant/hmmp/index.shtm	To provide assistance to states, localities, and tribes to fund projects that will reduce the loss of lives and property in future disasters. Funding is provided from the Disaster Relief Fund and administered by the states according to their own priorities.	State, local, and tribal governments
	Emergency Preparedness and Response Directorate	Pre-Disaster Mitigation Program http://www.fema.gov/government/grant/pdm/index.shtm	This program provides funding for mitigation activities before disaster strikes. In recent years it has provided assistance for mitigation planning. In FY03, Congress passes a competitive pre-disaster mitigation grant program that will include project funding.	State, local, and tribal governments

Agency	Office/ Directorate	Program	Purpose	Funding Beneficiaries
Department of Homeland Security	<i>Emergency Preparedness and Response Directorate</i>	Flood Mitigation Assistance Program (FMA) http://www.fema.gov/government/grant/fma/index.shtm	The FMA program was created as part of the National Flood Insurance Reform Act (NFIRA) of 1994 (42 U.S.C. 4101) with the goal of reducing or eliminating claims under the <u>National Flood Insurance Program</u> (NFIP). FEMA provides FMA funds to assist States and communities implement measures that reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other structures insurable under the National Flood Insurance Program.	State, local and tribal governments
	<i>Emergency Preparedness and Response Directorate</i>	Repetitive Flood Claims Program (RFC) http://www.fema.gov/government/grant/rfc/index.shtm	The Repetitive Flood Claims (RFC) grant program was authorized by the Bunning-Bereuter-Blumenauer Flood Insurance Reform Act of 2004 (P.L. 108-264), which amended the National Flood Insurance Act (NFIA) of 1968 (42 U.S.C. 4001, et al). Up to \$10 million is available annually for FEMA to provide RFC funds to assist States and communities reduce flood damages to insured properties that have had one or more claims to the National Flood Insurance Program (NFIP).	State, local and tribal governments
	<i>Emergency Preparedness and Response Directorate</i>	Severe Repetitive Loss Program (SRL) http://www.fema.gov/government/grant/srl/index.shtm	The Severe Repetitive Loss (SRL) grant program was authorized by the Bunning-Bereuter-Blumenauer Flood Insurance Reform Act of 2004, which amended the National Flood Insurance Act of 1968 to provide funding to reduce or eliminate the long-term risk of flood damage to severe repetitive loss (SRL) structures insured under the National Flood Insurance Program (NFIP).	State, local and tribal governments
	<i>Emergency Preparedness and Response Directorate</i>	Map Modernization http://www.fema.gov/plan/prevent/fhm/mm_main.shtm	This funding provides assistance to develop digital flood maps, support flood-mapping activities and expand the Cooperating Technical Partners Program to communities and regional entities.	State, local and tribal governments
Programs to interdict potentially hazardous events from occurring				

Agency	Office/ Directorate	Program	Purpose	Funding Beneficiaries
Department of Health and Human Services	<i>Centers for Disease Control</i>	Immunization Grants www.cdc.gov	To assist States and communities in establishing and maintaining preventive health service programs to immunize individuals against vaccine-preventable diseases.	States
Other				
Department of Housing and Urban Development	<i>NH Office of Energy and Planning</i>	Community Development Block Grant (CDBG) Program http://www.hud.gov/offices/cpd/communitydevelopment/programs/	HUD provides flexible grants to help cities, counties, and States recover from Presidentially declared disasters, especially in low-income areas, subject to availability of supplemental appropriations.	State, local and tribal governments

Mitigation Programs of Other NH State Agencies

The following State of New Hampshire agencies are directly or indirectly involved in activities that include Hazard Mitigation Planning and/or program implementation:

- NH Department of Transportation Bureau of Repair and Maintenance
- NH OSP/NFIP Program
- NH OSP Coastal Program
- NH DRED Division of Forests and Lands
- NHDES Water Resources Division – Dam Safety Program
- NHDES Wetlands Program
- NHDES Shoreline Protection

APPENDIX C. MINUTES AND ATTENDANCE SHEETS

Derry Hazard Mitigation Committee Meeting

AGENDA: Meeting #1

February 21st, 2020

Derry Municipal Center

14 Manning Street

Derry, NH 03038

1. Introductions

- a. Elect Chair & minute taker

2. Overview of the Hazard Mitigation Planning Process

- a. Review of materials
- b. Scope of work to be completed

3. Hazard Identification and Risk Assessment

- a. Assessing Probability Severity and Risk (handout)
- b. Update Past and Potential Hazards
 - i. Add any hazard events that have occurred *since last plan update*, add new hazard types from 2018 State Hazard Mitigation Plan with any past occurrences

4. Critical Facilities and Areas at Risk

- a. Review and update Critical Facilities in existing plan
- b. Review and update existing mitigation strategies matrix (if time)

5. Next Meeting Schedule _____ and Adjournment

Derry Hazard Mitigation Planning Meeting Minutes

Date:

Friday, February 21, 2020 (10:00-12:00)

Meeting Location:

Derry Municipal Center, Emergency operations Center (EOC)

Committee Chairman:

Deputy Emergency Manager William Gillis

Meeting Attendees:

Southern NH Planning Commission, Assistant Planner Madeline Dilonno
Southern NH Planning Commission, Assistant Planner Monique Duchesne
NH Homeland Security & Emergency Management Liaison Kayla Henderson
Emergency Management Director Michael Gagnon
Deputy Emergency Management Director Jim Richardson
Police Captain Vern Thomas
Planning Assistant Elizabeth Robidoux
IT Director Doug Rathburn
DPW Superintendent Alan Cote
Paramedic Todd Donovan
Captain Ryan Bump

Committee Member Introductions

Reviewed and Discussed Section I

- Background
- Purpose
- Authority
- Scope
- Goals and Objectives

Reviewed and discussed Section II

- Hazard Identification and Potential Risk Assessment
- National Flood Insurance discussion
- Past and Potential Hazard discussion
 - o Flooding
 - Dam breach and failure potential
 - Bridges
 - o Wind

- Wildfire
- Ice/Snow
- Other
 - Cybersecurity threats

Next Meeting: Friday, April 10th, 2020 (via GoToMeeting)

Meeting 1: February 21st, 2020 Attendance	
Name	Title
James Richardson	Assistant fire Chief
Todd Donovan	EM Project Manager
Mike Gagnon	Fire Chief, EMD Director
Ryan Bump	Fire Captain / Deputy EMD
Elizabeth Robidoux	Assistant Planning Director
Alan Cote	Superintendent of Operations – Derry Public Works
Dough Rathburn	IT / GIS Coordinator
Vern Thomas	Chief of Police
Kayla Henderson	NH Homeland Security & Emergency Management
Judy Emmert	NH Homeland Security & Emergency Management
Madeleine Dilonno	Southern NH Planning Commission

DRAFT

Derry Hazard Mitigation Committee Meeting

AGENDA: Meeting # 2

April 10th, 2020

10:00am

(Meeting held online via "GoToMeeting")

6. Introductions
7. Review and finalize "Hazard Identification and Probability" Exercise from Meeting #1
 - a. Add any missing information
 - b. Questions, comments, suggested revisions
4. Review and Update "Critical Facilities" and "Areas at Risk"
 - a. Provide updates and revisions to critical facilities and areas at risk identified in 2015 Plan
5. Review and Update "Existing Mitigation Strategies and Proposed Improvements" (Section III of 2015 Plan)
 - a. Review existing mitigation strategies identified in 2015 Plan and summary matrix
 - b. Provide revisions and Identify any new mitigation strategies
6. Next Meeting Schedule _____ and Adjournment

Derry Hazard Mitigation Planning Meeting Minutes

Date:

Friday, April 10, 2020 (10:00-12:00)

Meeting Location:

Virtual (GoToMeeting)

Committee Chairman:

Deputy Emergency Manager William Gillis

Meeting Attendees:

Southern NH Planning Commission, Assistant Planner Madeline Dilonno
Emergency Management Director Michael Gagnon
Deputy Emergency Management Director Jim Richardson
Deputy Emergency Management Director William Gillis (Chairman)
Police Captain Vern Thomas
Director of Public Works Mike Fowler
Planning Director George Sioras
Planning Assistant Elizabeth Robidoux
IT Director Doug Rathburn
Code Enforcement Director Bob Mackey
Assistant Building Inspector Bob Wentworth
DPW Superintendent Alan Cote
Paramedic Todd Donovan
Captain Ryan Bump

Committee Member Introductions Section II - Final Review and Discussion

- Hazard Identification and Potential Risk Assessment
- Modified infectious disease probability
- Reviewed and discussed *Critical Facilities*
- Police Department
- Emergency management
- Emergency Fuel Facilities
- Wastewater Treatment Plant
- Municipal Center
- Fire Department
- Post Offices
- Shelters
- Evacuation Routes
- Bridges
- Hospitals
- Initial Spill Response Information
- Cell Towers
- Radio Towers
- Emergency Communications Towers
- Back-up Power Availability
- Reviewed and discussed *Areas at Risk*
- Public Water Systems
- Sewer Pumping Stations
- Private Pump Stations
- Electrical Substations
- Major Highways/Routes
- Schools

- Child Care Centers
- Adult Day Care Centers
- Churches
- Elderly Housing
- Recreation Areas
- Nursing Homes
- Unique / Historic Resources
- Other Historic Places
- Solid Waste/Municipal Recycling Facility – Transfer Station
- Incinerators
- Lodges and Community Centers
- Active Dams
- Reviewed and discussed *Commercial Economic Impact Area*
- Reviewed and discussed *Hazardous materials Facilities*
- Above-ground Storage Tanks
- Active Hazardous Waste Generator

Elizabeth Robidoux has several edits and omissions to the above lists. She will coordinate directly with Ms. Dilonno.

Section III – Existing Mitigation Strategies & Proposed improvements

- Reviewed and discussed *Existing Regulations, Strategies & Programs*

Next Meeting: Friday, May 8th, 2020 - time and location TBD

Meeting 2: April 10th, 2020 Attendance	
Name	Title
James Richardson	Assistant fire Chief
Todd Donovan	EM Project Manager
Mike Gagnon	Fire Chief, EMD Director
Ryan Bump	Fire Captain / Deputy EMD
Elizabeth Robidoux	Assistant Planning Director
George Sioras	Planning Director
Alan Cote	Superintendent of Operations – Derry Public Works
Dough Rathburn	IT / GIS Coordinator
Mike Fowler	Director of Public Works
Vern Thomas	Chief of Police
Bob Mackey	Code Enforcement Director
Bob Wentworth	Assistant Building Inspector
Madeleine Dilonno	Southern NH Planning Commission

Derry Hazard Mitigation Committee Meeting

AGENDA: Meeting # 3

May 8th, 2020

10:00am

(Meeting held online via "GoToMeeting")

- 8. Introductions**
- 9. Review 2015 Mitigation Action Plan (Section V)**
 - a. Review 2015 Action Plan and determine status of existing action items
 - b. Add any missing information
 - c. Questions, comments, suggested revisions
- 7. Identify new mitigation actions for 2020 action plan**
 - a. Brainstorm action items for natural hazards identified in 2020 risk assessment
 - b. For each action item, identify corresponding leadership, timeframe and estimated cost/funding source (template handout)
- 8. STAPLEE Process**
 - a. Rank new and existing mitigation actions using STAPLEE ranking matrix (handout)
- 9. Next Meeting Schedule _____ and Adjournment**

Derry Hazard Mitigation Planning Meeting Minutes

Date:

Friday, May 08, 2020 (10:00-11:40)

Meeting Location:

Virtual (GoToMeeting)

Committee Chairman:

Deputy Emergency Manager William Gillis

Meeting Attendees:

Southern NH Planning Commission, Assistant Planner Madeline Dilonno
Emergency Management Director Michael Gagnon
Deputy Emergency Management Director Jim Richardson
Deputy Emergency Management Director William Gillis (Chairman)
Police Captain Vern Thomas
Director of Public Works Mike Fowler
Planning Director George Sioras
Planning Assistant Elizabeth Robidoux
IT Director Doug Rathburn
Code Enforcement Director Bob Mackey
Paramedic Todd Donovan
Captain Ryan Bump

Section V – Prioritized Implementation Schedule and Funding Sources

- Reviewed implementation Strategy for Priority Mitigation Actions
- Reviewed Ranking and Priority Mitigation Actions

Rank	Statuses	Changes
1	Ongoing	None
2	Ongoing	None
3	Ongoing	None
4	Ongoing	None
5	Ongoing	Add <i>IT department</i>
6	Ongoing	None
7	Ongoing	None
8	Ongoing	None
9	Ongoing	None
10	Ongoing	Add <i>Federal</i> to Funding
11	Ongoing	None
12	Ongoing	None
13	Ongoing	Add <i>\$80,000</i> Delete <i><\$10,000</i>
14	Ongoing	None
15	Ongoing	None

16	Ongoing	Add <i>Medium Term</i> Delete <i>Short Term</i>
17	Ongoing	Add <i>Medium Term</i> Delete <i>Short Term</i>
18	Ongoing	None
19	Ongoing	Change <i>GIS Dept.</i> to <i>IT Dept.</i> Delete <i>FD budget</i>
20	Ongoing	Change <i>GIS Dept.</i> to <i>IT Dept.</i>
21	Ongoing	Delete <i>EMD</i> from funding Add <i>Health Dept.</i> to funding
22	Ongoing	None
23	Ongoing	Delete <i>EMD</i> from funding Add <i>Federal</i> to funding Change <\$10,000 to \$25,000-\$50,000 Change <i>short term</i> to <i>long term</i>
24	Delete	
25	Ongoing	Clarify language to reflect during a “ <i>flood emergency</i> ”

- Reviewed and discussed action plans for Medium to High Identified Hazards
 - o Ice Storms
 - o Flooding
 - o Infectious Diseases
 - o Water Contaminants
 - o Long Term Utility Outages
 - o Human Causes
 - Cyber
 - Terrorism
 - Transport Accidents
- Reviewed and discussed *STAPLEE criteria (Social, Technical, Administrative, Political, Legal, Economic and Environmental)* and each category was ranked 1 (poor) through 3 (good).

Next Meeting: Friday, June 12th, 2020 - time and location TBD

Meeting 3: May 8th, 2020 Attendance	
Name	Title
James Richardson	Assistant fire Chief
Todd Donovan	EM Project Manager
Mike Gagnon	Fire Chief, EMD Director
Ryan Bump	Fire Captain / Deputy EMD
Elizabeth Robidoux	Assistant Planning Director
George Sioras	Planning Director
Dough Rathburn	IT / GIS Coordinator
Mike Fowler	Director of Public Works
Vern Thomas	Chief of Police
Bob Mackey	Code Enforcement Director
Madeleine Dilonno	Southern NH Planning Commission

DRAFT

Derry Hazard Mitigation Committee Meeting

AGENDA: Meeting # 4

June 12th, 2020

10:00am

(Meeting held online via "GoToMeeting")

- 1. Introductions**
- 2. Review 2020 Action Plan Items**
 - a. Review and/or amend action items discussed at May meeting for 2020 Action Plan
 - b. Add any missing information
 - c. Questions, comments, suggested revisions
- 3. Review Hazard Mitigation Plan Maps (SNHPC GIS Analyst)**
- 4. Discuss Monitoring, Updating and Adoption of Plan**
 - a. Final edits by SNHPC staff
 - b. Final review by Derry Hazard Mitigation Committee
 - c. Plan Submittal to NHHSEM
 - d. Plan adoption by Derry Town Council
- 5. Next Meeting Schedule _____ and Adjournment**

DRAFT

Derry Hazard Mitigation Planning Meeting Minutes

Date:

Friday, June 12, 2020 (10:00-11:30)

Meeting Location:

Virtual (GoToMeeting) Meeting #4

Committee Chairman:

Deputy Emergency Manager William Gillis

Meeting Attendees:

Southern NH Planning Commission, Assistant Planner Madeline Dilonno
 Emergency Management Director Michael Gagnon
 Deputy Emergency Management Director Jim Richardson
 Deputy Emergency Management Director William Gillis (Chairman)
 Police Captain Vern Thomas
 Planning Director George Sioras
 Planning Assistant Elizabeth Robidoux
 Code Enforcement Director Bob Mackey
 Paramedic Todd Donovan
 Captain Ryan Bump
 Southern NH Planning Commission, GIS Coordinator, Zack Swick

Review of 2020 Action Plan Items

- Reviewed recommended mitigation actions, specific hazards, Who (Leadership), When (Timeframe) and Cost/Funding.

Mitigation Action	Hazards Addressed	Who (Leadership)	When (Timeframe)	Cost/Funding
1) Increase coordination with Eversource utilities in cutting back tree limbs that have the potential to interfere with powerlines, promote underground utilities.	Ice Storm	DPW	Ongoing	n/a (Eversource funded. Utilities are placed underground as required by town ordinance)
2) Implement damage assessment procedures to address natural disasters.	All Hazards	Emergency Management	Medium & Ongoing	Low Cost
3) Improve community surveillance capabilities to monitor for potential outbreaks.	Infectious Disease	Southern NH Public Health	Ongoing	Grant Funded – State of NH
4) Ensure town maintains an adequate cache of supplied such as PPE for potential outbreaks.	Infectious Disease	Emergency Management	Ongoing	Low – Medium Cost
5) Maintain and improve mosquito control program in	Infectious Disease	Health Department	Ongoing / As Needed	Medium Cost

Town.		(DPW)		
6) Improve town-wide sanitation and disinfecting capabilities in the event of an epidemic.	Infectious Disease	DPW	As Needed	Low Cost
7) Replace culvert on N. Shore Road over Taylor Brook.	Flooding	DPW	Short Timeframe	DOT Funding (high cost)
8) Maintain and improve monitoring capabilities for PFAS and arsenic in town water supplies.	Known and Emerging Contaminants	Wastewater Department / Health Department (DPW)	Ongoing	Medium Cost
9) Provide training opportunities to municipal staff in preparation for potential cyber threats.	Cyber Event	I.T.	Ongoing	Low Cost
10) Continue providing trainings and active shooter drills in schools and municipal buildings.	MCI	Police Department	Ongoing	Low Cost
11) Continue coordination with regional hazmat team for monitoring of potential terror or violence threats.	Terror/Violence	Emergency Management	Ongoing	Low Cost

- Reviewed and discussed hazardous mitigation planning maps.
 - o Wildland/Urban Interface map
 - o Critical Infrastructure Map
 - Bridges, Dams, Culverts
 - o Past Hazards Map
 - o Flood zone Map
 - o Potential Environmental Hazard Map
 - o Buildings in Flood Zone Map
 - o Steep Slope Map
 - o Derry Large Scale Developed Land Use / Land Cover Conversion Map
 - o Above Ground Storage Tank (5000+) Map
 - o Active Remediation Site Map
- Reviewed and discussed seasonal average temperature scale.
- Reviewed and discussed Toler Exposure calculation (FEMA) spreadsheet.

Next Meeting: Time and location TBD, if needed.

Meeting 4: June 12th, 2020 Attendance	
Name	Title
James Richardson	Assistant fire Chief
Todd Donovan	EM Project Manager
Mike Gagnon	Fire Chief, EMD Director
Ryan Bump	Fire Captain / Deputy EMD
Elizabeth Robidoux	Assistant Planning Director
George Sioras	Planning Director
Mike Fowler	Director of Public Works
Vern Thomas	Chief of Police
Bob Mackey	Code Enforcement Director
Madeleine Dilonno	Southern NH Planning Commission

DRAFT

APPENDIX D. DOCUMENTATION OF OUTREACH FOR PLANNING PROCESS

Derry Hazard Mitigation Committee Meeting 4/10

MEETING TO BE HELD ONLINE
POSTED ON: APRIL 7, 2020 - 10:48AM

The Southern NH Planning Commission is be working with the Town of Derry to update its Hazard Mitigation Plan as required by the Federal Emergency Management Agency (FEMA). A Hazard Mitigation Plan Update Committee must be established and host at least three public meetings to collaborate on the updated plan.

The Derry Hazard Mitigation Committee's second meeting will be Friday, April 10th at 10am. Due to the State of Emergency declared by the Governor as a result of the pandemic, the SNHPC and committees thereof are authorized to meet electronically. **The meeting will be held online via "GoToMeeting."** Please find meeting access information below:

Online Access: <https://global.gotomeeting.com/join/518466725>

You can also dial in using your phone.
United States: +1 (571) 317-3122

Access Code: 518-466-725

Any questions can be directed to Assistant Planner, Madeleine DiIonno at mdiionno@snhpc.org or Fire Chief, Michael Gagnon at (603) 432-6751.

23Example of public notice on SNHPC website

Hazard Mitigation Meetings #2 - Derry & Hooksett

April 10, 2020 - Derry Hazmit Meeting #2 - 10:00 AM (*electronic format TBD*)

April 23, 2020 - Hooksett Hazmit Meeting #2 - 9:30 AM (*electronic format TBD*)

The Southern NH Planning Commission will be working with the Towns of Derry and Hooksett to update their Hazard Mitigation Plan as required by the Federal Emergency Management Agency (FEMA).

A Hazard Mitigation Plan Update Committee must be established and host at least three public meetings to collaborate on the updated plan.

**For more information, please contact
Madeleine DiIonno at 669-4664.**

**APPENDIX E. SOUTHERN NEW HAMPSHIRE PLANNING COMMISSION 2020 VULNERABILITY
ASSESSMENT: A DECISION-MAKING TOOL TO PLAN FOR A CHANGING CLIMATE**

DRAFT

EXECUTIVE SUMMARY

VULNERABILITY ASSESSMENT ACTIVITY

In September 2018, Southern New Hampshire Planning Commission (SNHPC) set out to analyze the risks to the road network associated with extreme weather within the SNHPC region. Historically, the most common and destructive type of risk to the region is inland flooding. Inland flooding is typically caused by heavy rainfall events. Over time, heavy rainfall events in have increased in frequency. Today, inland flooding continues to threaten damage to the region's road network.

This vulnerability assessment explores the risk posed to **culverts and small bridges, which are referred to as "stream crossings"** throughout the report. Vulnerability assessment activity included engagement of road agents and public works staff to identify risk factors and to consider potential adaptation and mitigation options.

In summary the vulnerability assessment project encompassed the following tasks:

- *Stakeholder outreach and engagement*
- *Empirical climate and asset data collection*
- *Scoring and prioritization of risk*
- *Identification of high-priority stream crossings*
- *Identification of possible impacts at crossings*
- *Adaptation and mitigation recommendation*

SNHPC staff and collaborators conducted these tasks with an intent to provide communities and regional agencies with a decision-making tool that can assist in selecting adaptation and mitigation strategies for stream crossings. The assessment used available data and resources to provide an online [Stream Crossing GIS Map](#) for the region. Communities can use this map to share information, increase coordination around emergency events, and consider their reliance on the road network.

As part of the process of understanding vulnerability issues, SNHPC staff sought guidance from staff at New Hampshire Geological Survey (NHGS) within New Hampshire Department of Environmental Services (NHDES). Communication identified inter-departmental coordination opportunities. NHGS provided direction and encouraged SNHPC staff to contribute to the statewide analysis of stream crossings already underway. NHGS staff also provided SNHPC with direction on gathering data from the [Statewide Stream Crossing Map](#) managed by the UNH Technology Transfer (T2) in the Statewide Asset Data Exchange System (SADES). Input from NHGS helped focus the work of the vulnerability assessment on improving local knowledge around the concepts of [hydraulic vulnerability](#), [geomorphic compatibility](#), and [flooding impacts](#) at stream crossings. This collaboration is reflected in the regional and local prioritization of stream crossings and through the documentation of high-priority stream crossings found in [Appendix E](#) of this report.

Observations of trends in weather patterns and a summary of projected climate change over the remainder of this century is also included in this report. The climate data in this report was sourced from [National Oceanic and Atmospheric Administration's National Centers For Environmental Information](#), Cornell University via [Precip.net](#), and the University of New Hampshire [Sustainability Institute](#). The sourced climate data utilized two commonly referenced climate scenarios (high carbon emissions and low carbon emissions) from the Global Circulation Model. The climate scenarios project a range of possible climate outcomes over the remainder of the century. The [Climate Projections](#) section of the report highlights the dramatic changes in intensity and frequency of major rainfall events Southern New Hampshire can anticipate for the timespan between year 2020 and year 2099.

VULNERABILITY ASSESSMENT SCALE AND OUTCOMES

Municipalities in the region have undertaken various levels of planning to address and identify vulnerability of high priority stream crossings. Yet, local asset managers still expressed a desire to adopt a broader scale assessment methodology into their decision-making, their existing maintenance activities, and as a resource to supplement documentation for stream crossing capital investment requests. The result was the creation of a methodology for prioritization of stream crossings utilizing existing data and input from municipal staff.

Details about the criterion for prioritization are found in the [Stream Crossing Prioritization](#) section of this report. Prioritization results were documented both region-wide and individually for each municipality. Statistical data, prioritization results, and high-priority stream crossings for each municipality are in [Appendix E: Scoring Summary and Detail Sheets](#) at the end of the report.

The work of this vulnerability assessment increased coordination and communication among relevant agencies. Assessment activities sought to build new opportunities for coordination of state and local agencies in anticipation of future emergency events. The work also considered impacts of increased frequency and intensity of precipitation on the function of the road network. By working together to address infrastructure vulnerabilities, the region can improve the ability to mitigate the occurrence of stream crossing failures brought about by more intense rainfall events.

RECOMMENDATIONS FOR ADAPTATION AND MITIGATION

Literature review, asset and climate data research, local interviews, and the findings of the prioritization model provide a well-rounded body of research and analysis including a foundation for making recommendations for action.

Recommendations for action to mitigate and adapt to known vulnerabilities include:

- *Improve access and function of stream crossing inventory maps and data.*
- *Increase coordination between NHDOT and local public works departments.*
- *Revisit local, regional, and state funding mechanisms to prioritize at-risk stream crossings.*
- *Include vulnerability assessment information in municipal Hazard Mitigation plans.*
- *Implement mitigation efforts before climate change is projected to accelerate.*

At the request of the region's municipalities, SNHPC developed an [online map of prioritized stream crossings](#) including a filter function to limit data by municipality, crossing ownership (state, local, private, or unknown), and stream crossing size (upstream horizontal open width measured in feet). The online map includes a video tutorial to illustrate the filter functions and how to switch between the ownership and prioritization layers. The online inventory and scoring of stream crossings were made available to communities and the public at-large in the spring of 2020. SNHPC also conducted field assessments to fill in gaps in data for high priority stream crossings. SNHPC will continue field assessments in support of NHGS during the summer of 2020 and in future years to improve the completeness of the region's stream crossing inventory in SADES.

To build support for adaptation and mitigation across different levels of government, SNHPC will work with stakeholders in developing outreach activities. It is the Commission's goal to ensure community leaders across the region are aware of the risks posed to public roads and stream crossings by increased frequency and intensity of rainfall events. With the resources presented in this report, SNHPC will illustrate available data on the existing conditions of stream crossings, the risks associated with those crossings, and criteria used to determine the level of risk posed to the road network. Public awareness activities will engage local stakeholders and state partners in efforts to improve the resiliency of the region's road network.

Prioritization Score Statistical Summary: Town of Derry

Traffic Volumes

Count	Totals
AAADT>=30,000	1
AAADT<30,000	0
AAADT<20,000	19
AAADT<10,000	15
AAADT<5,000	18
AAADT<1,000	102

TOTAL: 155

10-Yr Vulnerability

Category	Count
Overtop	5
Vulnerable	11
Unknown	88
Pass	7
Not Applicable	44

TOTAL: 155

Beaver Activity

Yes	9
No	146

TOTAL: 155

Total Crossings

Region	1433
Town	155

Flood Zone

Count	Totals
Floodway	40
100-Year Flood Zone	28
500-Year Flood Zone	3
Minimal Hazard	84

TOTAL: 155

Structure Material

Metal	39
Not Metal	116

TOTAL: 155

Flood Hazard

ID'd	46
Not ID'd	109

TOTAL: 155

Culvert Condition

Poor	22
Fair	55
Good	71
Unknown	7

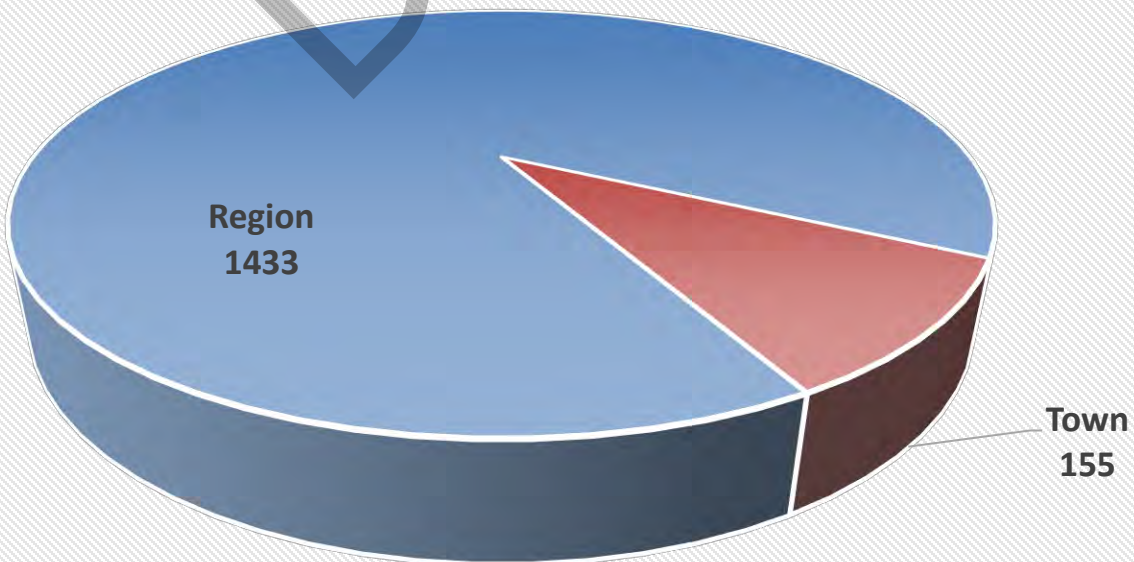
TOTAL: 155

Asset Manager

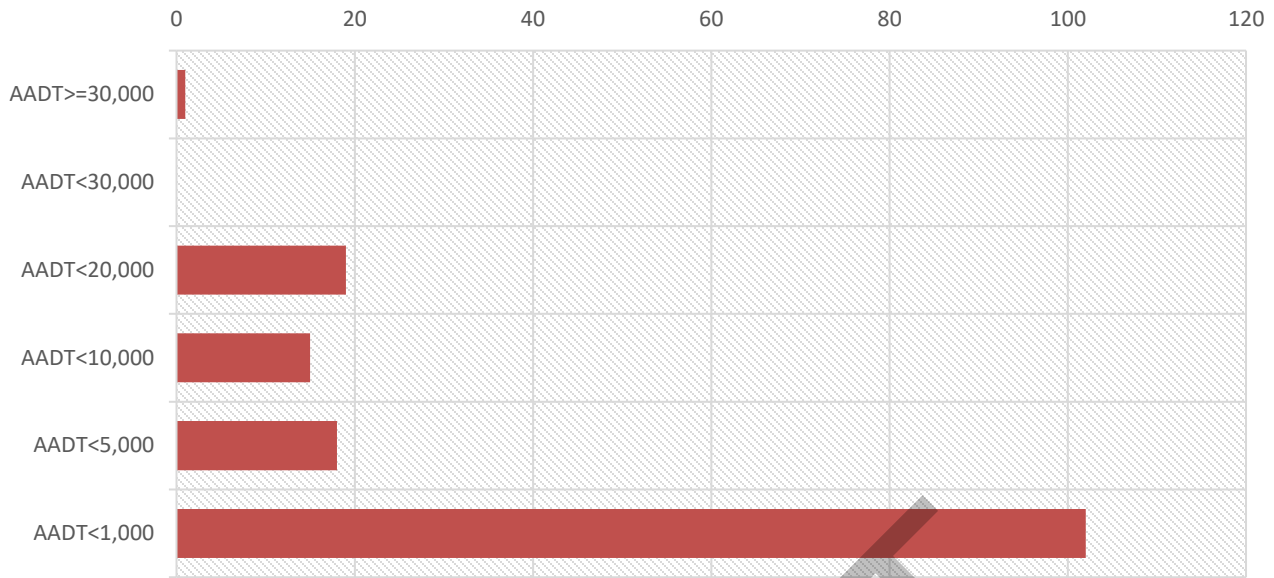
ID'd	2
Not ID'd	153

TOTAL: 155

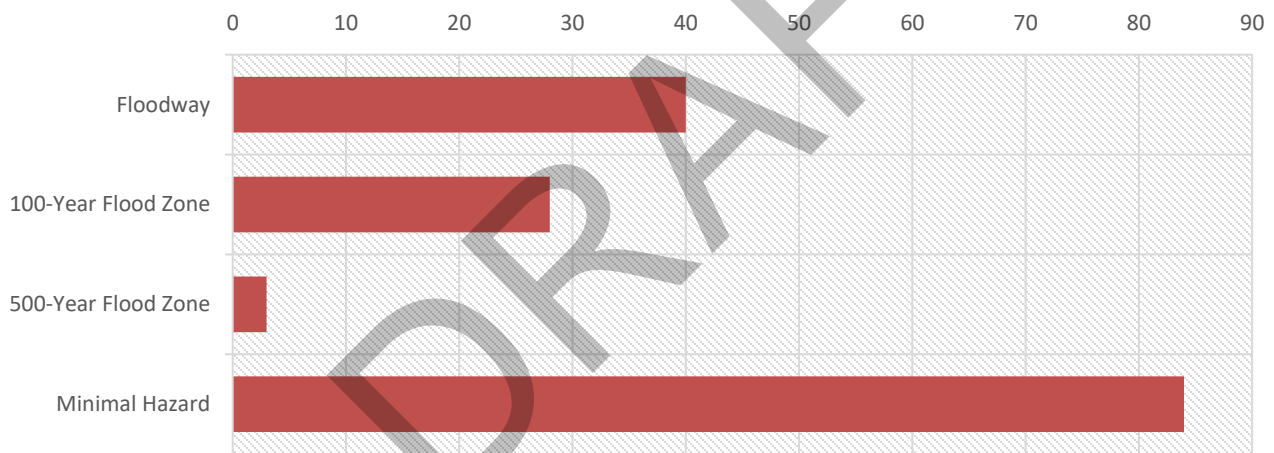
Total Crossings, Town and Region



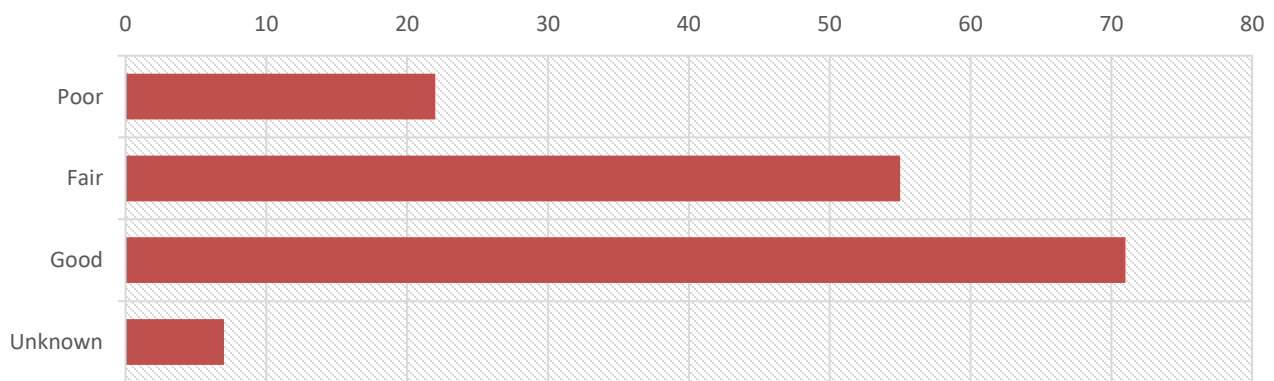
MUNI. COUNT BY TRAFFIC VOLUME CATEGORY



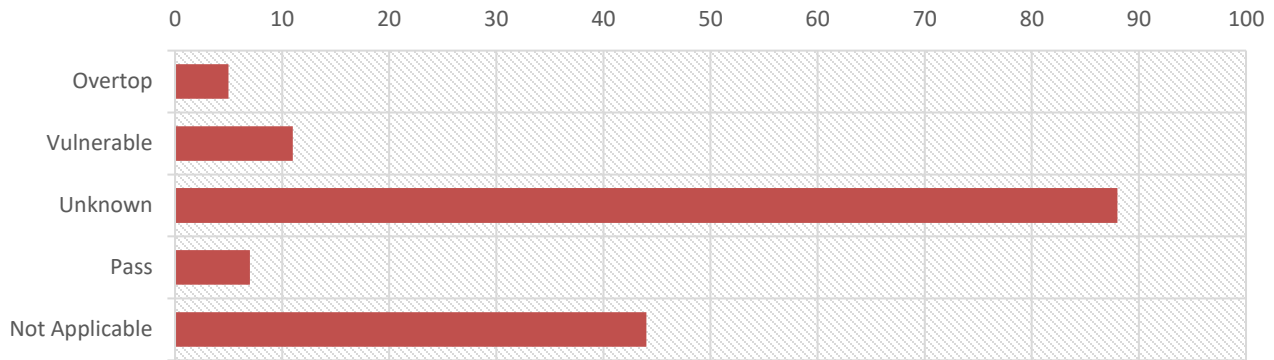
MUNI. COUNT BY FEMA FLOOD ZONE CATEGORY



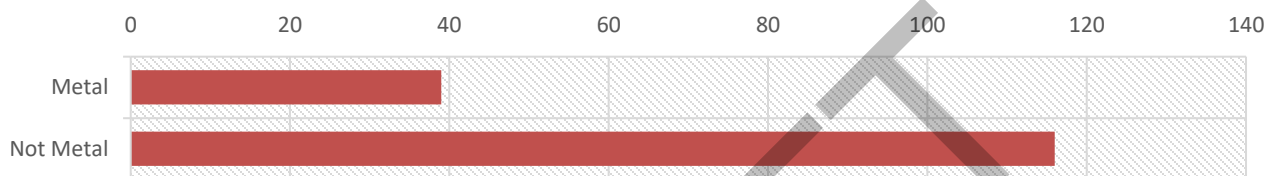
MUNI. COUNT BY STREAM CROSSING CONDITION



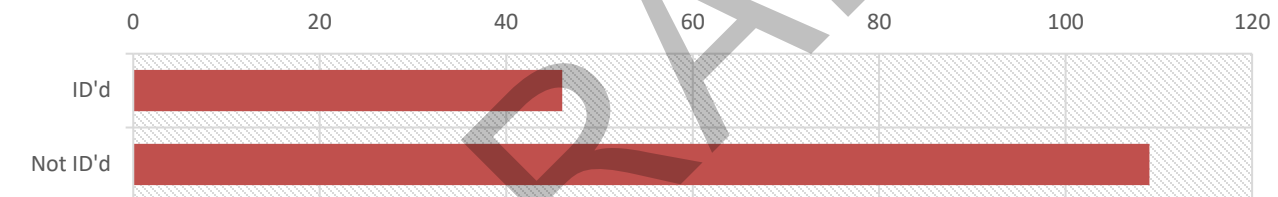
MUNI. COUNT BY 10-YR VULNERABILITY



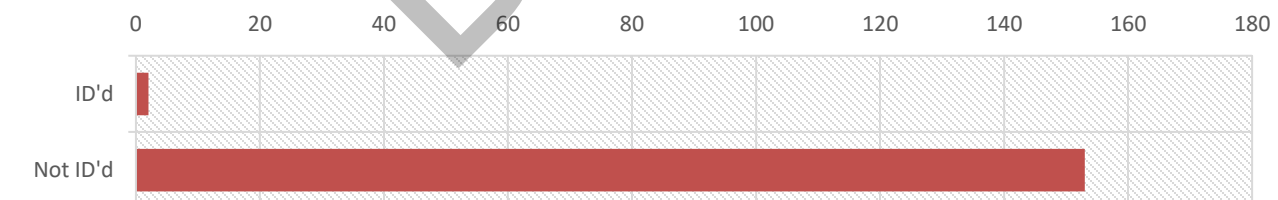
MUNI. COUNT BY STRUCTURE MATERIAL



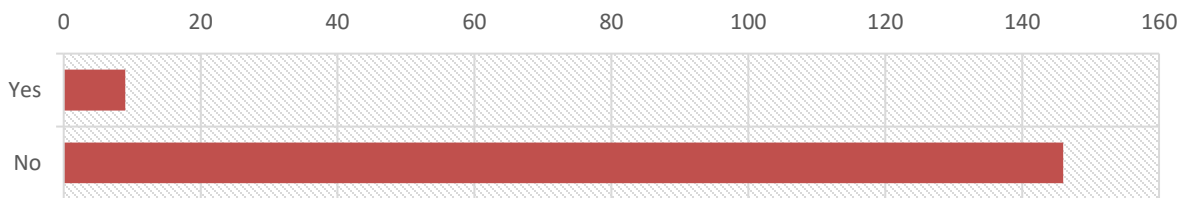
MUNI. COUNT BY IDENTIFIED FLOOD HAZARD HISTORY



MUNI. COUNT BY ASSET MANAGER IDENTIFICATION



TOTAL REGION COUNT BY BEAVER ACTIVITY



Region-Wide Stream Crossing Statistical Summary

SNHPC Region

Traffic Volume

Count	Totals
AADT>=30,000	17
AADT<30,000	46
AADT<20,000	95
AADT<10,000	142
AADT<5,000	240
AADT<1,000	1048

TOTAL: 1588

Flood Zone

Floodway	201
100-Yr Flood Zone	425
500-Yr Flood Zone	53
Minimal Hazard	909

TOTAL: 1588

Culvert Condition

Poor	119
Fair	188
Good	1086
Unknown	195

TOTAL: 1588

10-Yr Vulnerability

Category	Count
Overtop	74
Vulnerable	84
Unknown	977
Pass	99
Not Applicable	354

TOTAL: 1588

Culvert Material

Metal	317
Not Metal	1271

TOTAL: 1588

Flood Hazard

ID'd	368
Not ID'd	1220

TOTAL: 1588

Asset Manager

ID'd	101
Not ID'd	1487

TOTAL: 1588

Crossing Count By Town

Municipality	Count
Auburn	81
Bedford	216
Candia	73
Chester	76
Deerfield	93
Derry	155
Francestown	66
Goffstown	145
Hooksett	74
Londonderry	150
Manchester	77
New Boston	133
Weare	166
Windham	83

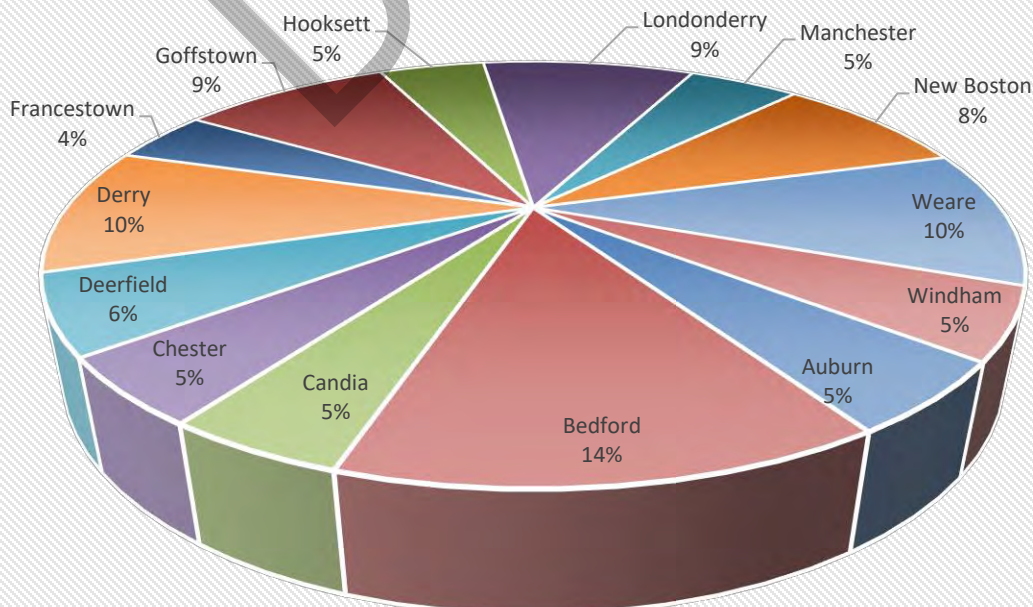
TOTAL: 1,588

Beaver Activity

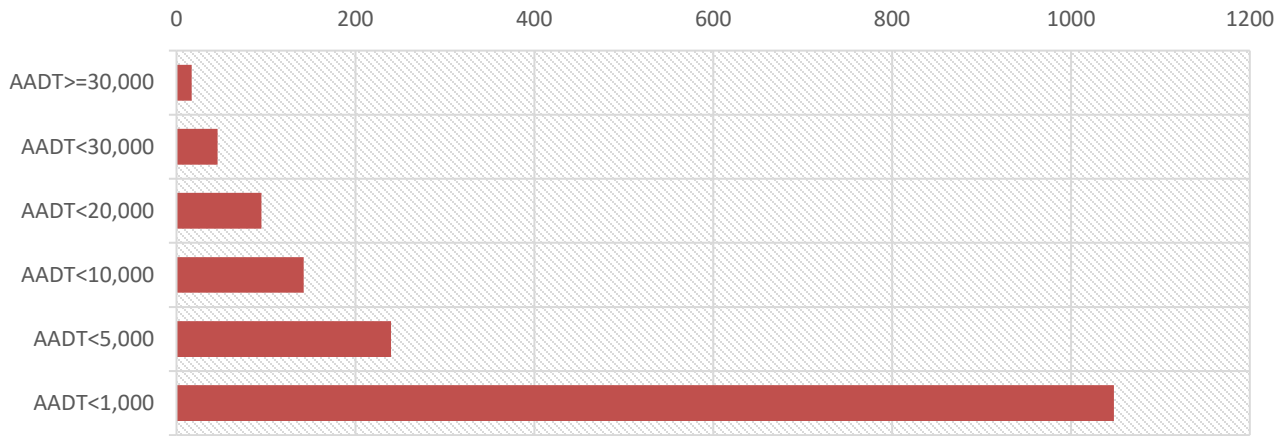
Yes	90
No	1498

TOTAL: 1588

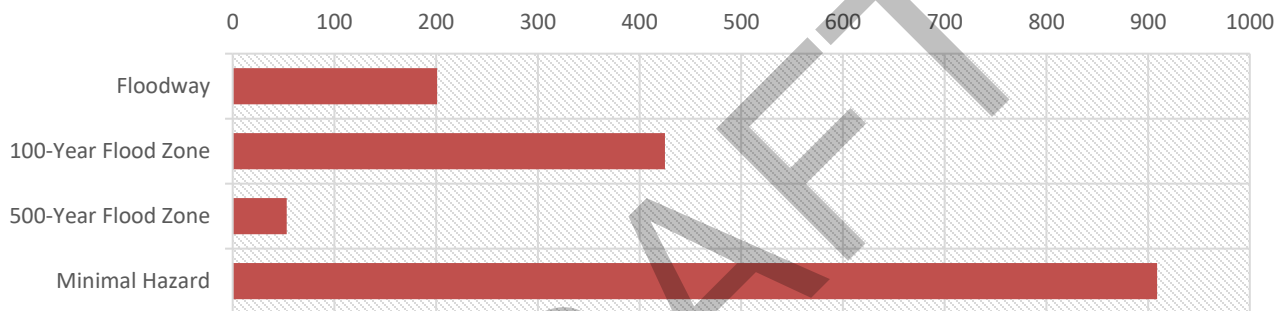
Percent of Total Crossings By Municipality



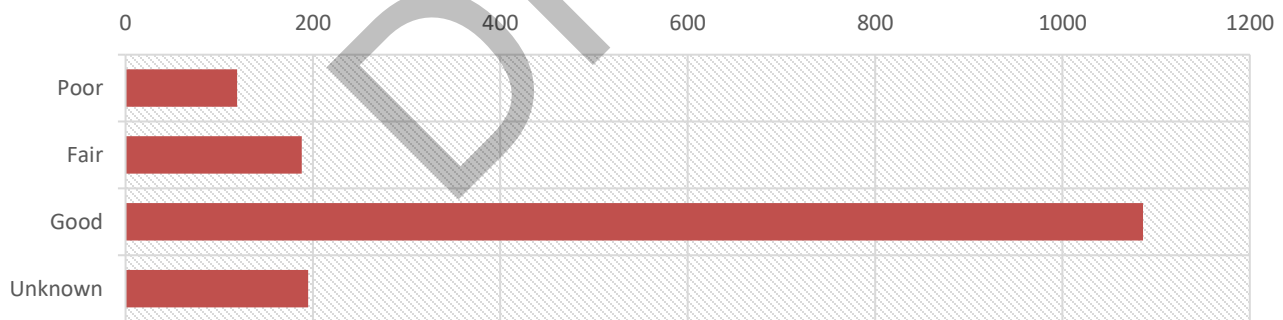
TOTAL REGION COUNT BY TRAFFIC VOL. CATEGORY



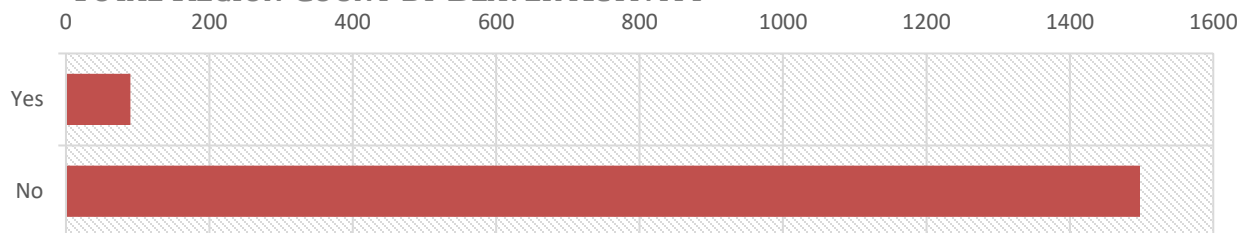
TOTAL REGION COUNT BY FLOOD ZONE CATEGOREY



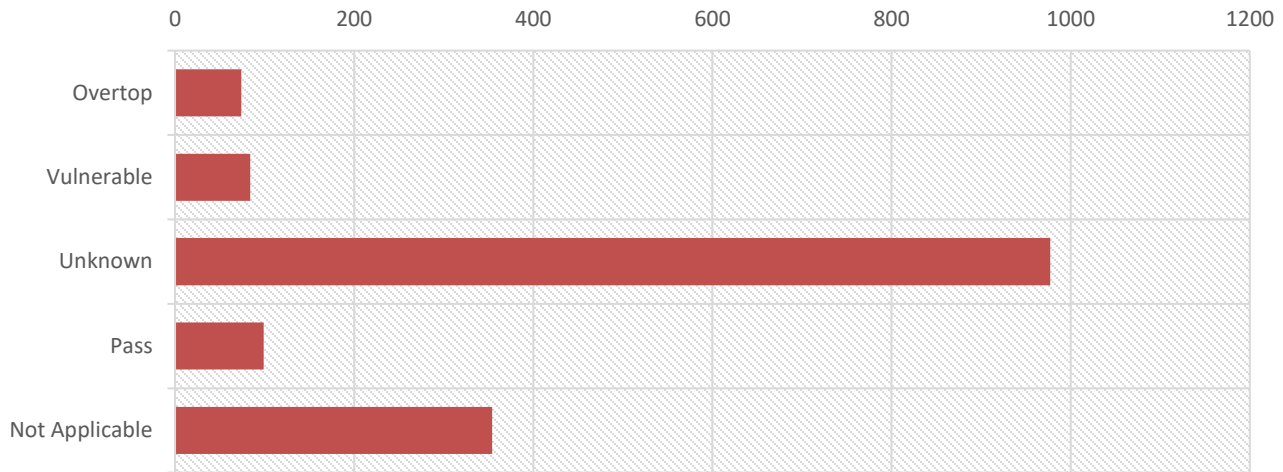
TOTAL REGION COUNT BY CONDITION



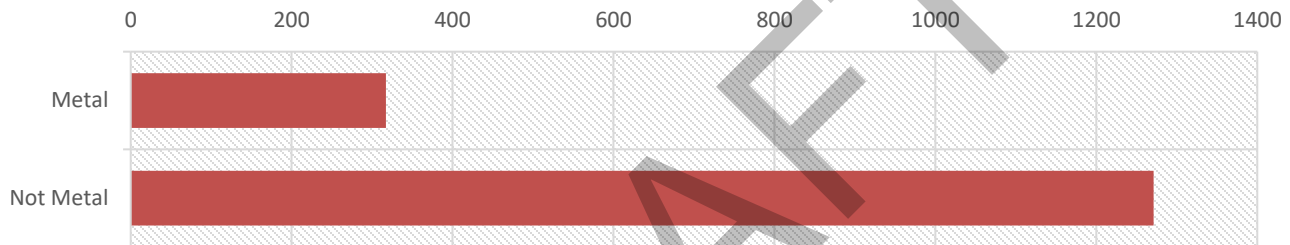
TOTAL REGION COUNT BY BEAVER ACTIVITY



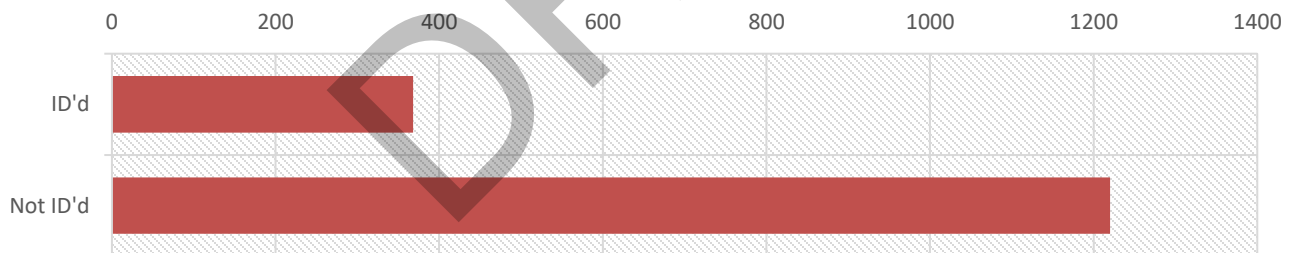
TOTAL REGION COUNT BY 10-YR VULNERABILITY



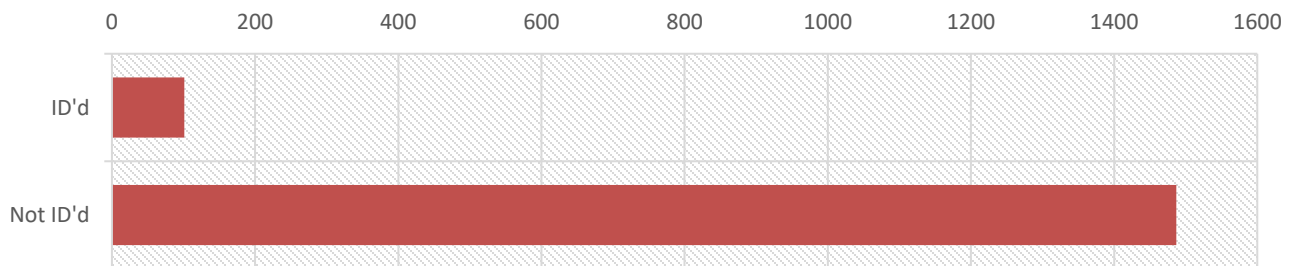
TOTAL REGION COUNT BY CROSSING MATERIAL



TOTAL REGION COUNT BY ID'D FLOOD HAZARD HISTORY



TOTAL REGION COUNT BY ASSET MANAGER ID

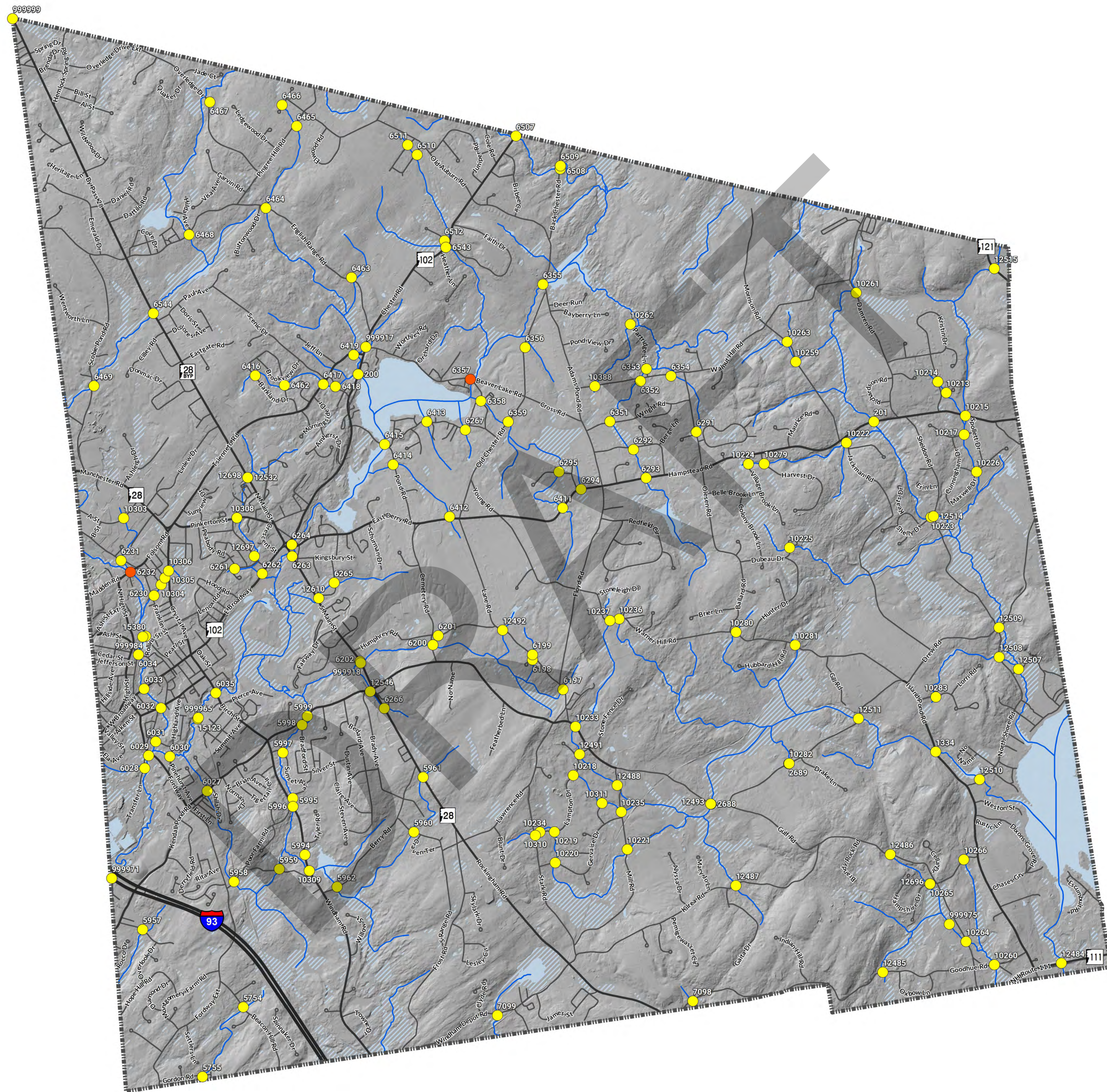


SADES ID	Annual Avg. Daily Trips (AADT)	AADT Score	Asset Mgr ID'd Crossing	Asset Mgr ID Score	History of Flood Hazard	Hazard Score	Flood Zone Category (FEMA)	Zone Score	Culvert Condition	Condition Score	10yr Hydraulic Vulnerability	Vuln. Score (10yr)	Culvert Material	Metal Score	Beaver Activity	Beaver Score	Total Score
6232	AADT<5,000	2	Yes	10	Yes	5	Floodway	5	Poor	10	Unknown	3	Metal	2	No	0	37
999971	AADT>=30,000	10	No	0	Yes	5	Floodway	5	Unknown	5	Unknown	3	Not Metal	0	No	0	28
6357	AADT<5,000	2	Yes	10	Yes	5	Floodway	5	Good	0	Unknown	3	Not Metal	0	No	0	25
5997	AADT<1,000	0	No	0	Yes	5	Floodway	5	Poor	10	Unknown	3	Metal	2	No	0	25
200	AADT<10,000	4	No	0	Yes	5	Floodway	5	Fair	5	Unknown	3	Not Metal	0	Yes	2	24
5995	AADT<1,000	0	No	0	Yes	5	Floodway	5	Poor	10	Unknown	3	Not Metal	0	No	0	23
5994	AADT<5,000	2	No	0	No	0	Floodway	5	Poor	10	Unknown	3	Not Metal	0	Yes	2	22
12510	AADT<1,000	0	No	0	Yes	5	Floodway	5	Fair	5	Overtop	5	Not Metal	0	Yes	2	22
6294	AADT<20,000	6	No	0	No	0	Minimal Hazard	0	Poor	10	Unknown	3	Metal	2	No	0	21
10217	AADT<1,000	0	No	0	Yes	5	Floodway	5	Fair	5	Vulnerable	4	Metal	2	No	0	21
5958	AADT<1,000	0	No	0	Yes	5	100-Year Flood Zone	4	Poor	10	Not Applicable	0	Metal	2	No	0	21
12610	AADT<20,000	6	No	0	No	0	100-Year Flood Zone	4	Poor	10	Not Applicable	0	Not Metal	0	No	0	20
10281	AADT<1,000	0	No	0	Yes	5	Minimal Hazard	0	Poor	10	Unknown	3	Metal	2	No	0	20
6200	AADT<1,000	0	No	0	Yes	5	Minimal Hazard	0	Poor	10	Unknown	3	Metal	2	No	0	20
6264	AADT<20,000	6	No	0	No	0	Floodway	5	Fair	5	Unknown	3	Not Metal	0	No	0	19
6414	AADT<1,000	0	No	0	No	0	100-Year Flood Zone	4	Poor	10	Unknown	3	Metal	2	No	0	19
6358	AADT<1,000	0	No	0	No	0	100-Year Flood Zone	4	Poor	10	Unknown	3	Metal	2	No	0	19
999918	AADT<20,000	6	No	0	No	0	100-Year Flood Zone	4	Unknown	5	Unknown	3	Not Metal	0	No	0	18
6262	AADT<20,000	6	No	0	Yes	5	100-Year Flood Zone	4	Good	0	Unknown	3	Not Metal	0	No	0	18
6202	AADT<20,000	6	No	0	No	0	100-Year Flood Zone	4	Fair	5	Unknown	3	Not Metal	0	No	0	18
15380	AADT<1,000	0	No	0	No	0	Floodway	5	Poor	10	Unknown	3	Not Metal	0	No	0	18
10224	AADT<1,000	0	No	0	Yes	5	Minimal Hazard	0	Poor	10	Unknown	3	Not Metal	0	No	0	18
999917	AADT<10,000	4	No	0	Yes	5	Minimal Hazard	0	Unknown	5	Unknown	3	Not Metal	0	No	0	17
6230	AADT<5,000	2	No	0	No	0	Minimal Hazard	0	Poor	10	Unknown	3	Metal	2	No	0	17
6468	AADT<1,000	0	No	0	Yes	5	100-Year Flood Zone	4	Fair	5	Unknown	3	Not Metal	0	No	0	17
6355	AADT<1,000	0	No	0	Yes	5	Floodway	5	Fair	5	Not Applicable	0	Metal	2	No	0	17
5962	AADT<1,000	0	No	0	Yes	5	100-Year Flood Zone	4	Fair	5	Unknown	3	Not Metal	0	No	0	17
6544	AADT<20,000	6	No	0	No	0	Floodway	5	Fair	5	Not Applicable	0	Not Metal	0	No	0	16
6263	AADT<20,000	6	No	0	Yes	5	Floodway	5	Good	0	Not Applicable	0	Not Metal	0	No	0	16
6035	AADT<20,000	6	No	0	Yes	5	Floodway	5	Good	0	Not Applicable	0	Not Metal	0	No	0	16
5999	AADT<20,000	6	No	0	Yes	5	Floodway	5	Good	0	Not Applicable	0	Not Metal	0	No	0	16
6419	AADT<10,000	4	No	0	Yes	5	Floodway	5	Good	0	Not Applicable	0	Metal	2	No	0	16
12515	AADT<5,000	2	No	0	No	0	Minimal Hazard	0	Poor	10	Vulnerable	4	Not Metal	0	No	0	16
10259	AADT<1,000	0	No	0	No	0	Minimal Hazard	0	Poor	10	Vulnerable	4	Metal	2	No	0	16
10226	AADT<1,000	0	No	0	No	0	Floodway	5	Fair	5	Vulnerable	4	Metal	2	No	0	16
201	AADT<10,000	4	No	0	Yes	5	100-Year Flood Zone	4	Good	0	Not Applicable	0	Metal	2	No	0	15
12511	AADT<5,000	2	No	0	Yes	5	Floodway	5	Good	0	Unknown	3	Not Metal	0	No	0	15
6034	AADT<5,000	2	No	0	Yes	5	Floodway	5	Good	0	Unknown	3	Not Metal	0	No	0	15
6032	AADT<5,000	2	No	0	Yes	5	Floodway	5	Good	0	Unknown	3	Not Metal	0	No	0	15
5996	AADT<5,000	2	No	0	Yes	5	Floodway	5	Good	0	Unknown	3	Not Metal	0	No	0	15
10235	AADT<1,000	0	No	0	No	0	Minimal Hazard	0	Poor	10	Unknown	3	Metal	2	No	0	15
6512	AADT<1,000	0	No	0	Yes	5	500-Year Flood Zone	3	Good	0	Unknown	3	Metal	2	Yes	2	15
6261	AADT<1,000	0	No	0	No	0	Minimal Hazard	0	Poor	10	Unknown	3	Metal	2	No	0	15
6201	AADT<1,000	0	No	0	Yes	5	Minimal Hazard	0	Fair	5	Unknown	3	Metal	2	No	0	15

SADES ID	Annual Avg. Daily Trips (AADT)	AADT Score	Asset Mgr ID'd Crossing	Asset Mgr ID Score	History of Flood Hazard	Hazard Score	Flood Zone Category (FEMA)	Zone Score	Culvert Condition	Condition Score	10yr Hydraulic Vulnerability	Vuln. Score (10yr)	Culvert Material	Metal Score	Beaver Activity	Beaver Score	Total Score
6197	AADT<1,000	0	No	0	No	0	Minimal Hazard	0	Poor	10	Unknown	3	Metal	2	No	0	15
12546	AADT<20,000	6	No	0	No	0	Minimal Hazard	0	Fair	5	Unknown	3	Not Metal	0	No	0	14
10308	AADT<20,000	6	No	0	No	0	Minimal Hazard	0	Fair	5	Unknown	3	Not Metal	0	No	0	14
10306	AADT<20,000	6	No	0	No	0	Minimal Hazard	0	Fair	5	Unknown	3	Not Metal	0	No	0	14
6412	AADT<20,000	6	No	0	No	0	Minimal Hazard	0	Fair	5	Unknown	3	Not Metal	0	No	0	14
6411	AADT<20,000	6	No	0	No	0	Minimal Hazard	0	Fair	5	Unknown	3	Not Metal	0	No	0	14
6033	AADT<20,000	6	No	0	No	0	Floodway	5	Good	0	Unknown	3	Not Metal	0	No	0	14
6029	AADT<10,000	4	No	0	Yes	5	Floodway	5	Good	0	Not Applicable	0	Not Metal	0	No	0	14
12493	AADT<5,000	2	No	0	No	0	Floodway	5	Fair	5	Not Applicable	0	Metal	2	No	0	14
10309	AADT<5,000	2	No	0	No	0	100-Year Flood Zone	4	Fair	5	Unknown	3	Not Metal	0	No	0	14
10264	AADT<1,000	0	No	0	No	0	100-Year Flood Zone	4	Fair	5	Overtop	5	Not Metal	0	No	0	14
10262	AADT<1,000	0	No	0	No	0	100-Year Flood Zone	4	Fair	5	Unknown	3	Metal	2	No	0	14
10260	AADT<1,000	0	No	0	Yes	5	100-Year Flood Zone	4	Fair	5	Not Applicable	0	Not Metal	0	No	0	14
10236	AADT<5,000	2	No	0	No	0	Minimal Hazard	0	Fair	5	Vulnerable	4	Metal	2	No	0	13
999984	AADT<1,000	0	No	0	No	0	Floodway	5	Unknown	5	Unknown	3	Not Metal	0	No	0	13
999965	AADT<1,000	0	No	0	No	0	Floodway	5	Unknown	5	Unknown	3	Not Metal	0	No	0	13
12508	AADT<1,000	0	No	0	No	0	100-Year Flood Zone	4	Fair	5	Vulnerable	4	Not Metal	0	No	0	13
12488	AADT<1,000	0	No	0	No	0	Minimal Hazard	0	Poor	10	Unknown	3	Not Metal	0	No	0	13
12487	AADT<1,000	0	No	0	No	0	100-Year Flood Zone	4	Fair	5	Vulnerable	4	Not Metal	0	No	0	13
6028	AADT<1,000	0	No	0	Yes	5	Floodway	5	Good	0	Unknown	3	Not Metal	0	No	0	13
5960	AADT<1,000	0	No	0	Yes	5	Minimal Hazard	0	Fair	5	Unknown	3	Not Metal	0	No	0	13
12484	AADT<20,000	6	No	0	No	0	100-Year Flood Zone	4	Good	0	Not Applicable	0	Not Metal	0	Yes	2	12
999999	AADT<10,000	4	No	0	No	0	Minimal Hazard	0	Unknown	5	Unknown	3	Not Metal	0	No	0	12
12532	AADT<10,000	4	No	0	No	0	Minimal Hazard	0	Fair	5	Unknown	3	Not Metal	0	No	0	12
6417	AADT<10,000	4	No	0	No	0	500-Year Flood Zone	3	Good	0	Unknown	3	Metal	2	No	0	12
6293	AADT<10,000	4	No	0	No	0	Minimal Hazard	0	Fair	5	Unknown	3	Not Metal	0	No	0	12
1334	AADT<10,000	4	No	0	No	0	Floodway	5	Good	0	Unknown	3	Not Metal	0	No	0	12
10237	AADT<5,000	2	No	0	No	0	Minimal Hazard	0	Fair	5	Unknown	3	Metal	2	No	0	12
5998	AADT<5,000	2	No	0	Yes	5	Floodway	5	Good	0	Not Applicable	0	Not Metal	0	No	0	12
999975	AADT<1,000	0	No	0	No	0	100-Year Flood Zone	4	Unknown	5	Unknown	3	Not Metal	0	No	0	12
10283	AADT<1,000	0	No	0	No	0	Minimal Hazard	0	Poor	10	Not Applicable	0	Metal	2	No	0	12
10263	AADT<1,000	0	No	0	No	0	Minimal Hazard	0	Poor	10	Not Applicable	0	Metal	2	No	0	12
6508	AADT<1,000	0	No	0	Yes	5	100-Year Flood Zone	4	Good	0	Unknown	3	Not Metal	0	No	0	12
6415	AADT<1,000	0	No	0	Yes	5	100-Year Flood Zone	4	Good	0	Unknown	3	Not Metal	0	No	0	12
6265	AADT<1,000	0	No	0	No	0	100-Year Flood Zone	4	Fair	5	Unknown	3	Not Metal	0	No	0	12
6231	AADT<1,000	0	No	0	Yes	5	100-Year Flood Zone	4	Good	0	Unknown	3	Not Metal	0	No	0	12
6027	AADT<10,000	4	No	0	No	0	100-Year Flood Zone	4	Good	0	Unknown	3	Not Metal	0	No	0	11
12696	AADT<1,000	0	No	0	No	0	Minimal Hazard	0	Fair	5	Vulnerable	4	Metal	2	No	0	11
10280	AADT<1,000	0	No	0	No	0	Minimal Hazard	0	Fair	5	Vulnerable	4	Metal	2	No	0	11
6509	AADT<1,000	0	No	0	Yes	5	100-Year Flood Zone	4	Good	0	Not Applicable	0	Not Metal	0	Yes	2	11
10282	AADT<5,000	2	No	0	No	0	Minimal Hazard	0	Fair	5	Unknown	3	Not Metal	0	No	0	10
10233	AADT<5,000	2	No	0	No	0	Minimal Hazard	0	Fair	5	Unknown	3	Not Metal	0	No	0	10
12697	AADT<1,000	0	No	0	No	0	Minimal Hazard	0	Fair	5	Unknown	3	Metal	2	No	0	10
12514	AADT<1,000	0	No	0	No	0	Floodway	5	Fair	5	Not Applicable	0	Not Metal	0	No	0	10

SADES ID	Annual Avg. Daily Trips (AADT)	AADT Score	Asset Mgr ID'd Crossing	Asset Mgr ID Score	History of Flood Hazard	Hazard Score	Flood Zone Category (FEMA)	Zone Score	Culvert Condition	Condition Score	10yr Hydraulic Vulnerability	Vuln. Score (10yr)	Culvert Material	Metal Score	Beaver Activity	Beaver Score	Total Score
12509	AADT<1,000	0	No	0	Yes	5	Floodway	5	Good	0	Not Applicable	0	Not Metal	0	No	0	10
12507	AADT<1,000	0	No	0	Yes	5	Floodway	5	Good	0	Not Applicable	0	Not Metal	0	No	0	10
10304	AADT<1,000	0	No	0	No	0	Minimal Hazard	0	Fair	5	Unknown	3	Metal	2	No	0	10
10265	AADT<1,000	0	No	0	No	0	Minimal Hazard	0	Fair	5	Unknown	3	Metal	2	No	0	10
10223	AADT<1,000	0	No	0	No	0	Floodway	5	Fair	5	Pass	0	Not Metal	0	No	0	10
10221	AADT<1,000	0	No	0	No	0	Minimal Hazard	0	Fair	5	Overtop	5	Not Metal	0	No	0	10
6352	AADT<1,000	0	No	0	Yes	5	Minimal Hazard	0	Good	0	Unknown	3	Metal	2	No	0	10
6031	AADT<1,000	0	No	0	Yes	5	Floodway	5	Good	0	Not Applicable	0	Not Metal	0	No	0	10
6030	AADT<1,000	0	No	0	Yes	5	Floodway	5	Good	0	Not Applicable	0	Not Metal	0	No	0	10
6266	AADT<20,000	6	No	0	No	0	Minimal Hazard	0	Good	0	Unknown	3	Not Metal	0	No	0	9
5961	AADT<20,000	6	No	0	No	0	Minimal Hazard	0	Good	0	Unknown	3	Not Metal	0	No	0	9
12698	AADT<10,000	4	No	0	No	0	Minimal Hazard	0	Fair	5	Not Applicable	0	Not Metal	0	No	0	9
10215	AADT<10,000	4	No	0	No	0	Floodway	5	Good	0	Pass	0	Not Metal	0	No	0	9
6507	AADT<10,000	4	No	0	Yes	5	Minimal Hazard	0	Good	0	Not Applicable	0	Not Metal	0	No	0	9
2688	AADT<5,000	2	No	0	No	0	Floodway	5	Good	0	Not Applicable	0	Metal	2	No	0	9
10225	AADT<1,000	0	No	0	Yes	5	Minimal Hazard	0	Good	0	Vulnerable	4	Not Metal	0	No	0	9
6469	AADT<1,000	0	No	0	No	0	Floodway	5	Good	0	Not Applicable	0	Metal	2	Yes	2	9
6359	AADT<1,000	0	No	0	Yes	5	100-Year Flood Zone	4	Good	0	Not Applicable	0	Not Metal	0	No	0	9
6543	AADT<10,000	4	No	0	No	0	100-Year Flood Zone	4	Good	0	Not Applicable	0	Not Metal	0	No	0	8
10388	AADT<1,000	0	No	0	No	0	Minimal Hazard	0	Fair	5	Unknown	3	Not Metal	0	No	0	8
10305	AADT<1,000	0	No	0	No	0	Minimal Hazard	0	Fair	5	Unknown	3	Not Metal	0	No	0	8
10220	AADT<1,000	0	No	0	No	0	Minimal Hazard	0	Fair	5	Unknown	3	Not Metal	0	No	0	8
10214	AADT<1,000	0	No	0	No	0	Minimal Hazard	0	Fair	5	Unknown	3	Not Metal	0	No	0	8
7099	AADT<1,000	0	No	0	No	0	100-Year Flood Zone	4	Good	0	Vulnerable	4	Not Metal	0	No	0	8
6462	AADT<1,000	0	No	0	No	0	Minimal Hazard	0	Fair	5	Unknown	3	Not Metal	0	No	0	8
6295	AADT<1,000	0	No	0	No	0	500-Year Flood Zone	3	Fair	5	Not Applicable	0	Not Metal	0	No	0	8
15123	AADT<1,000	0	No	0	No	0	Floodway	5	Good	0	Not Applicable	0	Not Metal	0	Yes	2	7
10261	AADT<1,000	0	No	0	No	0	Minimal Hazard	0	Fair	5	Not Applicable	0	Not Metal	0	Yes	2	7
6418	AADT<1,000	0	No	0	No	0	100-Year Flood Zone	4	Good	0	Unknown	3	Not Metal	0	No	0	7
2689	AADT<5,000	2	No	0	No	0	Minimal Hazard	0	Good	0	Unknown	3	Not Metal	0	No	0	5
12491	AADT<1,000	0	No	0	No	0	Minimal Hazard	0	Fair	5	Not Applicable	0	Not Metal	0	No	0	5
12485	AADT<1,000	0	No	0	No	0	Minimal Hazard	0	Fair	5	Not Applicable	0	Not Metal	0	No	0	5
10311	AADT<1,000	0	No	0	No	0	Minimal Hazard	0	Fair	5	Pass	0	Not Metal	0	No	0	5
10310	AADT<1,000	0	No	0	No	0	Minimal Hazard	0	Fair	5	Not Applicable	0	Not Metal	0	No	0	5
10279	AADT<1,000	0	No	0	No	0	Minimal Hazard	0	Fair	5	Not Applicable	0	Not Metal	0	No	0	5
10234	AADT<1,000	0	No	0	No	0	Minimal Hazard	0	Fair	5	Pass	0	Not Metal	0	No	0	5
10222	AADT<1,000	0	No	0	No	0	Minimal Hazard	0	Fair	5	Pass	0	Not Metal	0	No	0	5
10213	AADT<1,000	0	No	0	No	0	Minimal Hazard	0	Good	0	Overtop	5	Not Metal	0	No	0	5
7098	AADT<1,000	0	No	0	No	0	Minimal Hazard	0	Good	0	Overtop	5	Not Metal	0	No	0	5
6510	AADT<1,000	0	No	0	No	0	Minimal Hazard	0	Good	0	Unknown	3	Metal	2	No	0	5
6465	AADT<1,000	0	No	0	Yes	5	Minimal Hazard	0	Good	0	Not Applicable	0	Not Metal	0	No	0	5
6464	AADT<1,000	0	No	0	No	0	Minimal Hazard	0	Good	0	Unknown	3	Metal	2	No	0	5
6463	AADT<1,000	0	No	0	No	0	Minimal Hazard	0	Fair	5	Not Applicable	0	Not Metal	0	No	0	5
6413	AADT<1,000	0	No	0	No	0	Minimal Hazard	0	Good	0	Unknown	3	Metal	2	No	0	5

SADES ID	Annual Avg. Daily Trips (AADT)	AADT Score	Asset Mgr ID'd Crossing	Asset Mgr ID Score	History of Flood Hazard Score	Flood Zone Category (FEMA)	Zone Score	Culvert Condition	Condition Score	10yr Hydraulic Vulnerability	Vuln. Score (10yr)	Culvert Material	Metal Score	Beaver Activity	Beaver Score	Total Score	
6354	AADT<1,000	0	No	0	No	0	Minimal Hazard	0	Good	0	Unknown	3	Metal	2	No	0	5
12492	AADT<1,000	0	No	0	No	0	Minimal Hazard	0	Good	0	Unknown	3	Not Metal	0	No	0	3
10303	AADT<1,000	0	No	0	No	0	Minimal Hazard	0	Good	0	Unknown	3	Not Metal	0	No	0	3
6467	AADT<1,000	0	No	0	No	0	Minimal Hazard	0	Good	0	Unknown	3	Not Metal	0	No	0	3
6466	AADT<1,000	0	No	0	No	0	Minimal Hazard	0	Good	0	Unknown	3	Not Metal	0	No	0	3
6416	AADT<1,000	0	No	0	No	0	Minimal Hazard	0	Good	0	Unknown	3	Not Metal	0	No	0	3
6353	AADT<1,000	0	No	0	No	0	Minimal Hazard	0	Good	0	Unknown	3	Not Metal	0	No	0	3
6292	AADT<1,000	0	No	0	No	0	Minimal Hazard	0	Good	0	Unknown	3	Not Metal	0	No	0	3
6291	AADT<1,000	0	No	0	No	0	Minimal Hazard	0	Good	0	Unknown	3	Not Metal	0	No	0	3
6267	AADT<1,000	0	No	0	No	0	Minimal Hazard	0	Good	0	Unknown	3	Not Metal	0	No	0	3
6199	AADT<1,000	0	No	0	No	0	Minimal Hazard	0	Good	0	Unknown	3	Not Metal	0	No	0	3
6198	AADT<1,000	0	No	0	No	0	Minimal Hazard	0	Good	0	Unknown	3	Not Metal	0	No	0	3
5957	AADT<1,000	0	No	0	No	0	Minimal Hazard	0	Good	0	Unknown	3	Not Metal	0	No	0	3
5755	AADT<1,000	0	No	0	No	0	Minimal Hazard	0	Good	0	Unknown	3	Not Metal	0	No	0	3
12486	AADT<1,000	0	No	0	No	0	Minimal Hazard	0	Good	0	Not Applicable	0	Not Metal	0	No	0	0
10266	AADT<1,000	0	No	0	No	0	Minimal Hazard	0	Good	0	Not Applicable	0	Not Metal	0	No	0	0
10219	AADT<1,000	0	No	0	No	0	Minimal Hazard	0	Good	0	Pass	0	Not Metal	0	No	0	0
10218	AADT<1,000	0	No	0	No	0	Minimal Hazard	0	Good	0	Pass	0	Not Metal	0	No	0	0
6511	AADT<1,000	0	No	0	No	0	Minimal Hazard	0	Good	0	Not Applicable	0	Not Metal	0	No	0	0
6356	AADT<1,000	0	No	0	No	0	Minimal Hazard	0	Good	0	Not Applicable	0	Not Metal	0	No	0	0
6351	AADT<1,000	0	No	0	No	0	Minimal Hazard	0	Good	0	Not Applicable	0	Not Metal	0	No	0	0
5959	AADT<1,000	0	No	0	No	0	Minimal Hazard	0	Good	0	Not Applicable	0	Not Metal	0	No	0	0
5754	AADT<1,000	0	No	0	No	0	Minimal Hazard	0	Good	0	Not Applicable	0	Not Metal	0	No	0	0



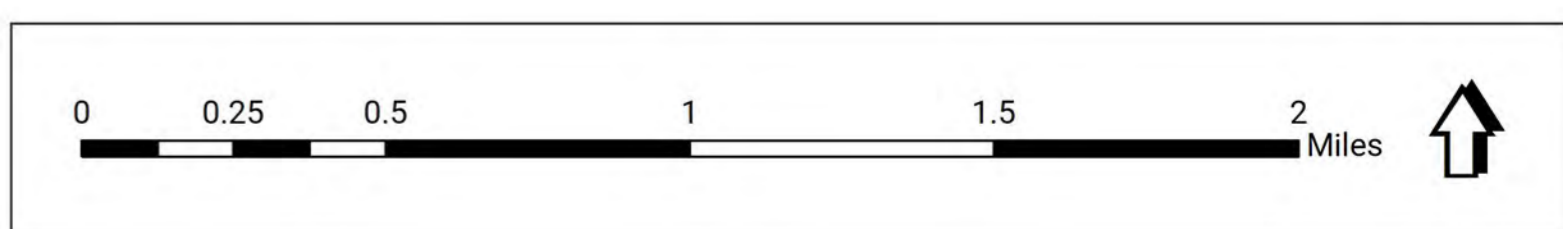
Stream Crossings: Derry

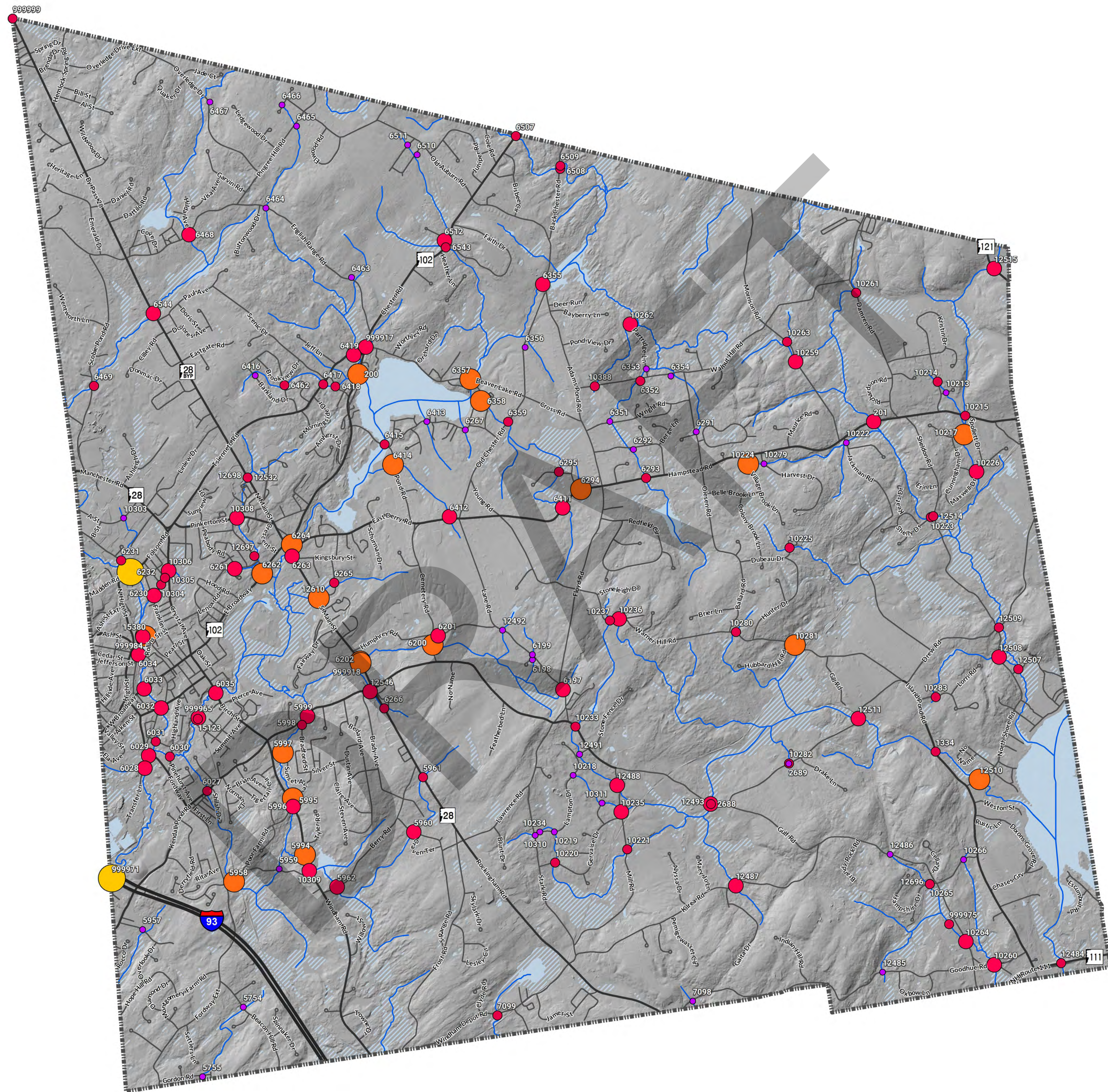
Created by SNHPC, 2020. Sources: NH Department of Environmental Services; NH Department of Transportation; Town of Derry; University of New Hampshire; US Census Bureau; US Fish and Wildlife Service; US Geological Survey.

Identified by asset



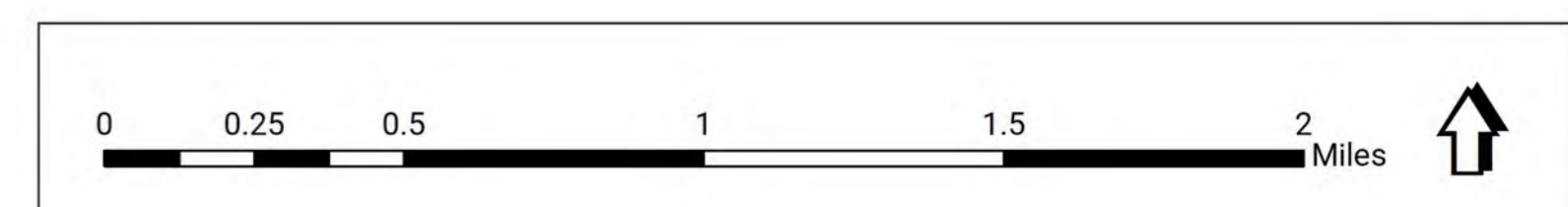
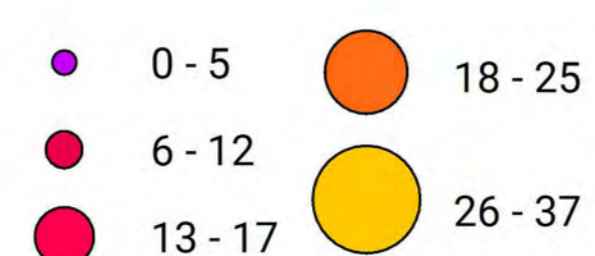
SNHPC





Scored Stream Crossings: Derry

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

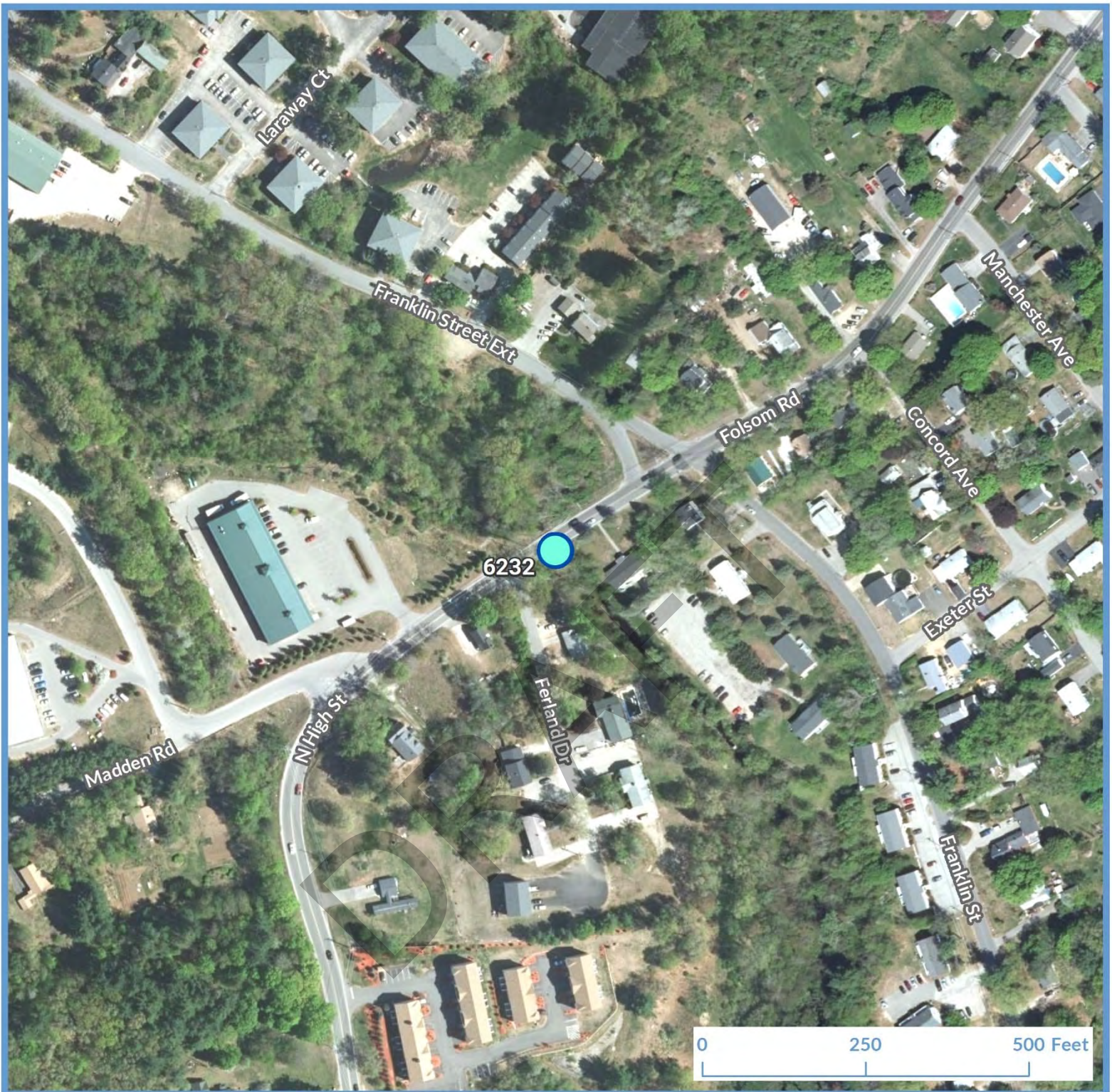


LOCAL ASSET MANAGER INPUT


LOCAL CONDITIONS FOR DERRY, NH

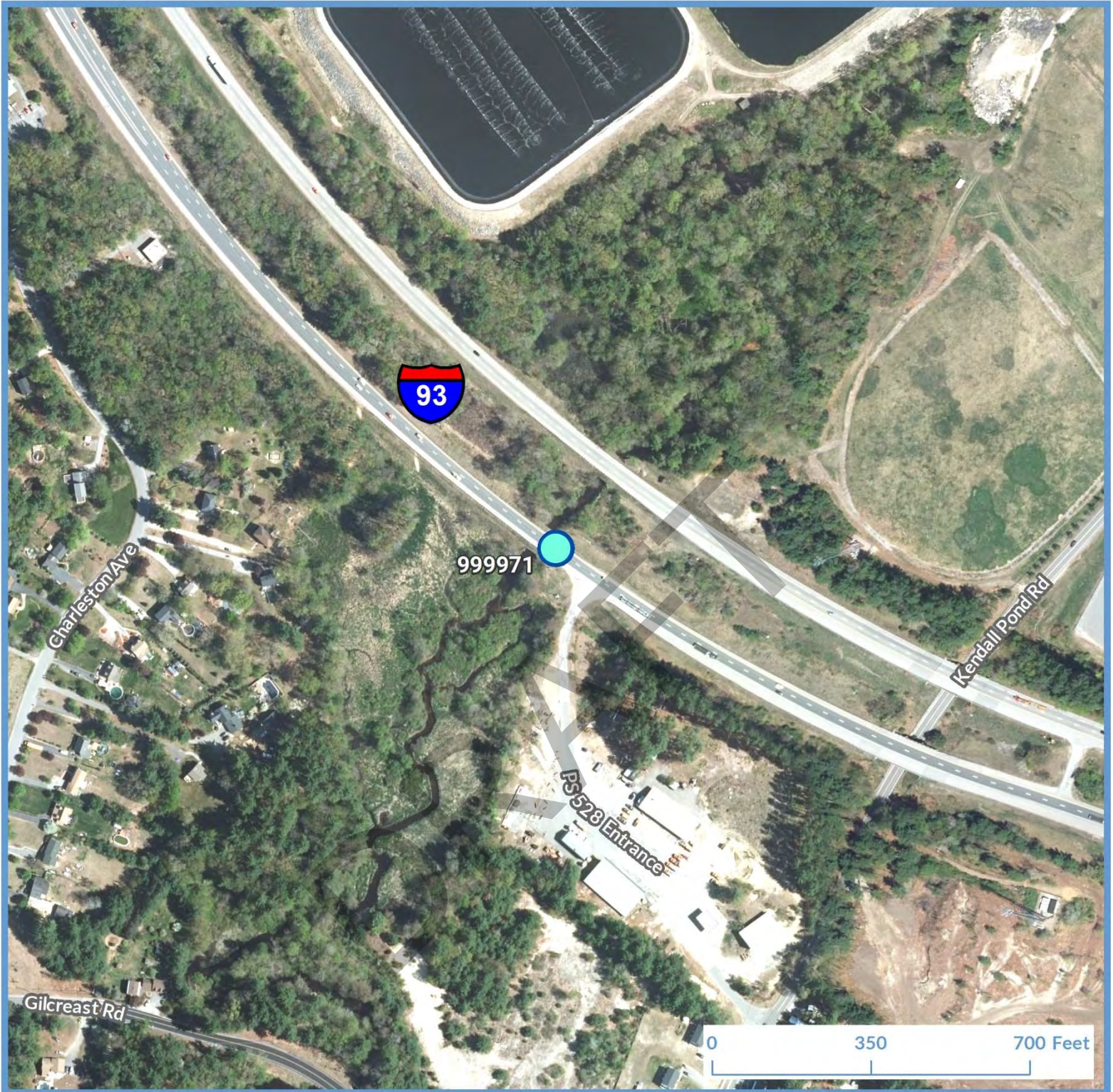
Crossing ID	Town	Road Name	State Route	Stream Name	Manager Comment	Assessment Action
6232	Derry	N High St		Beaver (Horne's) Brook	Recurring Flooding at stream crossing	Add to Hotlist
6357	Derry	N Shore Rd		Manter Brook	Recurring Flooding at stream crossing	Add to Hotlist
999917	Derry	Chester Rd (Rt 102)	X	Intermittent (No Name)	Culvert Missing from SADES; Just north of N Shore Rd	Add to SADES
999918	Derry	Londonderry Tpke (Rt 28)	X	West Running Brook	Culvert Missing from SADES	Add to SADES

DRAFT




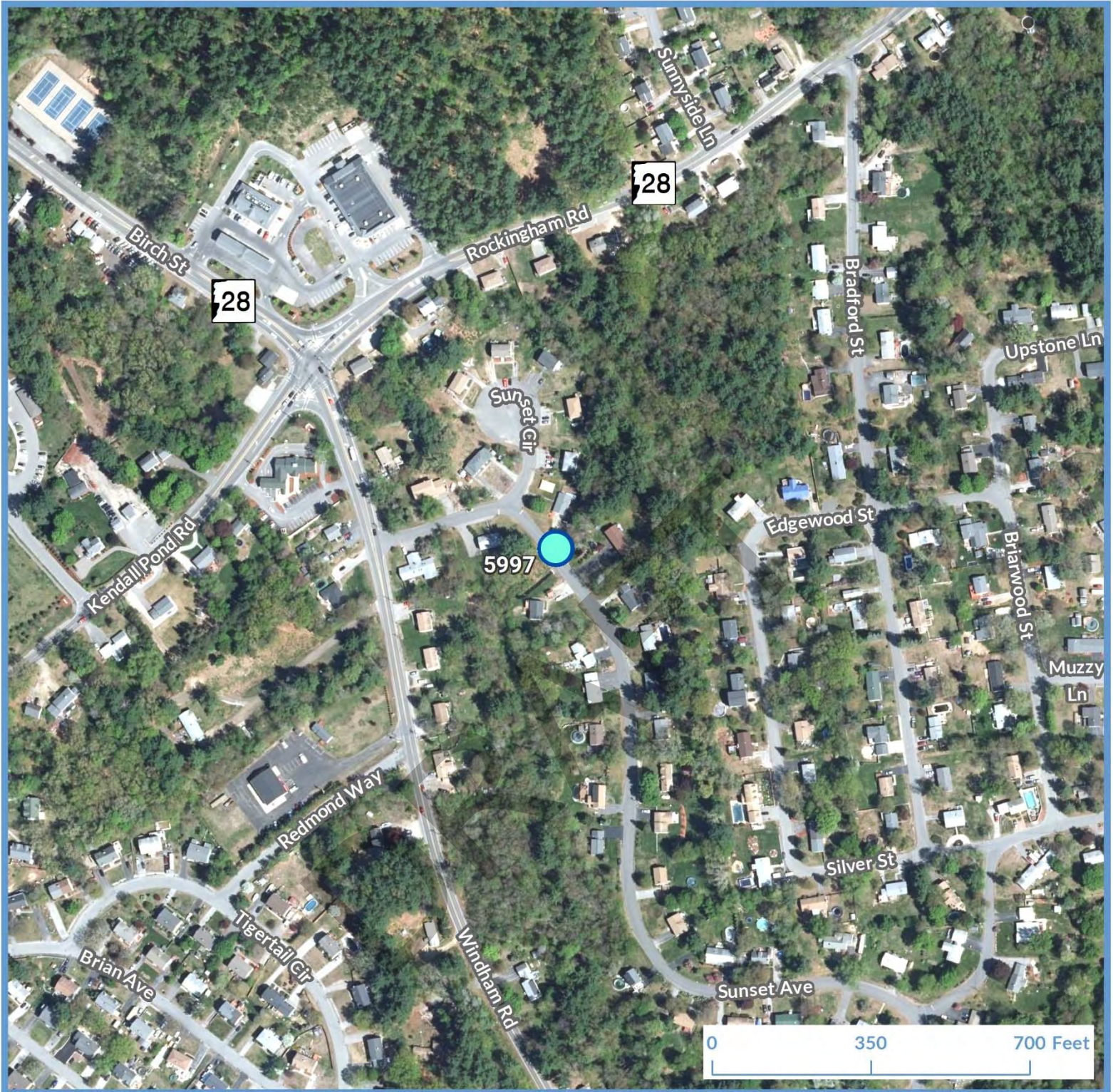
Created by SNHPC, 2020. Sources: NH Department of Environmental Services; NH Department of Transportation; University of New Hampshire.

Derry, NH		Stream Crossing Detail Sheet		SADES ID 6232	
Prioritization Score	37	Traffic Volume	<5,000	Crossing Type	Stream
 SNHPC Detail Sheet Created: January 17, 2020	Asset Manager ID'd	Yes	Road Name	Madden Road	
	Flood Hazard ID'd	Yes	Stream Name	Beaver Brook	
	Flood Zone Category	Floodway	Structure Type	Elliptical Steel Corrugated Culv.	
	Culvert Condition	Poor	Crossing Width	7.00'	
	10-Yr Hydraulic Vuln.	Unknown	Open Height	No Data	
	Crossing Material	Metal	Obstruction	None	
	Beaver Activity	No	Assessment Date	07/11/2016	




Created by SNHPC, 2020. Sources: NH Department of Transportation; University of New Hampshire.

Derry, NH		Stream Crossing Detail Sheet		SADES ID 999971	
Prioritization Score	28	Traffic Volume	>=30,000	Crossing Type	No Data
 SNHPC Detail Sheet Created: January 17, 2020	Asset Manager ID'd	No	Road Name	Interstate 93	
	Flood Hazard ID'd	Yes	Stream Name	No Data	
	Flood Zone Category	Floodway	Structure Type	No Data	
	Culvert Condition	Unknown	Crossing Width	No Data	
	10-Yr Hydraulic Vuln.	Unknown	Open Height	No Data	
	Crossing Material	No Data	Obstruction	No Data	
	Beaver Activity	No	Assessment Date	Not Yet Surveyed	




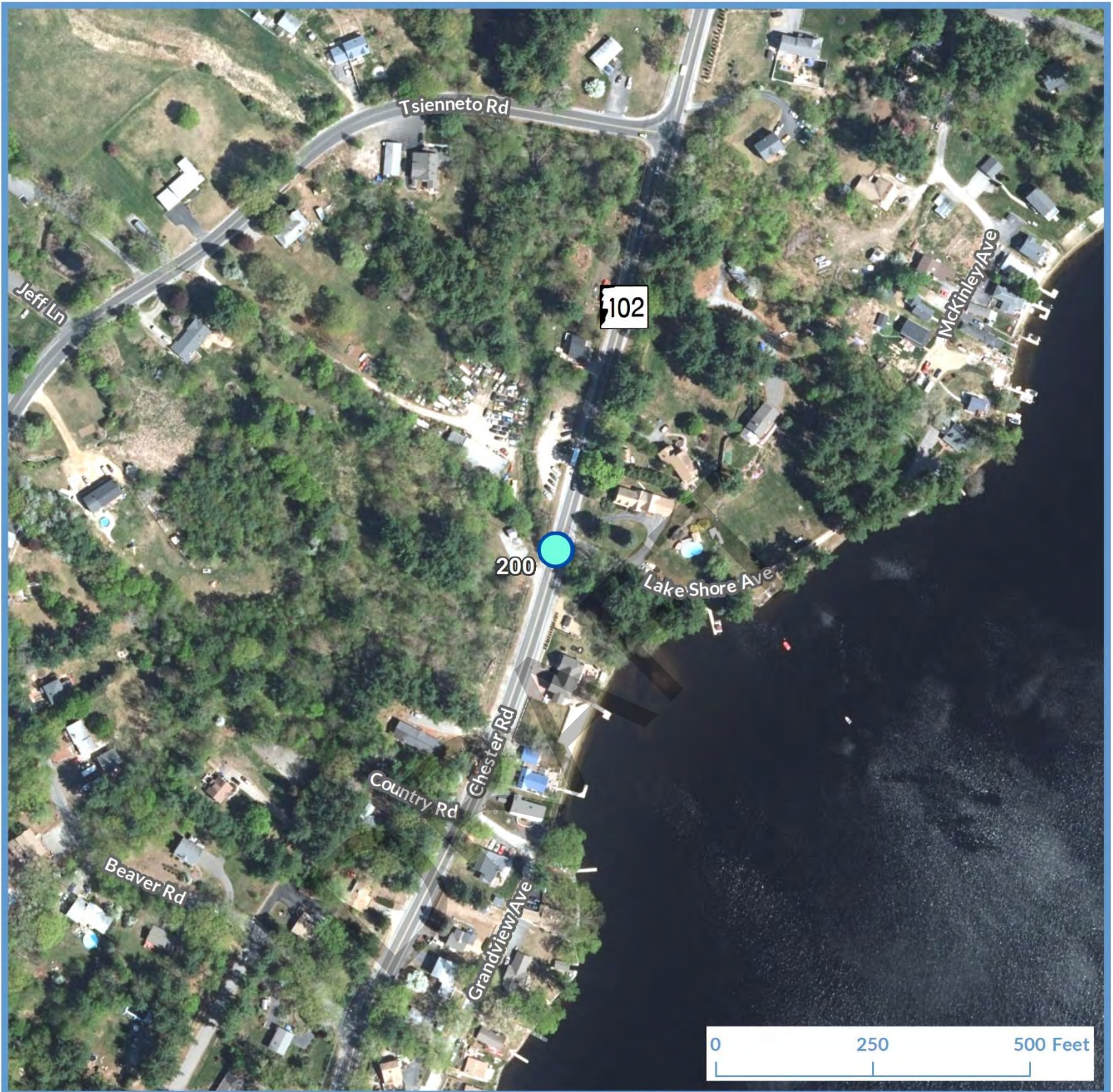
Created by SNHPC, 2020. Sources: NH Department of Environmental Services; NH Department of Transportation; University of New Hampshire.

Derry, NH		Stream Crossing Detail Sheet			SADES ID 5997	
Prioritization Score	25	Traffic Volume	<1,000	Crossing Type	Stream	
 SNHPC Detail Sheet Created: January 17, 2020	Asset Manager ID'd	No	Road Name	Sunset Avenue		
	Flood Hazard ID'd	Yes	Stream Name	No Name		
	Flood Zone Category	Floodway	Structure Type	Steel Corrugated Elliptical Culv.		
	Culvert Condition	Poor	Crossing Width	4.75'		
	10-Yr Hydraulic Vuln.	Unknown	Open Height	No Data		
	Crossing Material	Metal	Obstruction	Sediment		
	Beaver Activity	No	Assessment Date	07/01/2016		




Created by SNHPC, 2020. Sources: NH Department of Environmental Services; NH Department of Transportation; University of New Hampshire.

Derry, NH		Stream Crossing Detail Sheet		SADES ID 6357	
Prioritization Score	25	Traffic Volume	<5,000	Crossing Type	Stream
 SNHPC Detail Sheet Created: January 17, 2020	Asset Manager ID'd	Yes	Road Name	North Shore Road	
	Flood Hazard ID'd	Yes	Stream Name	No Name	
	Flood Zone Category	Floodway	Structure Type	Concrete Bridge W/Abutments	
	Culvert Condition	Good	Crossing Width	11.95'	
	10-Yr Hydraulic Vuln.	Unknown	Open Height	No Data	
	Crossing Material	Not Metal	Obstruction	None	
	Beaver Activity	No	Assessment Date	07/14/2016	



Created by SNHPC, 2020. Sources: NH Department of Environmental Services; NH Department of Transportation; University of New Hampshire.

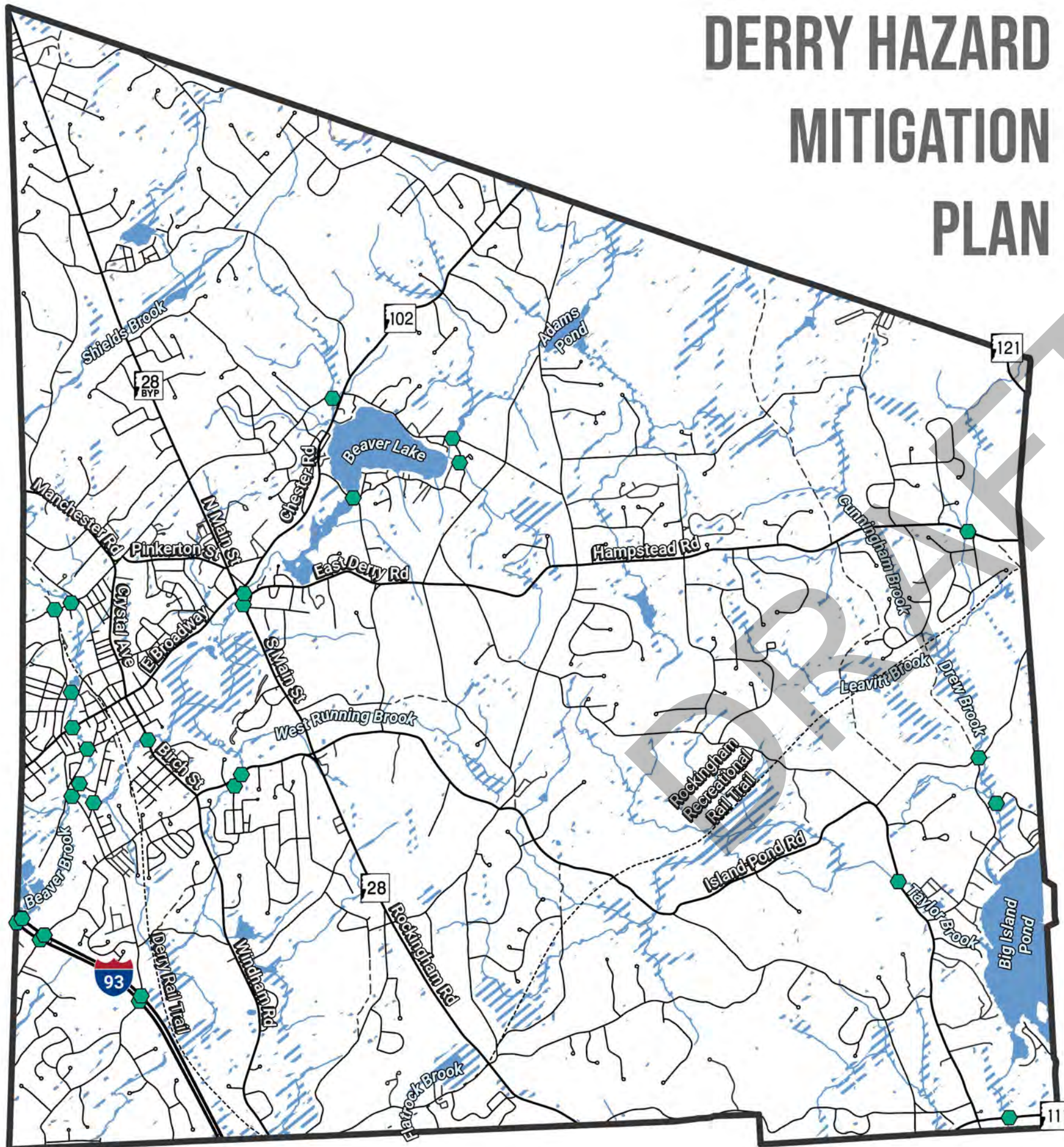
Derry, NH		Stream Crossing Detail Sheet			SADES ID 200	
Prioritization Score	24	Traffic Volume	<10,000	Crossing Type	Stream	
 SNHPC Detail Sheet Created: January 17, 2020	Asset Manager ID'd	No	Road Name	Chester Road		
	Flood Hazard ID'd	Yes	Stream Name	Cato Brook		
	Flood Zone Category	Floodway	Structure Type	Concrete Round Culvert		
	Culvert Condition	Fair	Crossing Width	3.00'		
	10-Yr Hydraulic Vuln.	Unknown	Open Height	3.00'		
	Crossing Material	Not Metal	Obstruction	None		
	Beaver Activity	Yes	Assessment Date	06/22/2018		

APPENDIX F. MAPS

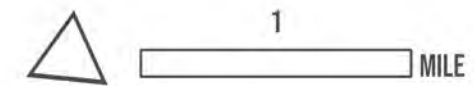
DRAFT

DERRY HAZARD MITIGATION PLAN

Map 5: Bridges



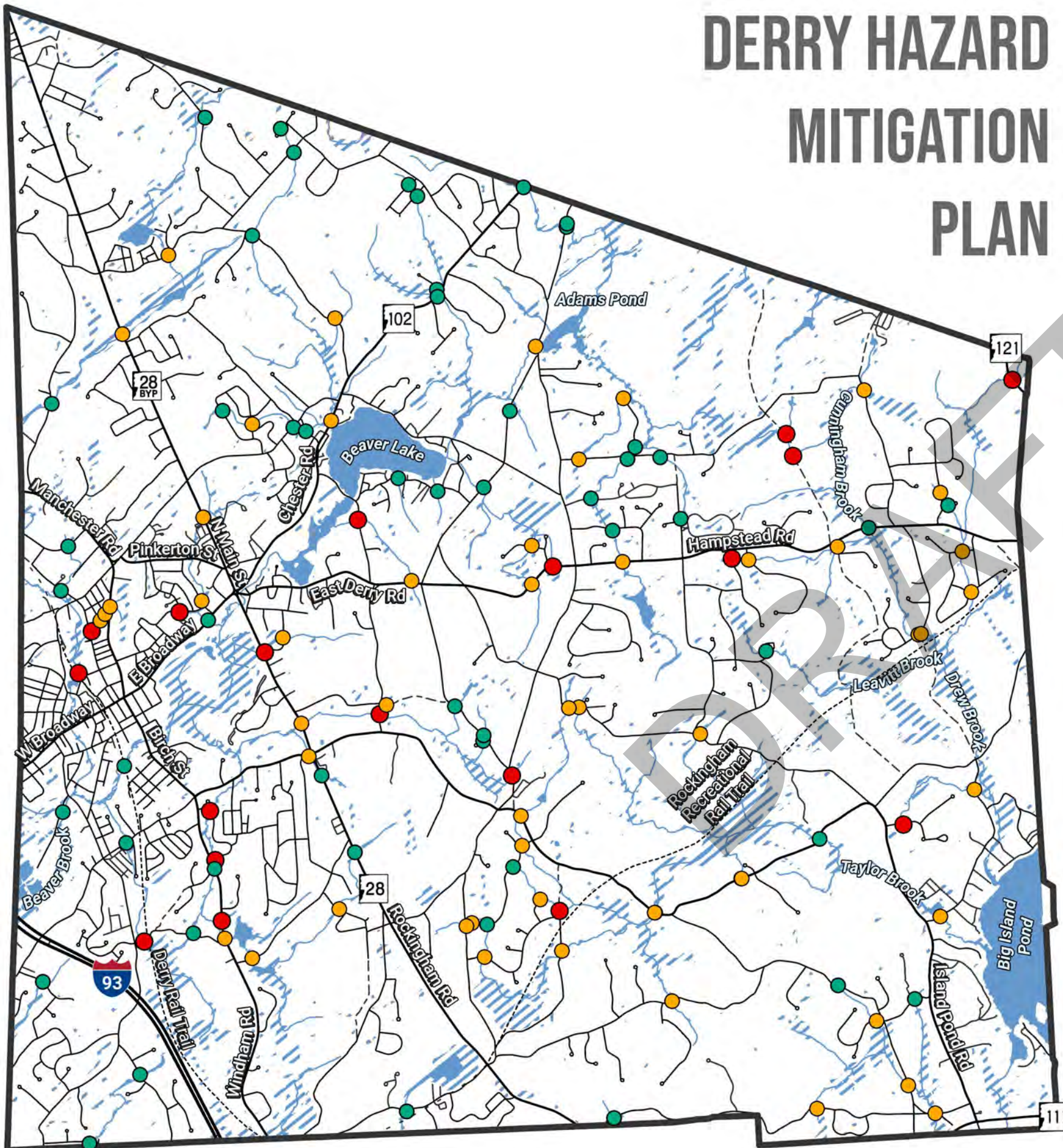
- ◆ Municipal Redlist
- ◆ Not on the Redlist



Created by the Southern New Hampshire Planning Commission, 2020. Sources: Federal Emergency Management Agency; NH Department of Transportation; US Census Bureau; US Geological Survey; US Fish & Wildlife Service.

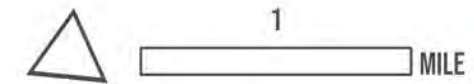
DERRY HAZARD MITIGATION PLAN

Map 6: Culverts



Structural Condition

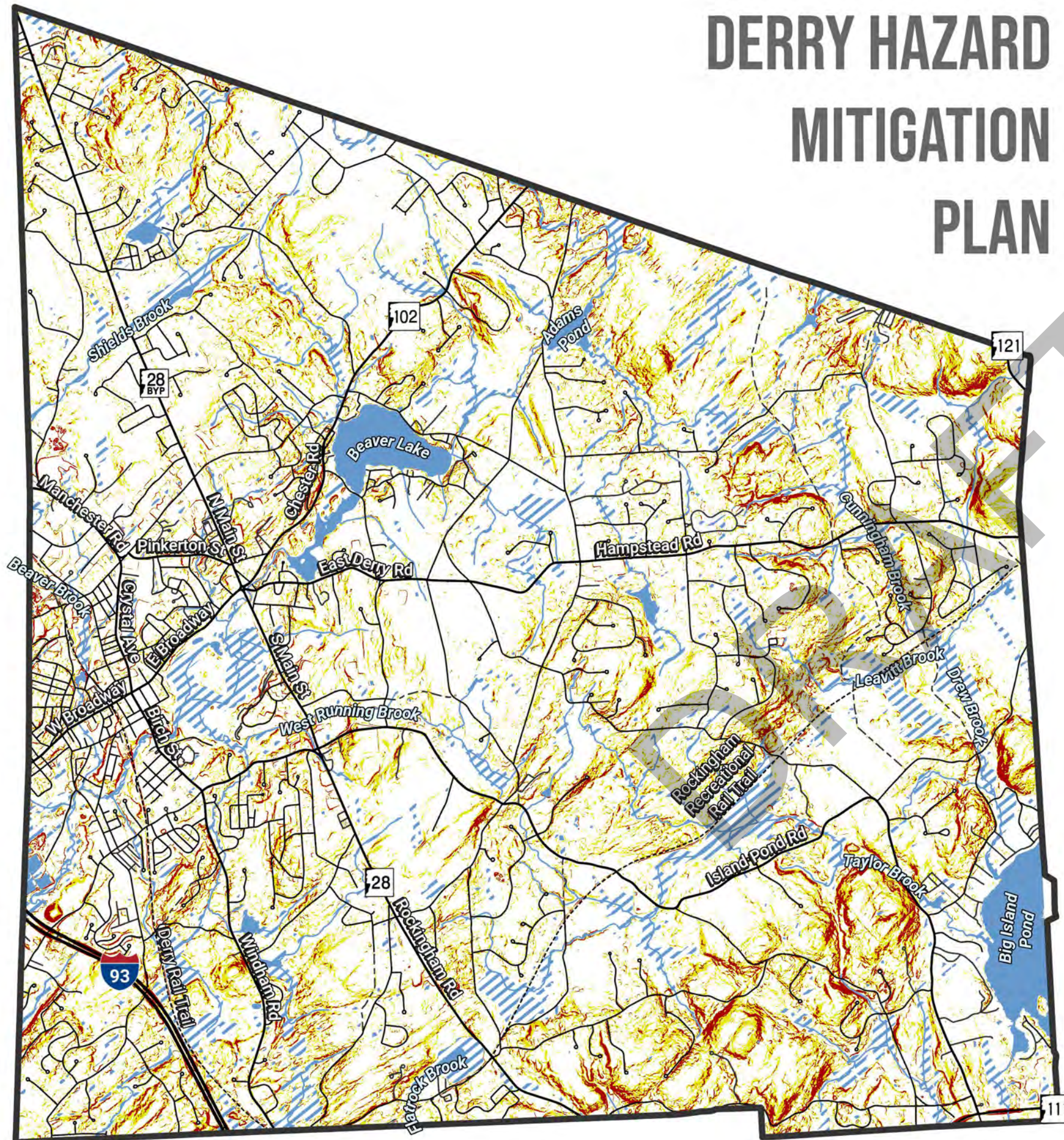
- Good
- Fair
- Poor



Created by the Southern New Hampshire Planning Commission, 2020. Sources: Federal Emergency Management Agency; NH Department of Environmental Services; NH Department of Transportation; US Census Bureau; US Geological Survey; US Fish & Wildlife Service.


DERRY HAZARD MITIGATION PLAN

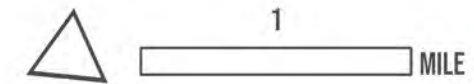
Map 7: Steep Slopes



Rise over Run

 15 to 25%

 25% or Greater



Created by the Southern New Hampshire Planning Commission, 2020. Sources: NH Department of Transportation; University of NH; US Census Bureau; US Geological Survey; US Fish & Wildlife Service.