LINCOLN, RI

2016 UPDATE

NATURAL HAZARD MITIGATION PLAN
STRATEGY FOR REDUCING
RISKS FROM NATURAL HAZARDS
Town of Lincoln
Natural Hazard Mitigation Plan
2016 Update
Strategy for Reducing Risks from Natural Hazards

Created by: The Lincoln Natural Hazard Mitigation Committee

ACKNOWLEDGMENTS

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ADDITIONAL ACKNOWLEDGMENTS

The Lincoln Natural Hazard Mitigation Committee would like to acknowledge the support of Town Administrator T. Joseph Almond, the Lincoln Town Council, Rhode Island Emergency Management Agency, and the Federal Emergency Management Agency for their guidance throughout the latest plan update.

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May 2016
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EXECUTIVE SUMMARY

The intent of this Natural Hazard Mitigation Plan update is to serve as a blueprint for coordinating and implementing mitigation programs and projects. It provides a list of hazards that are of concern to the Town of Lincoln, mitigation goals, and related actions.

Hazard mitigation planning is a process in which hazards are identified and profiled, people and facilities at risk are assessed for threat and vulnerability then mitigation actions are developed. The result of the process is an integrated and coordinated effort to mitigate hazards. The expected outcome of all actions of the Town of Lincoln’s 2016 Natural Hazard Mitigation Plan Update (HMP) is to lessen the impact of damage caused by natural hazards to life, the economy, infrastructure or our ability to continue to operate as a community and town. The purpose of the 2016 HMP Update is to document these actions and determine priorities and implementation efforts.

Specifically, the Lincoln HMP Committee’s planning process consisted of several elements: the utilization of the expertise of eight different departments, the review of existing data and research into the history of hazard events in Lincoln. The public was invited to participate in the planning process through the Town of Lincoln’s website and at public meetings of the Lincoln Town Council. The process was implemented by the Lincoln HMP Committee, which set out to: identify and profile natural hazards; assess vulnerability; set local hazard mitigation goals and strategy; and plan for future maintenance of the Lincoln Natural Hazard Mitigation Plan.

The 2016 update to the 2005 HMP, identifies eight natural hazards and 23 mitigation action items. Each action item is listed under an identified vulnerable area. The natural hazards that this plan will address over the next five years are (listed in order of impact and then frequency of occurrence):

- Hurricane/Nor’easter
- Heavy Rains/Flooding
- Snowstorm
- Hail
- Wind Event
- Lightning
- Earthquake
- Wildfire
Resolution to Adopt the Lincoln Hazard Mitigation Plan, 2016

WHEREAS, the Town of Lincoln recognizes the threat that natural hazards pose to people and property within our community; and

WHEREAS, the Town of Lincoln has prepared a multi-hazard mitigation plan, hereby known as the Lincoln Natural Hazard Mitigation Plan, 2016 in accordance with the Disaster Mitigation Act of 2000; and

WHEREAS, the Lincoln Natural Hazard Mitigation Plan, 2016 identifies mitigation goals and actions to reduce or eliminate long-term risk to people and property in Lincoln from the impacts of future hazards and disasters; and

WHEREAS, adoption by the Town Council demonstrates their commitment to hazard mitigation and achieving the goals outlined in the Lincoln Natural Hazard Mitigation Plan, 2016.

NOW THEREFORE, BE IT RESOLVED that the Town Council of the Town of Lincoln hereby adopts the Lincoln Natural Hazard Mitigation Plan, 2016.

ATTACHMENTS:
- Lincoln_Revised HMP 02June16 (PDF)

RESULT: ADOPTED [UNANIMOUS]
MOVER: James Jahnz, Council Vice President
SECONDER: Kenneth Pichette, Councilman
AYES: James Jahnz, Keith Macksoud, Kenneth Pichette, Bruce Ogni

Submitted by: Planner Albert Ranaldi
Section 1– Natural Hazard Mitigation Background

Section 1.1 – Introduction to Hazard Mitigation in the Town of Lincoln

Natural Hazard Mitigation is any sustained action taken to reduce or eliminate long-term risk to people and their property from the effects of natural hazards (e.g. wind, fire, floods, nor’easters, hurricanes, earthquakes, etc.). This Plan is an update of the Town’s original Natural Hazard Mitigation Plan adopted in April of 2005.

The purpose of the Town of Lincoln’s Natural Hazard Mitigation Plan (hereinafter referred to as “Plan”) is to provide comprehensive framework for hazard mitigation in the Town of Lincoln. The Plan addresses natural hazards and long-term risk reduction actions specific to the Town. The Plan is designed to complement and coordinate with the State of Rhode Island’s Hazard Mitigation Plan and the Town of Lincoln’s Comprehensive Plan, as updated. According to the 2014 update of the Rhode Island Hazard Mitigation Plan, the State has experienced its share of natural disasters in recent years with four (4) federal disaster declarations, in as many years, starting in 2010 (Rhode Island Hazard Mitigation Plan – 2014 Update, page 9).

A primary benefit of natural hazard mitigation is to develop and implement preventative measures that will significantly reduce the cost of post-disaster cleanup. In addition, mitigation actions conducted before hazards occur greatly reduces the impact and costs associated with the aftermath of a natural hazard event. By planning ahead, Lincoln will implement hazard mitigation actions that will minimize the economic and social disruptions (destruction of property, loss or interruption of jobs and the loss of businesses) that can result from floods, snowstorms, hurricanes and other natural disasters.

The adoption and implementation of this Plan will assist Lincoln in receiving assistance from the Federal Emergency Management Agency (FEMA) in pre- and post-disaster times:

- FEMA’s Community Rating System (CRS) – This program allows residents of participating communities to gain credit points that would result in discounts on National Flood Insurance Program (NFIP) premiums. The Town of Lincoln currently does not participate in FEMA’s Community Rating System (CRS) Program due to limited staffing resources. Should the Town decide to enter into the program in the future, it is necessary that they have an approved natural hazard mitigation plan.
- FEMA’s Pre-Disaster Flood Mitigation Assistance (FMA) Program – This program makes grants available for communities to implement flood mitigation planning and activities such as acquisition, relocation, and retrofitting of structures. This program is available only to communities having a pre-existing approved natural hazard mitigation plan.
- FEMA’s Post-Disaster Hazard Mitigation Grant Program (HMGP) - This program is made available only to communities after a federally declared disaster. Having an approved mitigation plan expedites the application process for pre- and post-federal mitigation funding, and ensures a funded project is eligible and feasible.
This program was utilized by the Town to fund clean-up projects resulting from the 2010 floods. The Town of Lincoln received $370,533.00 to reimburse the Town for repairing washed out roads, rebuild a failed road culvert, and storm debris removal.

Section 1.2 Community Profile of the Town of Lincoln

The goal of this Plan is to preserve and enhance the quality of life, property, and resources within the Town of Lincoln by identifying areas at risk from natural hazards and implementing priority hazard mitigation actions in order to protect the Town and surrounding communities’ infrastructure, population, and historical, cultural, and natural resources.

a. Location and Geography
The Town of Lincoln is located in the northeast section of Rhode Island, bordered by the Towns of Smithfield and North Smithfield to the west, the City of Woonsocket to the north, the Town of Cumberland to the north and east, the City of Central Falls to the east, and the Town of North Providence and City of Pawtucket to the south. The total size of the Town is approximately 12,100 acres (18.9 square miles). The Blackstone River that flows north to south makes up the town's eastern-most border with Cumberland and Central Falls. See Map 1 below.

Map 1: Lincoln, Rhode Island

b. Demographics, Census, and Housing Characteristics
The 2010 U.S. Census reported a total of 21,105 people that live in the Town. The 2013 population estimate is 21,177 (U.S. Census Bureau, American Community Survey). This count indicates a population growth of 1% from the 2000 Census total of 20,898.
According to the recent 2013 Census, the female population is 10,870 or 51.3% of the total population. The male population is 10,307 or 48.7% of the total population. The median age of our residents is 43. Approximately 17% of the population is over 65. The Town of Lincoln is predominantly white at 90.8%, Black or African Americans make up 4.5%, Asians 2.9%, and other 2%. An estimated 4.2% of the population identifies as Hispanic or Latino. English only is spoken in 89% of the homes, 11.2% of homes speak a language other than English. The median income for a family household is $94,040. Five percent of the population has income below the poverty level.

The 2013 Census reported an estimate of 8,910 housing units which is an increase of 4.7% from the 2000 Census count. Approximately 28% of the housing units were built before 1939. Approximately 70% of the housing units are single family detached or attached (condo). The remaining 30% of the housing units are considered multi-family. The greatest concentration of multi-family housing units is located in the village of Manville which is located in the northern section of Town.

c. Land Use and Infrastructure
Lincoln’s overall land use pattern is one that is primarily defined by the transportation system that runs throughout the town. Route 146 runs north to south and divides the eastern and western portions of the town. Interstate 295, a four-lane highway, runs east to west and divides the northern section of the town with the southern section. Route 116 runs parallel to I-295 which creates a corridor of easily accessible land between these two highways. Commercial and industrial development is located primarily along the 295/116 corridors and in the industrial park to the southwest of the Route 116 and Route 146 intersection. The interstates and the excellent highway system not only support modern commercial and industrial development but also have turned much of Lincoln into a suburban commuting town.

Functioning, vacant, redeveloped mills, and underutilized mill complexes can be found in the villages of Manville, Albion, Lonsdale and Saylesville. In general, density significantly decreases when moving westward across the town. The entire Town is serviced by public sewer and water.

d. Community Development and Development Trends
Since the first edition of the Town’s Natural Hazard Mitigation Plan, residential land development came to a dramatic stop. This stop in home building was the result of a nationwide recession. Fortunately, during 2012 and 2013, several commercial developments were approved and constructed. Recently, in the later part of 2013, single family residential development began to show signs of activity. This growth increases the number of homes and businesses that may be vulnerable to town-wide hazards such as hurricanes and snow storms. However, local land use and zoning regulations prevent additional development in the floodplain, thereby not putting more people in harm’s way during flood events.

Historically, the most prominent type of development in Town has been the traditional single family houses on an half an acre to an acre of land. Most of these developments are located within the western section of Town. Recently, two active senior (over 55 years of age) condominium communities have been built. These private communities are higher density neighborhoods where multiple housing units are attached to form one building. All interior infrastructure (roadways, water and sewer lines) is owned and
managed by the condominium association. This presents an increase in the vulnerable aging population but does not increase the risk to the population, just a greater number of people affected.

e. Historic and Natural Resources/Environmental Significance
Lincoln’s inventory of historic and natural/environmental resources is quite extensive. The town’s goal of protecting at least 30% of the land area (currently 27% open space) has resulted in a significant number of publicly owned open spaces and historic properties. These lands include both active and passive recreation areas, a variety of natural areas, and historical features such as Chase Farm, Hannaway Blacksmith Shop, and the Blackstone River Bike Path. One of the largest natural resource is the State owned and managed Lincoln Woods. Another of Lincoln’s largest uniform natural resource is the Blackstone River. It defines the town’s land boundaries to the east and was the genesis for development of Lincoln’s early industrial economy.

f. Commerce, Industry, Academic
Lincoln’s excellent regional highway network and zoning designations surrounding highway network, support a strong economic environment. Commercial and industrial development is located primarily along the 295/116 corridors and in the industrial park to the southwest of the Route 116 and Route 146 intersection. Many corporate headquarters are located within these corridors. Small village-based businesses can be found in the center of most villages. The Saylesville Industrial Park and the Moshassuck Valley Highway Industrial Area, located in the southeasterly portion of town, are part of a regional Enterprise Zone that includes extensive manufacturing and commercial areas. An Enterprise Zone makes certain businesses and workers within the Zone eligible for state tax credits and bestows priority status for state projects within the Zone.

Lincoln is host community to one of two casinos located within the State. Twin River Casino, located in the village of Lime Rock and just off of Route 146, has approximately 300,000 square feet of gaming space, with over 4,500 video slot machines and virtual table games, as well as 80 live table games. Other amenities include a 29,000-square-foot event center, many restaurants and food courts, several bars, and a racebook. This facility is the third largest source of state revenue.

Lincoln has a variety of public and private academic institutions. The Town operates four public elementary schools, one public middle school, and one public high school. Also located within Lincoln is a public vocational school, a public charter school, one private special needs school and a private career training facility. The Town is also host to a regional community college. Table 1 below identifies the school’s name, street address and type of school.


Table 1 – Public and Private Schools located in the Town of Lincoln

<table>
<thead>
<tr>
<th>School Name</th>
<th>Address</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blackstone Valley Prep Mayoral Academy</td>
<td>3 Fairlawn Way</td>
<td>Public – Charter</td>
</tr>
<tr>
<td>Central Elementary</td>
<td>1081 Great Road</td>
<td>Public</td>
</tr>
<tr>
<td>Lincoln High School</td>
<td>135 Old River Road</td>
<td>Public</td>
</tr>
<tr>
<td>Lincoln Middle School</td>
<td>152 Jenckes Hill Road</td>
<td>Public</td>
</tr>
<tr>
<td>Lincoln Seventh Day Adventist School</td>
<td>1000 Smithfield Avenue</td>
<td>Private</td>
</tr>
<tr>
<td>Lonsdale Elementary</td>
<td>270 River Road</td>
<td>Public</td>
</tr>
<tr>
<td>Northern Elementary</td>
<td>315 New River Rd, Manville</td>
<td>Public</td>
</tr>
<tr>
<td>Saylesville Elementary</td>
<td>50 Woodland Street</td>
<td>Public</td>
</tr>
<tr>
<td>The Spurwink School</td>
<td>365 River Road</td>
<td>Private - Special Needs</td>
</tr>
<tr>
<td>Wm. M. Davies Career &amp; Technical High School</td>
<td>50 Jenckes Hill Road</td>
<td>Public - Vocational</td>
</tr>
<tr>
<td>Community College of Rhode Island – Flanagan Campus</td>
<td>1762 Old Louisquisset Pike</td>
<td>Public - College</td>
</tr>
<tr>
<td>Lincoln Technical Institute</td>
<td>622 George Washington Hwy</td>
<td>Private – Career Training</td>
</tr>
</tbody>
</table>

**g. NFIP and CRS Community Participation**

The Town of Lincoln as well as all the other cities and towns in the State of Rhode Island participate in the National Flood Insurance Program. Lincoln has been a member of the NFIP since 1982, and has adopted the Flood Insurance Rate Map and Flood Insurance Study dated September 2013. The Town maintains their active NFIP status by designating an NFIP Coordinator in the Building Inspection Department, participating in Community Assisted Visits (CAVs), enforcing the State Building Code, and ensuring compliance with floodplain regulations as adopted. The Town of Lincoln does not participate in the Community Rating System.

The most contiguous floodplain in Lincoln is the land surrounding the Blackstone River on the Town’s northeastern boundary. This area is classified as an AE Zone. An AE Zone is defined as a 100-year (1% annual chance) floodplain. FEMA lists 242 properties in Lincoln that are insured by the National Flood Insurance Program (NFIP) with a total value of over $61,837,300 as of March 2015. From 1978 through January 2016, there were 60 flood insurance claims in Lincoln through the NFIP. There have been 23 flood claims on 7 properties located along the banks of the Blackstone River and other parts of Lincoln. Of the 7 Repetitive Loss properties, 5 are commercial and 2 are residential. These properties have amassed about $1,830,082 in claims.

**Section 1.3 Significant Events Since the Last Plan Update**

Since the last update of the Town’s Hazard Mitigation Plan, the State of Rhode Island has experienced five (5) federal disaster declarations.

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/29/10</td>
<td>Floods</td>
</tr>
<tr>
<td>8/7/11</td>
<td>Hurricane Irene</td>
</tr>
<tr>
<td>10/29/12</td>
<td>Hurricane Sandy</td>
</tr>
<tr>
<td>3/22/13</td>
<td>Winter Storm (Nemo)</td>
</tr>
<tr>
<td>4/3/15</td>
<td>Winter Storm (Juno)</td>
</tr>
</tbody>
</table>

The Town of Lincoln was declared for 3 of these events, excluding Hurricane Sandy.
Section 2 Planning Process

Section 2.1 Purpose, Overview, and Background

The Town of Lincoln, through its Lincoln Natural Hazard Mitigation Committee (LNHMC) developed its first local natural hazard mitigation plan in 2005 according to 44 CFR 201. This plan focused on creating a comprehensive document describing past storm events and mitigation efforts. The plan analyzed and documented the Town’s vulnerability to natural hazards and the mitigation efforts to date. Goals and actions were established to address the Town’s vulnerability and mitigation efforts.

In 2011, the LNHMC began to update the plan to reflect changes in development, progress in local and state mitigation efforts, and changes in priorities. The plan update also reflects new required elements presented in FEMA’s July 1, 2011 Local Multi-Hazard Mitigation Guidance document, and local plan compatibility with the Rhode Island Emergency Management Agency (RIEMA) State Hazard Mitigation Plan, dated April 2014.

Since 2005, the Town of Lincoln has completed 12 actions and has identified 3 new mitigation actions to better reduce losses and increase community resiliency in the event of a hazard.

Section 2.2 Building Support: Community Involvement, Roles, and Responsibilities

a. The Planning Team, Technical Assistance, and Local Leadership

The plan update was conducted in-house by the Lincoln Natural Hazard Mitigation Committee (LNHMC). The committee represents all of the Town’s key stakeholders of natural hazard mitigation activities. This committee includes representatives from the following departments:

- Town’s Emergency Management Agency
- Lincoln Engineering Department
- Lincoln Public Works Department
- Lincoln Sewer Department
- Lincoln Planning Department
- Lincoln Building Department
- Lincoln Police Department
- Lincoln Rescue Department

When it was time to update the 2005 plan, the Lincoln Town Planner called or emailed the representatives that worked on the 2005 plan and invited them to reconvene in 2011. On-site committee/stakeholder meetings were held on January 20, 2011, January 30, 2012, August 30, 2012, and June 6, 2013 to discuss the plan update. In addition, the Planning Department published a notice of the plan revision process on the Town’s website on July 17, 2012 to December 31, 2012, provided a copy of the 2005 plan for review, and requested public comments. The latest draft plan was posted to the Town’s
website on January 09, 2015 for review and requesting public comment (see Appendix D).

The 2005 Natural Hazard Mitigation Plan was reviewed by the committee and compared against the current regulations and guidance documents, as well as the then current Rhode Island State Hazard Mitigation Plan. Sections of the plan that needed to be revised in accordance to any new requirements were noted. The committee did not identify any new hazards for the 2016 update; however, significant time was dedicated to documenting the Town’s recent mitigation activities.

Concurrently with the update of the 2005 Natural Hazard Mitigation Plan, the Town worked with RIEMA in updating our Flood Insurance Rate Maps (FIRMs). The Preliminary FIRMs show a minor increase in the size and location of the floodplain. There were no additional structures located within the updated floodplain. The Town has received their Preliminary FIRMs and a FEMA’s Letter of Final Determination stating that the Preliminary FIRMs will become effective in 6 months. The Town’s FIRMs were adopted and became effective on September 18, 2013. The companion local ordinance entitled Special Flood Hazard Areas and Flood Fringe Lands – Chapter 129 (see Appendix A) has been updated to reflect the recent changes in maps.

Additional documents such as the Town’s Comprehensive Plan, Land Development and Subdivision Regulations, Water Commission's Clean Water Infrastructure Plan, Continuity of Operations Plan (COOP)/Continuity of Government (COG) and Emergency Operations Plan, were reviewed during the plan update.

b. Public Outreach
Copies of the draft Natural Hazard Mitigation Strategy were published in 2013 for public comment on the Town’s official website, and hard copies were made available for review at the Planning Department. All meetings of the Lincoln Natural Hazard Mitigation Committee were open to the public. See Appendix D. Copies of this current update are posted on the Town’s website and made available in multiple locations throughout Town, including in the Town Planning Office and the Lincoln Public Library. On January 6, 2015, the Town’s Emergency Management Director hand-delivered a copy of the Town’s draft Natural Hazard Mitigation Plan to each local EMA directors of all neighboring communities (Town of Cumberland, City of Woonsocket, Town of North Smithfield, Town of Smithfield, Town of North Providence, City of Pawtucket, and the City of Central Falls). Each director was asked to review the Town’s draft plan and submit comments to the Planning Department. No comments were received from the Emergency Management Directors or the public. The plan will be presented to the Town Council upon approval from the State and FEMA.

Section 2.3 Understanding the Community’s Risks

Since the 2005 edition of the Town’s Natural Hazard Mitigation Plan, the State of Rhode Island experienced several significant storm events. These events elevated the value of comprehensive and up-to-date natural hazard mitigation plans at the State, Federal, and local levels. Flooding concerns were further analyzed during the 2016 update process as this was the most identified risk to the community.
Section 2.4 Updating the Mitigation Strategy

The completion of a planning document is merely the first step in its life as an evolving tool. The Natural Hazard Mitigation Plan is a dynamic document which should be reviewed on a regular basis as to its relevancy and usefulness and to add new tasks as old tasks are completed. This section will discuss the methods by with the Town of Lincoln will review, monitor, and update its 2016 Natural Hazard Mitigation Plan.

The Town of Lincoln’s Town Planner will be responsible for maintaining a permanent local Hazard Mitigation Committee. The Town Planner will serve as the Chair of the LNHMC.

Each agency or department that is responsible for a specific action will begin their tasked assignments after Town Council approval. The Emergency Management Director will also seek other funding sources to help each agency/department implement their strategies; even if funding is an issue.

The LNHMC decided that since the Public Works Department has the lead on most of the actions associated with the Plan that they will also be the coordinating agency that will track the progress of each action utilizing the Mitigation Action Progress Form (located in Appendix D). The agencies will report all progress to the Public Works Director who will maintain all documentation.

The local strategy will be reviewed annually or after each disaster (whichever comes first) and will undergo a full update every 5 years. During each review process, the LNHMC will reach out to neighboring communities for their input and host a public meeting to allow for public comment. The plan may also be updated earlier to reflect changes after a major hazard event. Furthermore, future revisions will use a well-defined method of prioritizing the mitigation actions since more detailed records of events will be able to be utilized. Any revisions and/or updates that are made will be forwarded to the RIEMA to insure that the State Hazard Mitigation Strategy remains current.

Section 2.5 Plan Implementation & Maintenance

During the annual review process and after any disaster situation that may test those actions that have already been implemented, the LNHMC, in coordination with the Emergency Management Director, will review all proposed and already implemented strategies to determine their effectiveness. The review criteria will test each implemented action to determine the degree to which the action has reduced the vulnerability to the structures it was meant to protect. This review is critical after an event as the degree of protection offered by the strategy is especially apparent. At this time the original information regarding the benefit-cost review of each action will be reviewed to determine which actions were the most cost effective. If the actions failed, new actions will be explored to correct the vulnerability. This type of evaluation will help to shape future actions proposed by the hazard mitigation committee.

The LNHMC approved the adoption of this revised plan and recommended it be forwarded to RIEMA for review by the State Hazard Mitigation Officer, and then to FEMA Region I for their approval pending adoption. The plan received formal FEMA
approval pending adoption on May 23, 2016. The plan was then adopted by the Town Council on the date indicated in the Adoption Resolution.

Also, as previously mentioned the mitigation actions stated in this Plan and any updates will be incorporated into future revisions of the Town’s Comprehensive Plan and the Land Development and Subdivision Regulations. Elements of this Plan will also be addressed in revisions of the Emergency Operations Plan. By incorporating mitigation strategies into all planning efforts (as listed in the Capabilities section), the Town will ensure consistency and continuity in all future planning efforts.
Section 3 Hazard Identification and Risk Assessment

Identifying the risk and vulnerabilities of a community is the primary factor in determining how to allocate finite resources and to determine what mitigation actions are feasible and appropriate. The hazard analysis involves identifying all of the hazards that potentially threaten Lincoln, and then analyzing them individually to determine the degree of threat that is posed by each natural hazard. Addressing risk and vulnerability through hazard mitigation measures will reduce societal, economic and environmental exposure to natural hazards impacts.

After the hazards are identified, community assets are inventoried, and losses are estimated, the LNHMC can create or re-define actions to mitigate losses from the most damaging events (Section 4).

Section 3.1 Defining Risk

Risk can be defined as “hazard, danger, peril, exposure to loss, injury, or destruction” or “the possibility of suffering harm or loss.” Natural hazard risk assessment describes the magnitude, duration and probability of the hazard event. For example, risk assessments estimate potential wind speeds and storm surge for a specific area.

Hazard identification and risk assessment provides a factual basis for developing mitigation strategies. Based on review of the Rhode Island 2014 State Hazard Mitigation plan, and previous versions of this plan, the hazards shown below are discussed and analyzed in the following hazard specific sections.

The Town of Lincoln is equally susceptible to the identified hazards in all parts of the Town. The town has relatively flat topography crisscrossed with streams and rivers. In a town of less than 19 square miles, a hurricane, flood, or strong wind is just as likely (or not) to occur in any region.

Section 3.2 Hazards

a. Hazard Identification

According to the 2014 Rhode Island Hazard Mitigation Plan, a natural hazard is defined as, “an event or physical condition that has the potential to cause fatalities, injuries, property and infrastructure damage, agricultural loss, damage to the environment, interruption of business, or other types of harm or loss…” A natural hazard can also be exacerbated by societal behavior and practice, such as building in a floodplain, along a sea cliff or an earthquake fault. Natural disasters are inevitable, but the impacts of natural hazards can, at a minimum, be mitigated or, in some instances, prevented entirely” (2014 Rhode Island Hazard Mitigation Plan, Section 3, Hazard Identification and Risk Assessment, page 29).

This plan will examine only natural hazards. Man-made hazards such as structural fires, chemical spills, hazardous materials, and weapons of mass destruction will not be examined. Table 2 presents an overview of a variety natural hazards that have
historically affected the cities and towns within the State of Rhode Island, and have been identified as hazards by the LNHMC. The table presents specific details regarding frequency of occurrence, magnitude (% of community affected), speed of onset (warning time available), seasonal pattern, possible affects to the community and risk priority.

Table 2 – Hazard Profile Summary for Lincoln

<table>
<thead>
<tr>
<th>Hazard</th>
<th>Frequency¹</th>
<th>Magnitude²</th>
<th>Speed of Onset</th>
<th>Seasonal Pattern</th>
<th>Possible Effects</th>
<th>Risk Priority³</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wind Event</td>
<td>Highly likely</td>
<td>Critical</td>
<td>12-24 hrs.</td>
<td>Any Season</td>
<td>Property damage, power outages, downed trees and limbs</td>
<td>High</td>
</tr>
<tr>
<td>Hurricane/Nor’eastern</td>
<td>Likely</td>
<td>Limited</td>
<td>24+ hrs.</td>
<td>June-Nov. with Aug.-Oct. most likely</td>
<td>Flooding, downed trees, power outages, property damage, loss of life</td>
<td>Medium</td>
</tr>
<tr>
<td>Winter Weather Hazards</td>
<td>Highly likely</td>
<td>Critical</td>
<td>12-24 hrs.</td>
<td>Winter</td>
<td>Power outages, poor travel conditions, schools/businesses closed</td>
<td>High</td>
</tr>
<tr>
<td>Hailstorms</td>
<td>Possible</td>
<td>Negligible</td>
<td>Minimal</td>
<td>Summer</td>
<td>Property damage</td>
<td>Low</td>
</tr>
<tr>
<td>Flood Related Hazards</td>
<td>Highly likely</td>
<td>Limited</td>
<td>12-24 hrs.</td>
<td>Spring and Summer</td>
<td>Flooding, property damage, roads closed, dams breached</td>
<td>Medium</td>
</tr>
<tr>
<td>Lightning</td>
<td>Highly likely</td>
<td>Negligible</td>
<td>6-12 hrs.</td>
<td>Spring, Summer, Fall</td>
<td>Property damage, fire</td>
<td>Low</td>
</tr>
<tr>
<td>Earthquake</td>
<td>Possible</td>
<td>Critical</td>
<td>Minimal</td>
<td>Any Season</td>
<td>Loss of life, property damage, power outages</td>
<td>Low</td>
</tr>
<tr>
<td>Wildfire</td>
<td>Possible</td>
<td>Limited to Negligible</td>
<td>Minimal</td>
<td>Any Season</td>
<td>Property damage, environmental damage</td>
<td>Medium</td>
</tr>
</tbody>
</table>

Due to the demographics and topography of the Town, any event that was to occur would affect the entire town in the same general manner. To profile the history of these events in Lincoln, the National Climatic Data Center’s online database (www.ncdc.noaa.gov/stormevents) was utilized. This database is the most comprehensive source for past weather events.

¹ Highly likely=near 100% probability within the next year; Likely=between 10% and 100% probability within the next year or at least one chance in next 10 years; Possible=between 1% and 10% probability within the next year or at least one chance in next 100 years; Unlikely=less than 1% probability in next 100 years
² Catastrophic=more than 50% of community affected; Critical=25% to 50% affected; Limited= 10% to 25% affected; Negligible=Less than 10% affected.
³ A function of the magnitude and the frequency.
b. Hazards Excluded from the Risk Assessment

It must be noted that the identified natural hazards listed in the table above is not complete. There are numerous natural hazards that exist but are not presented, such as volcanoes, tsunamis, landslides, land subsidence, avalanche, tornadoes, storm surge, and coastal erosion that may occur and affect other parts of the state. However, after the LNHMC analyzed the historical data, the committee decided not to consider these hazards at this time due to a low probability and frequency of occurrence for the hazards listed above in this part of the United States. Lincoln does not have volcanoes or the right terrain to support landslides, avalanches, or land subsidence. Given the low probability of tornado activity the committee decided not to include them in this plan. Being an inland town, Lincoln does not experience the effects of tsunamis, coastal erosion, or storm surge. Although temporary drought conditions may occasionally exist in Rhode Island, devastating, long term drought conditions are not indicative of this temperate region and therefore were not described in depth in this plan. Droughts are mentioned briefly as they relate to brushfires.

c. Hazard Profiles

This subsection will describe each type of natural hazard that Lincoln has historically experienced and more likely experience in the future.

As part of the hazard profile, the LNHMC assigned a value of high, medium, and low for the probability of future occurrence.

<table>
<thead>
<tr>
<th>Probability of Future Event</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>Less than 10 % probability within the next year</td>
</tr>
<tr>
<td>Medium</td>
<td>10-100% probability within the next year</td>
</tr>
<tr>
<td>High</td>
<td>100% probability within the next year</td>
</tr>
</tbody>
</table>

Wind Related Hazards

Wind is the movement of air caused by a difference in pressure from one place to another. Local wind systems are created by the immediate geographic features in a given area, such as mountains, valleys, or large bodies of water. National climatic events such as high gale winds, tropical storms, thunderstorms, nor’easters, hurricanes, and low-pressure systems produce wind events in Rhode Island. Wind effects can include blowing debris, interruptions in elevated power and communications utilities, and intensification of the effects of other hazards related to winter weather and severe storms.
The Beaufort Wind Scale is a 17 level scale used to describe wind speed and observed wind conditions at sea and on land. A wind classification of 0 has wind speeds of less than 1 mile per hour are considered calm. On the other end, a classification of 10 with wind speeds reaching 63 miles an hour will blow down trees and cause considerable damage.

**Location**
Wind events are expected throughout the year in Lincoln.

**Probability of Occurrence**
High- The Lincoln HMP Committee agreed that there is a very high likelihood of strong winds causing damage in Lincoln within the next year. This is consistent with the geographic extent of winds throughout Rhode Island.

**Extent and Impact**
Strong wind gusts of 40 miles an hour (Beaufort Scale of 8) can blow off twigs and small branches from trees. Occasional gusts and sustained winds at this speed (and above) are of concern to the Town. Damages from wind events range from power outages, property damage to vehicles and buildings and fallen trees/limbs. Wind events in Lincoln have resulted primarily in power outages and downed tree limbs with minimal property damage. It is important that the Town of Lincoln develops and implements a proactive public tree trimming program that will reduce the likelihood of fallen trees/limbs from disrupting transportation routes and/or taking down power lines.

**Previous Occurrences**
Table 3 provides a history of significant wind events for the Providence County area since the 2005 plan.

**Table 3: Recent Wind Storms in Providence County**

<table>
<thead>
<tr>
<th>Date</th>
<th>Magnitude (kts or mph)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>February 17, 2006</td>
<td>50-55 mph gusts</td>
<td>A cold front swept across the region producing strong winds that brought down a 1 foot diameter tree in Glocester</td>
</tr>
<tr>
<td>February 10, 2008</td>
<td>67 mph gusts</td>
<td>Downed tree limbs and wires across most of RI</td>
</tr>
<tr>
<td>January 25, 2010</td>
<td>45-50 mph gusts</td>
<td>Brought down trees, no injuries reported</td>
</tr>
<tr>
<td>April 29, 2010</td>
<td>40-50 mph gusts</td>
<td>Strong winds brought down wires in some areas and resulted in scattered wind damage</td>
</tr>
<tr>
<td>August 28, 2011</td>
<td>44 mph</td>
<td>Tropical Storm Irene resulted in widespread tree damage and power outages.</td>
</tr>
<tr>
<td>December 8, 2011</td>
<td>45-55 mph gusts</td>
<td>Heavy rain and strong to damaging winds across much of the area</td>
</tr>
<tr>
<td>October 29, 2012</td>
<td>48 mph</td>
<td>Hurricane Sandy brought heavy winds</td>
</tr>
</tbody>
</table>

Source: National Climate Data Center
Hurricanes and Nor’easters

Description
FEMA’s Multi-Hazard Identification and Risk Assessment (MHIRA) defines a hurricane “as a low pressure area of closed circulation winds that originates over tropical waters. Winds rotate counterclockwise in the Northern Hemisphere and clockwise in the Southern Hemisphere. As it intensifies, it may develop into a tropical storm, with further development producing a hurricane or typhoon. As a storm travels over land or colder waters, it eventually weakens (FEMA's MHIRA 1997, Chapter/Section Number: Part 1. Natural Hazards: Atmospheric Hazards, pg. 12).

Hurricanes originate in the Atlantic Ocean and are usually accompanied by rain, thunder and lightning. They usually occur from June to October. (Hurricanes that originate in the Pacific Ocean are referred to as typhoons.)

An extra-tropical coastal storm, known as a nor’easter, is typically a large, counterclockwise wind circulation around a low pressure center. The storm radius is often as large as 1,000 miles, and the horizontal storm speed is about 25 miles per hour, traveling up the eastern United States coast. Sustained wind speeds of 10-40 MPH are common during a nor’easter, with short term wind speeds gusting up to 70 MPH. Unlike hurricanes and tropical storms, nor’easters can sit off shore, wreaking damage for days.  

Nor’easters are a common winter occurrence in New England (September to April) and repeatedly result in flooding, various degrees of wave and erosion induced damage to structures, and erosion of natural resources, such as beaches, dunes and coastal bluffs.

Location
The entire town of Lincoln is vulnerable to hurricanes that track close to Rhode Island.

Probability of Occurrence
Medium- The Lincoln HMP Committee agreed that there is less than a 100% likelihood of a hurricane affecting Lincoln within the next year. Although Lincoln is an inland community and not subject to wave energy, a hurricane’s strong winds and heavy rain will still have a likely impact on the Town.

Extent and Impact
Hurricanes that affect the Town of Lincoln primarily originate in the Atlantic Ocean and generate their storm energy from the warm ocean water. The wind speed of a hurricane decreases as it moves inland due to the absence of warm ocean water and the presence of land, vegetation, and structures that offer frictional resistance to the storm winds. The wind and rain that precede a hurricane can cause severe damage even to those communities that are further inland, such as Lincoln. Hurricanes can also spawn tornadoes that are extremely dangerous and that contribute to the overall damage.

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4 Rhode Island Emergency Management Agency (RIEMA), Rhode Island 2014 Hazard Mitigation Plan Update
Hurricanes are classified by their damage potential according to a scale developed in the 1970s by Robert Simpson and Herbert Saffir, and updated slightly by the National Hurricane Center in 2012. The scale is designed to give public officials and the general public usable information on the magnitude of a storm. It gives an indication of the potential flooding and wind damages associated with each hurricane category. The scale rates the intensity and effects of hurricanes based on wind speed and barometric pressure measurements as shown in Table 4.

Table 4: Saffir/Simpson Scale of Hurricane Intensity

<table>
<thead>
<tr>
<th>Wind Speed</th>
<th>Typical Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Category 1 Hurricane- Weak</strong></td>
<td></td>
</tr>
<tr>
<td>74-95 mph  (64-82 kts)</td>
<td>Minimal Damage: Damage is primarily to shrubbery, trees, foliage, and unanchored mobile homes. No real damage occurs in building structures. Some damage is done to poorly constructed signs.</td>
</tr>
<tr>
<td><strong>Category 2 Hurricane- Moderate</strong></td>
<td></td>
</tr>
<tr>
<td>96-110 mph  (83-95 kts)</td>
<td>Moderate Damage: Considerable damage is done to shrubbery and tree foliage, some trees are blown down. Major structural damage occurs to exposed mobile homes. Extensive damage occurs to poorly constructed signs. Some damage is done to roofing materials, windows, and doors; no major damage occurs to the building integrity of structures.</td>
</tr>
<tr>
<td><strong>Category 3 Hurricane- Strong</strong></td>
<td></td>
</tr>
<tr>
<td>111-129 mph  (96-112 kts)</td>
<td>Extensive Damage: Foliage torn from trees and shrubbery; large trees blown down. Practically all poorly constructed signs are blown down. Some damage is done to roofing materials, windows, and doors. Some structural damage occurs to small buildings, residences and utility buildings. Mobile homes are destroyed. There is a minor amount of failure of curtain walls in framed buildings.</td>
</tr>
<tr>
<td><strong>Category 4 Hurricane- Very Strong</strong></td>
<td></td>
</tr>
<tr>
<td>130-156 mph  (113-136 kts)</td>
<td>Extreme Damage: Shrubs and trees are blown down; all signs are down. Extensive roofing material and window and door damage occurs. Complete failure of roofs on many small residences occurs, and there is a complete destruction of mobile homes. Some curtain walls experience failure.</td>
</tr>
<tr>
<td><strong>Category 5 Hurricane- Devastating</strong></td>
<td></td>
</tr>
<tr>
<td>Greater than 157 mph  (136 kts+)</td>
<td>Catastrophic Damage: Shrubs and trees are blown down; all signs are down. Considerable damage to roofs of buildings. Very severe and extensive window and door damage. Complete failure of roof structures occurs on many residences and industrial buildings, and extensive shattering of glass in windows and doors occurs. Some complete buildings fail. Small buildings are overturned or blown away. Complete destruction of mobile homes.</td>
</tr>
</tbody>
</table>

Source: National Hurricane Center and RI 2013 State Hazard Mitigation Plan

Previous Occurrences
In the sixteen year period from 1938 to 1954, Rhode Island experienced three major hurricanes that caused a tremendous amount of damage and resulted in almost 300 deaths across the State. The great un-named hurricane of 1938 devastated Rhode Island and caused 100 million dollars in property damage and took 262 lives. Hurricane Carol in August of 1954 caused similar damage dollar-wise, but thankfully only resulted in the loss of 19 lives. While Rhode Island has not had hurricanes as severe as this in the last
50 years, we have had several that have resulted in millions of dollars in property damage, mostly due to the fact that people like to live near the water and are naïve to the fact that even a small hurricane can wreak havoc on lives and property. Even in Lincoln which is not a coastal community, hurricane force winds and heavy rain can cause flooding and damage to infrastructure and trees. Table 5 below provides a history of hurricanes that affected the State of Rhode Island. Lincoln has not been hit by extremely intense hurricanes (Category 4 or 5) as seen in other parts of the East Coast.

Table 5: Hurricane History in Rhode Island

<table>
<thead>
<tr>
<th>Hurricane</th>
<th>Date</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1938</td>
<td>September 21, 1938</td>
<td>The hurricane of September 21, 1938 brought major devastation to the State, with 262 persons losing their lives and damage estimated at $100 million. Another major hurricane occurred on September 14, 1944; no lives were lost, but property damage was over $2 million. The coastal area from Westerly to Little Compton experienced the heaviest damage, but there was no tidal wave, since the storm hit at ebb tide. Sustained winds of 95 MPH recorded; damage estimated at $100 million; 262 fatalities. Tide 15 feet above mean sea level (at USGS gage in Westerly). Virtually all the State was without power. Ten percent of electric customers still without power 12 days after hurricane.</td>
</tr>
<tr>
<td>1944</td>
<td>September 14, 1944</td>
<td>Affected Rhode Island and southeastern Massachusetts; $2 million property damage, no loss of life.</td>
</tr>
<tr>
<td>Carol</td>
<td>August 31, 1954</td>
<td>On August 31, 1954, Hurricane Carol swept into Rhode Island with little warning. The result was 19 deaths and $200 million in property damage. The storm center passed to the west of Providence and came at high tide. The central area of Providence was flooded to a depth of 13 feet, and 3,500 cars were inundated in the downtown areas. Hurricane Edna occurred 12 days after Carol, with heavy rain and major river flooding. There were 19 fatalities in New England, $200 million property damage and 13’ flooding. In Providence, wind speed of 90 MPH, with 115 MPH gusts; nearly 3,800 homes destroyed. Tide 12.2 feet above mean seal level (at USGS gage in Westerly). Most of State without power. Four days after storm, approximately 50% had power restored; 90% after seven days.</td>
</tr>
<tr>
<td>Edna</td>
<td>September 11, 1954</td>
<td>Heavy rain and major flooding in the Blackstone River Valley.</td>
</tr>
<tr>
<td>Diane</td>
<td>August 17-20, 1955</td>
<td>In 1955, remnants of the August Hurricane Diane swept over Rhode Island, but its wind velocities were far below hurricane force because of its long inland trip over North Carolina, Virginia, and Pennsylvania. Damage to power lines was high, and at one time 82% of Rhode Island's homes were without electricity. Ample warning permitted people to return home from school and work early, and as a result, only two lives were lost. Property damage amounted to $170 million, most resulting from torrential rains which caused serious river flooding. Heavy rain; Blackstone River crests 15' above normal; $170 million in property damage. Heavy rain and 6' tidal surge; $5 million in property damage; 82% of electric customers lose power.</td>
</tr>
<tr>
<td>Hurricane</td>
<td>Date</td>
<td>Description</td>
</tr>
<tr>
<td>-----------</td>
<td>------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Donna</td>
<td>September 12, 1960</td>
<td>Heavy rain and major flooding in the Blackstone River Valley.</td>
</tr>
<tr>
<td>Esther</td>
<td>September 21, 1961</td>
<td>Heavy shore damage at Sakonnet Point in Little Compton and Misquamicut in Westerly.</td>
</tr>
<tr>
<td>Gloria</td>
<td>September 27, 1985</td>
<td>Two fatalities in New England; property damage estimated at $19.8 million; 8,596 of electric customers lose power an estimated 23,700 people evacuated.</td>
</tr>
<tr>
<td>Bob</td>
<td>August 18, 1991</td>
<td>Southern New England damage at $1.5 billion; 60% of residents across Southeastern New England lost power; 6'-10' storm surge in Narragansett Bay; Two (2) unconfirmed tornadoes in Rhode Island. There were 18 fatalities in Southern New England, although none in Rhode Island.</td>
</tr>
<tr>
<td>Irene</td>
<td>August 27, 2011</td>
<td>Preliminary damage assessment report from FEMA brings the total Public Assistance cost to $9,260,898. Irene knocked down trees and power lines, leaving up to half of Rhode Island residents without power. Gusts of wind up to 71 MPH were reported, and storm surge in Narragansett Bay caused some coastal damage. However, the majority of damage was caused by wind. The storm surge experienced along the coast was generally in the two to four foot range with a high of 4.78 feet at Fox Point in Providence, Rhode Island. The highest sustained windspeed was 54 knots (62 MPH) at the Physical Oceanographic Real Time System station at Conimicut Light in Narragansett Bay, RI.</td>
</tr>
<tr>
<td>Sandy</td>
<td>October 29, 2012</td>
<td>Hurricane Sandy swept through the region in October 2012 leaving significant damage all along the coast. Beaches along Westerly, including Misquamicut, were devastated and almost unrecognizable. More than 122,000 people lost power. It is estimated that more than $39.4 million in support from four federal disaster relief programs is helping RI recover from this disaster, a majority of which is from the NFIP ($31.1 million).</td>
</tr>
</tbody>
</table>

**Winter Weather Hazards**

Winter weather includes heavy snows, ice, and extreme cold can affect Lincoln. A heavy snow is generally defined as having more than 8 inches of accumulation in less than 24 hours. Heavy snow can bring a community to a standstill by inhibiting transportation, knocking down trees and utility lines, and by causing structural collapse in buildings not designed to withstand the weight of the snow. Repair and snow removal costs can be significant and surpass annual municipal salt and snow removal budgets, often before the end of the season. A winter storm warning is issued when snowfall is expected to accumulate more than 4 inches in 12 hours and/or a quarter inch or more of freezing rain accumulation.
The term “ice storm” is used to describe occasions when damaging accumulations of ice are expected during freezing rain situations. Ice storms result from the accumulation of freezing rain, which is rain that becomes super-cooled and freezes upon impact with cold surfaces. Freezing rain most commonly occurs in a narrow band within a winter storm that is also producing heavy amounts of snow and sleet in other locations. If extreme cold conditions are combined with low/no snow cover, the cold can better penetrate downward through the ground and potentially create problems for underground infrastructure as well. When utilities are affected and heaters do not work, water and sewer pipes can freeze and even rupture.

Snow melting poses problems as well, such as road flooding in low-lying areas. Storms can also occur in quick succession with little time to recover from the first storm. Winter weather has resulted in hazardous road conditions, power outages, the closing of schools/businesses, minor accidents and highway travel disruptions. It is important that the Town of Lincoln to be prepared to handle a wide variety of winter storm conditions before snow season begins.

Location
Winter storms are expected every year in the Town of Lincoln. Being the northern communities usually see greater amounts and frequency of snow storms.

Probability of Occurrence
High- The Lincoln HMP Committee agreed that there is a 100% likelihood of a heavy snow or ice storm affecting Lincoln within the next year. Recent history has shown that the Town needs to continue to prepare annually for winter storms.

Extent and Impact
Winter storms can range from a few inches of snow to a coating of ice to a major blizzard. Lincoln is susceptible to all types of winter storms. According to the Rhode Island 2014 Hazard Mitigation Plan, “the impact of a winter storm is primarily measured in terms of the financial costs associated with preparing for, responding to, and recovering from the event. Modeling the relationship between actual financial impact and winter storm magnitude is difficult”. In Lincoln, the impacts of a winter storm vary depending on the storm characteristics. Heavy snow collapses roofs and snarls traffic, ice can bring down power lines and tree branches. During the colder winter months the loss of power due to a winter storm can put many people at risk.

Previous Occurrences
In recent years, Lincoln has more than once been impacted major snow storms which strain public resources. The winter of 2015 produced record snow in Rhode Island. In January 2015, winter storm Juno dropped over 18 inches of snow and created treacherous icing conditions on the roads, forcing the State to implement a driving ban during the worst of the storm. Subsequent storms only added to the snowload as melting was late to occur. Previously, in February 9 2013, Lincoln experienced approximately 24” in accumulation of heavy, wet snow that made removal difficult and highway travel just about impossible during the height of the storm. Tree limbs fell, scattered power outages occurred, transportation systems were disrupted, and schools closed for two days. Another storm that produced snowfall totals of 20+ inches in Lincoln, but had less of an impact, occurred on February 17, 2003. Since this storm fell on Presidents’ Day, most schools were already closed which also resulted in less traffic on the
However, there were still numerous reports of minor accidents. This storm was also a light fluffy snow which resulted in less damage to trees and power lines. Table 6 below provides a history of significant snowstorms for the Providence County area since 2005.

Table 6: Recent Winter Storm History

<table>
<thead>
<tr>
<th>Date</th>
<th>Snowfall (inches)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>February 12, 2006</td>
<td>9-14”</td>
<td>Nor’easter produced heavy snow and gusty winds. New record of 9.4” set at T.F. Green Airport for the date</td>
</tr>
<tr>
<td>February 14, 2007</td>
<td>2-4”</td>
<td>Light icing was reported from a combination of snow, sleet and freezing rain which created hazardous driving conditions</td>
</tr>
<tr>
<td>March 16, 2007</td>
<td>4-7”</td>
<td>Winter storm brought heavy snow and sleet to interior RI before changing to sleet, freezing rain and eventually all rain.</td>
</tr>
<tr>
<td>December 13, 2007</td>
<td>12+”</td>
<td>Snow fell at rates of up to 2” per hour for an 8-10 hour period. Many motorists were affected as early dismissals from work and school just before snow began created rush hour conditions which limited the snowplow’s ability to plow.</td>
</tr>
<tr>
<td>December 19, 2008</td>
<td>10-12”</td>
<td>An intensifying coastal low spread heavy snow across Northern Providence County</td>
</tr>
<tr>
<td>December 31, 2008</td>
<td>4-10”</td>
<td>Fast moving system brought 4-10 inches of snow to the region along with very cold temperatures, strong winds and bitterly cold wind chills</td>
</tr>
<tr>
<td>January 18, 2009</td>
<td>6-7”</td>
<td>No major issues to report with this storm</td>
</tr>
<tr>
<td>March 2, 2009</td>
<td>5-10”</td>
<td>Late season storm affected most of the east coast and resulted in hundreds of flights being cancelled and many car accidents</td>
</tr>
<tr>
<td>December 19, 2009</td>
<td>18-20”</td>
<td>Wide spread snowfall across the region resulted in flight cancellations, school closings and plows that struggled to keep roads clear.</td>
</tr>
<tr>
<td>December 26, 2010</td>
<td>8-12”</td>
<td>Strong winter storm brought heavy snow and strong winds to the area resulting in near blizzard conditions at times.</td>
</tr>
<tr>
<td>January 12, 2011</td>
<td>10-22”</td>
<td>Numerous roof collapses and disruptions to transportation</td>
</tr>
<tr>
<td>January 26, 2011</td>
<td>12-17”</td>
<td>No major issues to report with this storm</td>
</tr>
<tr>
<td>February 9, 2013</td>
<td>24-30”</td>
<td>Fierce winter storm brought blizzard conditions and hurricane force winds resulting with widespread power outages and transportation problems throughout the region.</td>
</tr>
<tr>
<td>January 26, 2015</td>
<td>18+”</td>
<td>Town of Lincoln had near record snowfall and peak wind gusts at 53mph accompanied by icing conditions which made for hazardous roads.</td>
</tr>
</tbody>
</table>

Source: National Climate Data Center

Hailstorms

Description
Hail is a solid form of precipitation consisting of balls or irregular lumps of ice. Hailstorms are associated with severe thunderstorms accompanied by high winds. Hail, if large enough, can cause damage to vehicles and structures.

Location
Most hail does tend to occur in the higher elevations of town which includes Manville and Lime Rock.
Probability of Occurrence
Low- The Lincoln HMP Committee agreed that there is a less than 10% likelihood of a hailstorm affecting Lincoln within the next year. The Committee wanted to include this hazard even though historically, Lincoln has not had many hailstorms.

Extent and Impact
The National Climate Data Center reports several hailstorms that have affected Lincoln in the past with hail ranging in size from 1.00” to 1.75”. Hailstorms are generally localized and brief. Damages may include dented vehicles, broken windows, and damaged crops.

Previous Occurrences
Table 7 below provides a history of significant hailstorms for the Providence County area.

Table 7: History of Hailstorm in Providence County

<table>
<thead>
<tr>
<th>Date</th>
<th>Magnitude (size in inches)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>May 25, 1994</td>
<td>1”</td>
<td>Marble-size hail fell during a thunderstorm</td>
</tr>
<tr>
<td>August 6, 1997</td>
<td>1.5”</td>
<td>Dime size to ping pong size hail fell</td>
</tr>
<tr>
<td>August 10, 2000</td>
<td>1.75”</td>
<td>Golf ball sized hail fell</td>
</tr>
<tr>
<td>June 30, 2001</td>
<td>1”</td>
<td>Severe thunderstorm dropped dime to quarter size hail and downed trees and large branches in the area</td>
</tr>
<tr>
<td>June 20, 2006</td>
<td>.75”</td>
<td>Strong thunderstorm brought penny sized hail to the area</td>
</tr>
<tr>
<td>June 28, 2007</td>
<td>1”</td>
<td>A large and powerful thunderstorm produced nickel to quarter size hail across Northern RI including Woonsocket, Lincoln and Smithfield</td>
</tr>
<tr>
<td>July 2, 2008</td>
<td>.88”</td>
<td>Penny to nickel size hail fell across the area in association with a strong thunderstorm</td>
</tr>
<tr>
<td>May 7, 2011</td>
<td>.88</td>
<td>Penny to nickel size hail fell across the area in association with a strong thunderstorm</td>
</tr>
<tr>
<td>July 18, 2012</td>
<td>1”</td>
<td>Severe damage to vehicles and large branches down</td>
</tr>
</tbody>
</table>

Source: National Climate Data Center

Flood Related Hazards

<table>
<thead>
<tr>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flooding typically results from a large weather systems generating prolonged rainfall or on-shore winds. Other causes of flooding include locally intense thunderstorms, snowmelt, ice jams, and dam failures. The excessive rainfall accumulates within a body of water and overflows onto the adjacent lands. The land adjacent to a water body is referred to as a floodplain. Flash floods are characterized by rapid on-set and high velocity waters, carry large amounts of debris. Floods</td>
</tr>
</tbody>
</table>
are capable of undermining buildings and bridges, eroding shorelines and riverbanks, tearing out trees, washing out access routes, and causing loss of life and injuries (FEMA's Multi-Hazard Identification and Risk Assessment 1997, Chapter/Section Number: Subpart C. Natural Hazards: Hydrologic Hazards, pg. 138).

A flood, which can be slow or fast rising but generally develops over a period of days, is defined by the National Flood Insurance Program (NFIP) as:

- “A general and temporary condition of partial or complete inundation of two or more acres of normally dry land area or of two or more properties from: overflow of inland or tidal waters; unusual and rapid accumulation or runoff of surface waters from any source; or a mudflow; or
- The collapse or subsidence of land along the shore of a lake or similar body of water as a result of erosion or undermining caused by waves or currents of water exceeding anticipated cyclical levels that result in a flood as defined above.”

For the purpose of this plan, flooding related hazards include riverine flooding, flash floods, urban flooding, and dam breaches. Flooding occurs in Lincoln because of excessive runoff from the Blackstone River Watershed, which drains an area of 640 sq. miles. The excessive runoff is a result of heavy rainfall or in combination with snowmelt.

**Location**

Floods occur in all 50 States and in the U.S. territories. Historically, Lincoln has been a flood-prone, inland community in which cultural, historical and economic resources are at risk. The Blackstone River flows south along the northeastern border of Lincoln, and eventually into Narragansett Bay. The area surrounding the Blackstone River contains “AE” flood zones. An AE-zone is an area that would be inundated by a 100-year flood event, but not subject to velocity wave impact. There are several high hazard dams along the Blackstone River in Lincoln as well as other dams located upstream from the Town that pose risks to the Town. See Table 11. (Should future development change the classification of some of the listed dams to high hazard, it will be noted in future plan updates.) There are also several streams and brooks that run through the town that are susceptible to flooding during periods of heavy rain.

**Probability of Occurrence**

High- The Lincoln HMP Committee agreed that there is a 100% likelihood of flooding occurring in Lincoln within the next year. As rain storms become more intense due to climate change and increased build out overland and riverine flooding will continue to be a major concern for the Town.

**Extent and Impact**

Stream gauges can alert weather forecasters when rivers and streams start to rise. There are no stream gauges in Lincoln but stations in nearby Woonsocket and North Smithfield can warn if the Blackstone River begins to rise. It is difficult to accurately determine the extent a rainstorm event would have on the possibility of flooding. A rainstorm that occurs when the ground is still frozen will cause more flooding than if a storm of the same intensity occurred during warmer months. Recent history has shown that in Lincoln, it may not be one storm that causes streams to overflow, but rather successive rain events that saturate the watershed. Flooding that peaks within a few hours before
The likelihood and costs of flooding within the Town of Lincoln has increased over the decades due to increases in real estate development and its associated impervious materials, and climate changes. It is important to point out that there are many natural factors and man-made structures such as dams, that when combined, can cause floods. Therefore, it is important that the Town identifies all of the existing man-made structures that may contribute to flooding events. Once identified, these structures can be analyzed for their structural integrity and functionality.

**Previous Occurrences, Disasters, and Probability of Future Events**

On March 29, 2010, heavy rain caused the Blackstone River to rise to moderate flood level. Several small streams also rose above flood level. Numerous streets within Town were undermined and eroded away. Numerous basements were also flooded. Several town-owned public roadways failed due to the heavy rains. The heavy rains also generated a large amount of tree debris. This public infrastructure was reconstructed with financial help from FEMA. The entire state was impacted by this event and a Presidential Disaster Declaration was made. It is estimated that there were over $26 million in damages. Table 8 below provides a history of significant heavy rain and flooding events for the Providence County area since the last plan update in 2005.

**Table 8: Recent Flood Events**

<table>
<thead>
<tr>
<th>Date</th>
<th>Rainfall (inches)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 7, 2006</td>
<td>2-4”</td>
<td>Coastal storm brought heavy rain which resulted in widespread flooding in Providence County</td>
</tr>
<tr>
<td>March 2, 2007</td>
<td>2-3”</td>
<td>Significant urban flooding reported in Woonsocket, Cumberland and Lincoln where several roads were closed</td>
</tr>
<tr>
<td>March 8, 2008</td>
<td>2-3”</td>
<td>Heavy rain combined with snowmelt resulted in area flooding of roads and some yards</td>
</tr>
<tr>
<td>March 29, 2010</td>
<td>6-9”</td>
<td>Heavy rains, Blackstone River rose to moderate flood levels, several small streams rose above flood level. Numerous streets and basements were flooded across the region with several being undermined and eroding away. The entire state was impacted by this event and a Presidential Disaster Declaration was made. It is estimated that there were over $26 million in damages.</td>
</tr>
<tr>
<td>September 8, 2011</td>
<td>4-6”</td>
<td>A slow moving cold front moved across Southern New England and stalled just south of the area. This front was instrumental in bringing tropical moisture from the remnants of Tropical Storm Lee into New England. A series of shortwaves moved through the northeast during this time period bringing several periods of showers and steady rainfall to parts of Southern New England. Rainfall totals throughout the region over the four days totaled anywhere from two to eight inches, with most areas receiving four to six inches. This resulted in flooding both on the rivers and small streams and in urban areas. The bulk of the flooding in urban areas occurred on Sept. 8 as a band of very heavy rain moved through, dumping up to two inches of rain in an hour to hour and a half in some locations.</td>
</tr>
<tr>
<td>September 2, 2013</td>
<td>Flashflood</td>
<td>A nearly stationary warm front draped across southern New England, coupled with a very moist atmosphere, resulted in</td>
</tr>
</tbody>
</table>
Date | Rainfall (inches) | Comments
--- | --- | ---

showers and thunderstorms across the area for the third day in a row. Heavy rain fell within these showers and storms and flash flooding occurred, particularly over portions of Rhode Island.

Source: National Climate Data Center

**Lightning Storms**

**Description**
Thunderstorms are a common occurrence in this community and the results of lightning strikes can be scattered power outages, house fires, forest fires and damage from trees being struck by lightning.

**Location**
While thunderstorms can be widespread, lightning strikes are very localized. There is not a particular area prone to lightning strikes in Lincoln, however cell towers, antennae, and steeples are susceptible.

**Probability of Occurrence**
High- The Lincoln HMP Committee agreed that there is a 100% likelihood of a lightning strike in Lincoln within the next year. Not all thunderstorms result in cloud to ground lightning strikes but the conditions present themselves enough throughout the year that is a hazard that the Town will continue to prepare for.

**Extent and Impact**
June, July, and August are peak months for lightning activity in the United States. This holds true for the Town of Lincoln. The charge and temperature of each bolt of lightning is different yet each could be lethal or cause damage. In general, buildings are more likely to be struck by lightning if they are located on high ground or if they have tall protrusions such as steeples or poles which the stepped leader can jump to. Electrical and communications utilities are also vulnerable to direct lightning strikes. Damage to these lines has the potential to cause power and communications outages for businesses, residences, and critical facilities (Rhode Island 2014 State Hazard Plan).

**Previous Occurrences**
The National Climate Data Center lists only two significant lightning storms for Lincoln; however, this does not mean that Lincoln is not at risk from the effects of lightning. Table 9 below provides a history of significant lightning storms for the Town of Lincoln.
Table 9: Lightning Events in Lincoln

<table>
<thead>
<tr>
<th>Date</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>May 31, 2002</td>
<td>Lightning struck a house in Lincoln that caused approx. $100,000 in damage</td>
</tr>
<tr>
<td>January 11, 2008</td>
<td>Several locations in the area were without power due to lightning strikes, including the Lincoln Mall</td>
</tr>
<tr>
<td>July 15, 2010</td>
<td>Lightning struck a large tree that splintered causing $10,000 worth of damage to house.</td>
</tr>
<tr>
<td>June 25, 2012</td>
<td>Lightning struck a house causing a fire with $150,000 in damages. The family pet died as a result of the fire</td>
</tr>
<tr>
<td>June 29, 2012</td>
<td>Lightning struck a house hitting the electrical system causing $1,000 in damage</td>
</tr>
</tbody>
</table>

Source: National Climate Data Center and the Town of Lincoln

Earthquakes

Description
The USGS estimates that there is a 40 to 60 percent chance of experiencing an earthquake of magnitude 6.0 or greater on the Richter Scale in the central or eastern United States within the next 30 years.

An earthquake is caused by a sudden displacement within the earth. Displacement at relatively shallow depths may be caused by volcanic eruptions, or even by avalanches. The resultant earthquakes are usually light and do little damage. Strong and destructive earthquakes usually result from the rupturing or breaking of great masses of rocks far beneath the surface of the earth. The ultimate cause of these deep ruptures has not been established. All earthquakes produce both vertical and horizontal ground shaking. This ground movement begins at the focus or hypocenter, deep in the earth, and spreads in all directions. The felt motion is the result of several kinds of seismic vibrations.

Location
Although Rhode Island is not prone to major earthquakes, there have been smaller quakes felt in parts of the state. Most quakes in and around Lincoln are usually only felt as a slight rumble lasting several seconds or less.

Probability of Occurrence
Low- There is very little earthquake activity in Lincoln yet the probability is high enough for the Lincoln HMP Committee to include it in this plan. The Committee agreed that there is a less than 10% chance of a significant earthquake to occur in Lincoln within the year.

Extent and Impact
All earthquakes produce both vertical and horizontal ground shaking. This ground movement begins at the focus or hypocenter, deep in the earth, and spreads in all directions. The felt motion is the result of several kinds of seismic vibrations. The
The magnitude of these vibrations are expressed by a value on the Richter Magnitude Scale. Richter magnitudes are technical quantitatively based calculations that measure the amplitude of the largest seismic wave recorded. Richter magnitudes are based on a logarithmic scale and are commonly scaled from 1 to 8. The higher the magnitude on the Richter Scale, the more severe the earthquake.

Impacts from earthquakes can be severe and cause significant damage. Ground shaking can lead to the collapse of buildings and bridges and disruption of gas and electric lines, phone service, and other critical utilities. Death, injuries, and extensive property damage are possible vulnerabilities from earthquakes. Some secondary hazards caused by earthquakes may include fire, hazardous material release, landslides, flash flooding, avalanches, tsunamis, and dam failure. (RI 2014 State Hazard Mitigation Plan)

Previous Occurrences
The most recent earthquake centered in Rhode Island was on October 7, 2003 in West Warwick. This quake had a magnitude of 1.8 on the Richter Scale. Most quakes that are felt in Rhode Island are not centered in the State, but in surrounding States (see Table 10). Therefore, earthquakes do need to be considered as a hazard to our community but with low priority. Table 10 below provides a history of earthquakes in Rhode Island.

Table 10: History of Earthquake Events

<table>
<thead>
<tr>
<th>Date</th>
<th>Point of Origin</th>
<th>Impact on Rhode Island</th>
</tr>
</thead>
<tbody>
<tr>
<td>February 28, 1925</td>
<td>St. Lawrence River region</td>
<td>Intensity V affects felt on Block Island and in Providence.Intensity IV effects felt in Charlestown</td>
</tr>
<tr>
<td>November 19, 1929</td>
<td>Grand Banks of Newfoundland</td>
<td>Moderate vibrations felt on Block Island, and in Chepachet, Newport, Providence and Westerly</td>
</tr>
<tr>
<td>November 1, 1935</td>
<td>Quebec, Canada</td>
<td>A magnitude of 6.25 with intensity IV felt on Block Island and in Providence and Woonsocket</td>
</tr>
<tr>
<td>December 20 &amp; 24,1940</td>
<td>Lake Ossipee, NH</td>
<td>Intensity V affects knocked pictures off walls in Newport. Intensity IV effects were felt at Central Falls, Pascoag, Providence and Woonsocket. Intensity I-III effects in Kingston, New Shoreham, Wakefield.</td>
</tr>
<tr>
<td>September 4, 1944</td>
<td>Massena, NY</td>
<td>Intensity I-III was reported in Kingston, Lonsdale, Providence, Wakefield and Woonsocket</td>
</tr>
<tr>
<td>October 16, 1963</td>
<td>Coast of Massachusetts</td>
<td>A magnitude 4.5 quake caused Intensity V to be felt in Chepachet with reports of some cracked plaster. There were also reports of rattling windows and dishes and rumbling earth sounds. Other Northern Rhode Island locations felt the tremor, but with less intensity.</td>
</tr>
<tr>
<td>December 7, 1965</td>
<td>Unknown</td>
<td>Windows and doors shook in Warwick and furniture and small objects moved in Bristol.</td>
</tr>
<tr>
<td>February 2, 1967</td>
<td>Unknown</td>
<td>A magnitude 2.4 created intensity V effects in Middletown, Newport, North Kingstown and Jamestown. No damage reported.</td>
</tr>
<tr>
<td>February 3, 1973</td>
<td>Unknown</td>
<td>Explosion like or sonic boom noises were heard throughout Rhode Island and houses and windows shook, but nothing was reported by seismographs.</td>
</tr>
<tr>
<td>June 14, 1973</td>
<td>Western Maine</td>
<td>Intensity IV effects felt at Charlestown and Intensity I-III felt at Bristol, E. Providence, Harmony and Providence</td>
</tr>
<tr>
<td>October 6, 2003</td>
<td>West Warwick</td>
<td>A magnitude of 1.8 caused minor shaking in the community, no damage reported</td>
</tr>
<tr>
<td>Date</td>
<td>Point of Origin</td>
<td>Impact on Rhode Island</td>
</tr>
<tr>
<td>--------------------</td>
<td>-----------------</td>
<td>------------------------------------------------------------</td>
</tr>
<tr>
<td>March 11, 2008</td>
<td>Central Connecticut</td>
<td>Magnitude 2.9. No data reported for Rhode Island</td>
</tr>
<tr>
<td>June 23, 2010</td>
<td>Ontario-Quebec</td>
<td>Magnitude 5.0. Felt throughout Rhode Island.</td>
</tr>
<tr>
<td>August 23, 2011</td>
<td>Rhode Island</td>
<td>Magnitude 0.9. Felt locally</td>
</tr>
<tr>
<td>October 22, 2011</td>
<td>Maine</td>
<td>Magnitude 4.6 Felt locally</td>
</tr>
<tr>
<td>April 4, 2013</td>
<td>Kingston, RI</td>
<td>Small, unknown magnitude. Felt locally</td>
</tr>
</tbody>
</table>

Source: US Geological Survey; Earthquake History of Rhode Island

**Brushfires**

**Description**

A brushfire (smaller than a wildfire) is a natural or human caused uncontrolled burning of vegetative fuel such as grasslands, trees, or woodland. There are many causes of brushfires, from naturally-caused lightning fires to human-caused fires linked to activities such as smoking, campfires, equipment use, and arson. There are three major factors that sustain brushfires and predict a given area’s potential to burn. These factors are fuel, topography and weather.

The following conditions, particularly when combined, can increase the potential for brushfires to occur:

- High temperatures
- Low humidity
- High winds
- Drought
- Lightning

Wind is the most treacherous weather factor. The greater the wind, the faster a fire will spread and the more intense it will be. Undetected, a small brushfire can quickly turn into an uncontrolled fire if there is enough fuel. In addition to wind speed, wind shifts can occur suddenly due to temperature changes or the interaction of wind with topographical features such as slopes or steep hillsides. Drought conditions also contribute to concerns about wildfire vulnerability. During periods of drought, the threat of brushfires increases.

**Location**

Although Lincoln does not have the acreage to sustain large wildfires, brushfires are a risk especially considering the numerous public and private forested areas throughout the Town. The state owned Lincoln Woods State Park is located in Town. This is a dense forested area (approximately 640 acres) with lots of underbrush and only one main road throughout the public park. Another area of concern would be the approximately 60 acres of wooded land on Cobble Hill Road, and the approximately 220 acres on Old River Road surrounding Handy Pond.

**Probability of Occurrence**

Low- There are large forested areas of Lincoln, but the Town does not experience extended periods of drought that would dry the vegetation to fuel large forest fires.
Extent and Impact
Brushfires primarily impacts timber and forest ecosystems, although the threat to nearby buildings is always present. Brushfires in Lincoln are usually small due to the high moisture content in the vegetation. Rhode Island does not experience long periods of drought that produce dry fuel for fires.

Previous Occurrences
There have been no major fires in Lincoln Woods or the other local areas of concern. Due to the low rate of occurrence, the Lincoln LNHMC did not explore mitigation actions that would reduce losses from wildfires. The State however does have an ongoing forestry management program that includes the area of Lincoln Woods and a Fire Department to respond to brushfires.
Section 3.3 Vulnerability

This section focuses on assessing the community’s vulnerability and risk to the effects of natural hazards. This section identifies what areas or resources are at risk, how vulnerable those areas are (e.g., structures, population or natural resources), and what the impacts will be if those areas are affected by a natural disaster (loss of life, environmental damage or inconvenience to residents). This section has been expanded from the last plan to include specific areas of vulnerability as well as their ownership.

“Vulnerability” can be defined as “susceptibility to injury or attack.” Vulnerability indicates what is likely to be damaged by the identified hazards and how severe the damage might be. For example, if an area is determined to be at risk of flooding, vulnerability estimates could include residential property losses, impacts to the tax base and damages to public infrastructure. A vulnerability assessment can help identify weak points within the community. These weak points can later be addressed with future community projects. The vulnerability assessment is often communicated in terms of the number of lives and the value of property in the high risk areas.

The Town of Lincoln’s Hazard Mitigation Committee identified and ranked nine vulnerable areas (local dams, public utilities, local bridges, and local roadways subject to flooding, tree damage, residential homes, schools, public infrastructure, and care facilities). Below is a description of each of the nine vulnerable areas. A risk assessment matrix (Table 16) summarizes these vulnerable areas and the risks associated with them. Section 5 of this plan outlines mitigation actions for these vulnerable areas.

Risk Area #1 – Local Dams

Vulnerability Description: The Town of Lincoln has twenty (20) dams located throughout the Town. Many of these dams were developed during the 1800’s in order to harness water power for the mill complexes in the area. Today, these dams are generally owned and maintained by public entities. However, several of the dams are privately owned.

Natural Hazard: The dams are subject to structural failure that will possibly create flooding hazards downstream. Structural failure of a dam can be caused by intense wind events, earthquakes, and/or heavy rains.

Primary Problems: Structural failure of any one of the dams could cause injury and/or loss of life, damage and/or loss of public infrastructure, environmental damage to the waterbody and downstream of the dam, damage and/or loss to private property downstream of the dams.

Risk Assessment: The Rhode Island Department of Environmental Management (RIDEM) administers and enforces the state-wide Rhode Island Dam Safety Program. The objective of this program is to inspect all dams within the State of Rhode Island to determine their condition, to review and approve plans for construction or substantial alteration of a dam, to order the owner to make repairs or to take other necessary action to make a dam safe.
In accordance with the RI Dam Safety Program, each dam located within the State is inventoried and classified by size and hazard ratings. The size classification provides a relative description of small, medium, or large, based on the storage capacity and height of the impounded water. The hazard classification relates to the probable consequences of failure or misoperation of the dam; it does not relate to the current condition or the likelihood of failure of the dam.

The hazard classifications are defined in the Dam Safety Regulations, as follows:

- **High Hazard** – means a dam where failure or misoperation will result in a probable loss of human life.
- **Significant Hazard** – means a dam where failure or misoperation results in no probable loss of human life but can cause major economic loss, disruption of lifeline facilities or impact other concerns detrimental to the public’s health, safety or welfare.
- **Low Hazard** – means a dam where failure or misoperation results in no probable loss of human life and low economic losses.

Based on the criteria set out in this program, the RIDEM Dam Safety Program has classified ten (10) dams located in Lincoln as high hazard. Table 11 lists all of the dams located within Lincoln according to the RIDEM Dam Safety Program. The table also notes the dam’s classification as well as its ownership.

**Table 11 – Dams located in Lincoln, RI**

<table>
<thead>
<tr>
<th>Name</th>
<th>Classification</th>
<th>Ownership</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lincoln Handy Brook Handy Pond Lower (#390)</td>
<td>Low</td>
<td>Private</td>
</tr>
<tr>
<td>Lincoln Handy Brook Handy Pond Upper (#391)</td>
<td>High</td>
<td>Public/Town</td>
</tr>
<tr>
<td>Lincoln Moshassuck River Butterfly Pond (#097)</td>
<td>High</td>
<td>Public/Town</td>
</tr>
<tr>
<td>Lincoln Moshassuck River Peace Pond (#098)</td>
<td>Low</td>
<td>Private</td>
</tr>
<tr>
<td>Lincoln Moshassuck River Moffett Pond (#099)</td>
<td>High</td>
<td>Private</td>
</tr>
<tr>
<td>Lincoln Moshassuck River Barney Pond (#101)</td>
<td>High</td>
<td>Public/Town</td>
</tr>
<tr>
<td>Lincoln Moshassuck River Bleachery Pond (#104)</td>
<td>High</td>
<td>Private</td>
</tr>
<tr>
<td>Lincoln Moshassuck River Limerock Reserve (#295)</td>
<td>High</td>
<td>Public/Town</td>
</tr>
<tr>
<td>Lincoln Moshassuck River Old Louisquisset Road Pond (#653)</td>
<td>Low</td>
<td>Private</td>
</tr>
<tr>
<td>Lincoln Moshassuck River-Trib Goldfish Pond (#100)</td>
<td>Low</td>
<td>Public/State</td>
</tr>
<tr>
<td>Lincoln Moshassuck River-Trib Bridlewood Pond (#408)</td>
<td>High</td>
<td>Private</td>
</tr>
<tr>
<td>Lincoln Moshassuck River-Trib Bridlewood Upper End (#649)</td>
<td>High</td>
<td>Private</td>
</tr>
<tr>
<td>Lincoln Mussey Brook - Meader Pond (#086)</td>
<td>Low</td>
<td>Private</td>
</tr>
<tr>
<td>Lincoln Mussey Brook – Memorial Park (#465)</td>
<td>Low</td>
<td>Public/Town</td>
</tr>
<tr>
<td>Lincoln Threadmill Brook Olney Pond (#102)</td>
<td>High</td>
<td>Public/State</td>
</tr>
<tr>
<td>Lincoln Threadmill Brook Lincoln Woods Circulation (#607)</td>
<td>Low</td>
<td>Public/State</td>
</tr>
<tr>
<td>Lincoln West River-Trib CCRI Upper (#625)</td>
<td>Low</td>
<td>Public/State</td>
</tr>
<tr>
<td>Lincoln West River-Trib CCRI Lower (#626)</td>
<td>Low</td>
<td>Public/State</td>
</tr>
<tr>
<td>Lincoln West River-Trib Lincoln Downs (#627)</td>
<td>Low</td>
<td>Private</td>
</tr>
<tr>
<td>Lincoln/North Smithfield Crookfall Brook-Woonsocket Reservoir (#070)</td>
<td>High</td>
<td>Public/City</td>
</tr>
</tbody>
</table>

Source – 2013 RIDEM Dam Safety Report
**Mitigation Benefits:** Mitigating the effects of natural hazards on a dam and the surrounding area will decrease the potential for dam failure, reduce the liability from damage to public and private property, and improve overall public safety.

**Risk Area #2 – Public Utilities**

**Vulnerability Description:** The Town of Lincoln has an extensive municipal wastewater collection system which is mainly comprised of approximately 100 miles of gravity sewers and 32 pumping stations. There are 26 submersible pump stations, five dry pit/wet well pump stations, and one screw pump. The submersible pump stations are considered small stations and the dry pit/wet well and screw pump stations are considered major stations. Though the majority of the system was constructed within the last 25 years, the system has been constructed over the past 150 years utilizing a variety of materials, construction methods and design standards. The Town is also serviced by public water lines as well as electric, natural gas, and a regional sanitary sewer collection system. These utilities are generally owned and maintained by public entities. However, there are some privately owned utilities.

**Natural Hazard:** The public utilities and their supporting above ground and below ground infrastructure are subject to floods, wind events, earthquakes, fire, nor’easters, hurricanes, ice storms, and heavy rains.

**Primary Problems:** Damage to the public utilities infrastructure could cause injury and/or loss of life, damage and/or loss to private property, environmental damage, hazardous waste contamination, decrease in public safety, or inconvenience to residents.

**Risk Assessment:** The existing public utilities infrastructure is located through-out the Town. The public utilities infrastructure is exposed to a wide variety of natural hazards. Below is a list of the Town’s sanitary sewer collection system.

**Table 12 – Public Sanitary Pump Stations in Lincoln, RI.**

<table>
<thead>
<tr>
<th>Name</th>
<th>Location</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>1   Lori Ellen</td>
<td>Lori Ellen Drive</td>
<td>Submersible</td>
</tr>
<tr>
<td>2   Angell Road South</td>
<td>Angell Road near Lennon Road</td>
<td>Major</td>
</tr>
<tr>
<td>3   Paddock</td>
<td>Paddock Drive</td>
<td>Submersible</td>
</tr>
<tr>
<td>4   Jason</td>
<td>Jason Drive</td>
<td>Submersible</td>
</tr>
<tr>
<td>5   Sables</td>
<td>Sables Way</td>
<td>Submersible</td>
</tr>
<tr>
<td>6   Rollingwood</td>
<td>Wingate Road</td>
<td>Submersible</td>
</tr>
<tr>
<td>7   Angell Road North</td>
<td>Angell Road between Green Lane &amp; Rosewood Drive</td>
<td>Major</td>
</tr>
<tr>
<td>8   Woodridge</td>
<td>Barbette Drive</td>
<td>Submersible</td>
</tr>
<tr>
<td>9   Davies</td>
<td>Old Louisquisset Pike &amp; Jenckes Hill Road</td>
<td>Submersible</td>
</tr>
<tr>
<td>10  Whitney</td>
<td>Greenwood Lane</td>
<td>Submersible</td>
</tr>
<tr>
<td>11  Belmont</td>
<td>Belmont Drive</td>
<td>Submersible</td>
</tr>
<tr>
<td>12  Heidi</td>
<td>Heidi Road</td>
<td>Submersible</td>
</tr>
<tr>
<td>13  Old Louisquisset Pike</td>
<td>Old Louisquisset Pike near Wilbur Road</td>
<td>Submersible</td>
</tr>
<tr>
<td>14  Middle</td>
<td>Middle Street</td>
<td>Submersible</td>
</tr>
<tr>
<td>15  Mount</td>
<td>Mount Avenue</td>
<td>Submersible</td>
</tr>
<tr>
<td>16  Newland</td>
<td>Newland Ave off Lonsdale Ave</td>
<td>Submersible</td>
</tr>
<tr>
<td>17  Hillside</td>
<td>Hillside Ave off Lonsdale Ave</td>
<td>Submersible</td>
</tr>
<tr>
<td>18  Edgehill</td>
<td>Edgehill Ave at Fairview Ave.</td>
<td>Submersible</td>
</tr>
<tr>
<td>19  Great Road South</td>
<td>596 Great Road</td>
<td>Major</td>
</tr>
<tr>
<td>Name</td>
<td>Location</td>
<td>Type</td>
</tr>
<tr>
<td>---------------</td>
<td>----------------------------------------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>20 Arlington</td>
<td>Arlington Drive</td>
<td>Submersible</td>
</tr>
<tr>
<td>21 Butterfly</td>
<td>East Butterfly Way at Breakneck Hill Road</td>
<td>Submersible</td>
</tr>
<tr>
<td>22 Ashley</td>
<td>Ashley Drive</td>
<td>Submersible</td>
</tr>
<tr>
<td>23 Maria Street</td>
<td>Maria Street</td>
<td>Major</td>
</tr>
<tr>
<td>24 Cider Mill</td>
<td>Cider Mill Lane</td>
<td>Submersible</td>
</tr>
<tr>
<td>25 Applewood</td>
<td>Applewood Lane</td>
<td>Submersible</td>
</tr>
<tr>
<td>26 Lower River Road</td>
<td>Lower River Road</td>
<td>Screw</td>
</tr>
<tr>
<td>27 Great Road North</td>
<td>Great Road @ Route 116</td>
<td>Submersible</td>
</tr>
<tr>
<td>28 Lincoln Center</td>
<td>Amica Way</td>
<td>Submersible</td>
</tr>
<tr>
<td>29 Kirkbrae</td>
<td>Timberland Drive</td>
<td>Major</td>
</tr>
<tr>
<td>30 Oak Hill</td>
<td>Albion Road @ Elbow Rock Road</td>
<td>Submersible</td>
</tr>
<tr>
<td>31 Eagle Nest</td>
<td>Eagle Nest Drive</td>
<td>Submersible</td>
</tr>
<tr>
<td>32 Birchwood</td>
<td>Birchwood Drive @ Sayles Hill Road</td>
<td>Submersible</td>
</tr>
</tbody>
</table>

**Mitigation Benefits:** Mitigating the effects of natural hazards on the existing public utilities infrastructure will protect life and property, decrease the potential for hazardous waste contamination, decrease clean-up costs, reduce the liability from damage to public and private property, and improve overall public safety.

**Risk Area #3 – Local Bridges**

**Vulnerability Description:** Rhode Island Department of Transportation (RIDOT) administers and enforces a state-wide bridge monitoring program. Bridges showing signs of advanced deterioration are often inspected more frequently. These identified bridges are assigned a particular status based on their condition. The program has two status categories that define the condition of the bridges.

A bridge showing signs of advanced deterioration can be assigned the status of “structurally deficient (SD)” if there is elements of the bridge that need to be monitored and/or repaired. It means that this specific bridge must be monitored, inspected and maintained, repaired or replaced at an appropriate time in order to maintain its structural integrity. A bridge assigned as structurally deficient does not imply that it is unsafe. However, these bridges have the potential to be vulnerable to natural hazards.

A bridge can be assigned the status of “functionally obsolete (FO)” if the bridge was built to standards that are not used today. These bridges are not automatically rated as structurally deficient, nor are they inherently unsafe. A functionally obsolete bridge are those that do not meet today’s standards such as lane widths, shoulder widths, or vertical clearances to serve current traffic demand or to meet the current geometric standards, or those that may be occasionally flooded.

There are 22 bridges located within the Town of Lincoln (13 of which are state-owned). The bridge monitoring program has identified six bridges as being structurally deficient and seven bridges as being functionally obsolete. Table 13 lists these bridges. Appendix A presents all of the bridges located within Lincoln.
### Table 13 – State Owned Bridges in Lincoln, RI

<table>
<thead>
<tr>
<th>Bridge ID</th>
<th>Bridge Name</th>
<th>Road Carried</th>
<th>Crossing</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>016301</td>
<td>Albion Trench</td>
<td>School St</td>
<td>Old Worcester &amp; Boston Canal</td>
<td>Functionally Obsolete</td>
</tr>
<tr>
<td>017901</td>
<td>Kelly House</td>
<td>Lower River Rd</td>
<td>Blackstone Canal</td>
<td>Functionally Obsolete</td>
</tr>
<tr>
<td>018801</td>
<td>Reservoir</td>
<td>Rt. 146 Eddie Dowling Hwy</td>
<td>Crookfall Brook</td>
<td>Functionally Obsolete</td>
</tr>
<tr>
<td>021901</td>
<td>Barney’s Pond</td>
<td>Rt. 126 Smithfield Ave</td>
<td>Moshassuck River</td>
<td>Structurally Deficient</td>
</tr>
<tr>
<td>027601</td>
<td>Old Louisquisset Pike</td>
<td>Rt. 146 Eddie Dowling Hwy</td>
<td>Rt. 116 George Washington Hwy</td>
<td>Structurally Deficient</td>
</tr>
<tr>
<td>041601</td>
<td>Breakneck Hill Road</td>
<td>Rt. 123 Breakneck Hill Rd</td>
<td>Rt. 146 Eddie Dowling Hwy</td>
<td>Structurally Deficient</td>
</tr>
<tr>
<td>041701</td>
<td>Twin River Rd</td>
<td>Twin River Rd</td>
<td>Rt. 146 Eddie Dowling Hwy</td>
<td>Structurally Deficient</td>
</tr>
<tr>
<td>049301</td>
<td>Higginson Ave</td>
<td>Higginson Ave</td>
<td>Moshassuck River</td>
<td>Structurally Deficient</td>
</tr>
<tr>
<td>074801</td>
<td>Louisquisset Pike North</td>
<td>I-295 Northbound</td>
<td>Rt. 146 Eddie Dowling Hwy</td>
<td>Functionally Obsolete</td>
</tr>
<tr>
<td>074821</td>
<td>Louisquisset Pike South</td>
<td>I-295 Southbound</td>
<td>Rt. 146 Eddie Dowling Hwy</td>
<td>Functionally Obsolete</td>
</tr>
<tr>
<td>074901</td>
<td>Old River Rd</td>
<td>Rt. 126 Old River Rd</td>
<td>I-295 Northbound &amp; Southbound</td>
<td>Structurally Deficient</td>
</tr>
<tr>
<td>098501</td>
<td>Blackstone River</td>
<td>Rt. 99 Northbound &amp; Southbound</td>
<td>Blackstone River Providence &amp; Worcester RR</td>
<td>Functionally Obsolete</td>
</tr>
<tr>
<td>098701</td>
<td>Rt. 146 Ramp</td>
<td>Rt. 99 Ramp</td>
<td>Rt. 146 Eddie Dowling Hwy</td>
<td>Functionally Obsolete</td>
</tr>
</tbody>
</table>

State Owned Bridges - National Bridge Inventory (NBI)-By Municipality, March 29, 2013

**Natural Hazard:** The local bridges are subject to floods, wind events, earthquakes, fire, Nor’easters, hurricanes, ice storms, and heavy rains.

**Primary Problems:** Damage to local bridges could cause injury and/or loss of life, damage and/or loss to public and private property, disrupt arterial traffic flow and evacuation routes, disrupt local and regional economy, environmental damage, decrease in public safety, or inconvenience to residents.

**Risk Assessment:** The existing local bridges are located along main arterial roadways through-out Town. The local bridges are exposed to a wide variety of natural hazards. The state of repair of these local bridges are either not known sufficiently or known to be cause for concern.

**Mitigation Benefits:** Mitigating the effects of natural hazards on the existing local bridges will protect life and property, reduce the liability from damage to private property, maintain arterial traffic flow and evacuation routes, continue local and regional economy, decrease clean-up costs, and improve overall public safety.
**Risk Area #4 – Local Roadways Subject to Flooding**

**Vulnerability Description:** According to the Town’s 2009 Comprehensive Plan, there are three limited access highways in town that provide major intercity connections north and south of the town. Interstate 295 and Route 146 are both limited access highways with grade separated access points. Route 99 is an extension of Route 146 that also is limited access in design. These arterial roads serve the major commercial and development centers in town. Smaller collector roads provide a connection between arterials and the local road system. Local roads connect to residential neighborhoods and provide access primarily for single and multi-family family homes to connect to the collector and arterial road system.

Any of the roadways that made up the public transportation system within the Town of Lincoln are subject to flooding and have the potential to be vulnerable to natural hazards. The majority of flooding problems within the Town of Lincoln stems from street flooding in poor drainage areas and flooded parking lots in low-lying areas. This is due to a combination of factors, including the inability of combined sewer overflow (CSO) system to handle the runoff during heavy rainfall.

**Natural Hazard:** The local roadways are subject to floods, Nor’easters, hurricanes, ice storms, and heavy rains.

**Primary Problems:** Damage to local roadways could cause injury and/or loss of life, damage and/or loss to private property, disrupt arterial traffic flow and evacuation routes, disrupt local and regional economy, environmental damage, decrease in public safety, or inconvenience to residents.

**Risk Assessment:** The existing local roadways represent main arterial roadways through-out Town. These roadways are exposed to flooding caused by natural hazards.

**Mitigation Benefits:** Mitigating the effects natural hazards could have on the existing local roadways will protect life and property, reduce the liability from damage to private property, maintain arterial traffic flow and evacuation routes, continue local and regional economy, decrease clean-up costs, and improve overall public safety.

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**Risk Area #5 – Tree Damage**

**Vulnerability Description:** Trees are located throughout the Town of Lincoln. These trees are owned and maintained by public and private entities.

**Natural Hazard:** Trees are subject to floods, Nor’easters, hurricanes, ice storms, and heavy rains.

**Primary Problems:** Damage to trees could cause injury and/or loss of life, damage and/or loss to private property, disrupt arterial traffic flow and evacuation routes, disrupt local and regional economy, environmental damage, disrupt communication, cause power outages, decrease in public safety, or inconvenience to residents.
**Risk Assessment:** Trees are located throughout the Town of Lincoln. These trees are owned and maintained by public and private entities. These trees are exposed to a wide variety of natural hazards.

**Mitigation Benefits:** Mitigating the effects natural hazards could have on trees will protect life and property, reduce the liability from damage to private property, maintain arterial traffic flow and evacuation routes, maintain communication and power, protect essential services, continue local and regional economy, decrease clean-up costs, and improve overall public safety.

**Risk Area #6 – Residential Homes**

**Vulnerability Description:** Residential homes are located throughout the Town of Lincoln.

**Natural Hazard:** Residential homes are subject to floods, fires, Nor’easters, hurricanes, wind events, snow storms, ice storms, earthquakes, and heavy rains.

**Primary Problems:** Damage to residential homes could cause economic and social hardships to the residents, injury and/or loss of life, disrupt local and regional economy, or inconvenience to residents.

**Risk Assessment:** Residential homes are located through-out the Town of Lincoln. These homes are exposed to a wide variety of natural hazards.

**Mitigation Benefits:** Mitigating the effects natural hazards could have on residential homes will protect life and property, continue local and regional economy, prevent and/or minimize economic and social hardships, and improve overall public safety.

**Risk Area #7 – Lincoln EMA Involvement**

**Vulnerability Description:** The Town of Lincoln and the School Department each have separate emergency operation plans. A working relationship needs to be developed so the Town and the School Department can capitalize on each other’s resources during a natural hazard.

**Natural Hazard:** All

**Primary Problems:** In efficient use of resources. Privately owned medical facilities and extended care facilities operate independently and in case of a natural hazard, the role of these facilities is unknown. Need to improve the Town’s working relationships of these entities.

**Risk Assessment:** Uncoordinated efforts put the whole Town at risk during an emergency.
Mitigation Benefits: Coordinated efforts improve response and recovery during a hazard event. It also improves planning efforts when all parties know the others’ roles.

Risk Area #8 – Public Infrastructure

Vulnerability Description: Public buildings and the services that are provided from these buildings are located throughout the Town of Lincoln. Table 14 lists the Town owned public buildings located in the Town of Lincoln.

Natural Hazard: Public buildings are subject to floods, fires, Nor’easters, hurricanes, wind events, snow storms, ice storms, earthquakes, and heavy rains.

Primary Problems: Damage to public buildings could cause damage to public infrastructure, disruption of emergency services, injury and/or loss of life, loss of public shelters, disrupt local and regional economy, or inconvenience to residents.

Risk Assessment: Public buildings and the services that are provided from these buildings are located throughout the Town of Lincoln. These public buildings are exposed to a wide variety of natural hazards.

Mitigation Benefits: Mitigating the effects natural hazards could have on public buildings will minimize disruption to emergency services, protect essential public services, protect life and property, maintain public shelters, prevent and/or minimize economic and social hardships, and improve overall public safety.

Table 14 Town Owned Public Buildings located in Lincoln, RI.

<table>
<thead>
<tr>
<th>Building Name</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Albion Fire Station</td>
<td>38 School Street, Albion</td>
</tr>
<tr>
<td>Albion Youth Center</td>
<td>35 School Street, Albion</td>
</tr>
<tr>
<td>Animal Shelter</td>
<td>25 Wellington Road</td>
</tr>
<tr>
<td>Chase Farm</td>
<td>667 Great Road</td>
</tr>
<tr>
<td>Family Literacy Center</td>
<td>12 Parkway, Manville</td>
</tr>
<tr>
<td>Hearthside</td>
<td>677 Great Road</td>
</tr>
<tr>
<td>Lime Rock Fire Station</td>
<td>20 Twin River Road</td>
</tr>
<tr>
<td>Lime Rock Sub Station</td>
<td>1085 Great Road</td>
</tr>
<tr>
<td>Lincoln Highway Garage</td>
<td>94 Old River Road</td>
</tr>
<tr>
<td>Lincoln Public Library</td>
<td>145 Old River Road</td>
</tr>
<tr>
<td>Lincoln Rescue Facility</td>
<td>115 Main Street, Albion</td>
</tr>
<tr>
<td>Lincoln School Administration Bldg.</td>
<td>1624 Lonsdale Ave</td>
</tr>
<tr>
<td>Lincoln Town Hall/Police Dept.</td>
<td>100 Old River Road</td>
</tr>
<tr>
<td>Lincoln Water Commission</td>
<td>96 Old River Road</td>
</tr>
<tr>
<td>Lonsdale Fire Station</td>
<td>224 Front Street</td>
</tr>
<tr>
<td>Manville Fire Station</td>
<td>112 Old Main Street, Manville</td>
</tr>
<tr>
<td>Moffitt Mill</td>
<td>585 Great Road</td>
</tr>
<tr>
<td>Quinnville Fire Station</td>
<td>861 Lower River Road</td>
</tr>
<tr>
<td>Saylesville Fire Station</td>
<td>1 Chapel Street</td>
</tr>
<tr>
<td>The Center</td>
<td>150 Jenckes Hill Road</td>
</tr>
<tr>
<td>Valentine Whitman House</td>
<td>1147 Great Road</td>
</tr>
</tbody>
</table>
Ranked #9 – Care Facilities

**Vulnerability Description:** Town of Lincoln has 2 senior living/memory impairment residences. There are also three public housing facilities (Washington Hills, Lincoln and Manville Manors) for elderly or persons with disabilities.

**Natural Hazard:** These populations are subject to all hazards in Lincoln including heavy rain/floods, fires, Nor’easters, hurricanes, wind events, snow storms, ice storms, and earthquakes.

**Primary Problems:** These special needs populations may have decreased mobility and require special assistance evacuating before an event or getting back home after. They may become house-bound if the roads are blocked.

**Risk Assessment:** Care facilities and the services that are provided from these buildings are located through-out the Town of Lincoln. These facilities are exposed to a wide variety of natural hazards.

**Mitigation Benefits:** Mitigating the effects natural hazards could have on care facilities will protect life and property, prevent and/or minimize economic and social hardships, and improve overall public safety.

### Table 15: Care Facilities

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atria Lincoln Place</td>
<td>Senior Living</td>
<td>612 George Washington Highway</td>
</tr>
<tr>
<td>The Lighthouse at Lincoln</td>
<td>Memory Impairment Residence</td>
<td>425 Albion Road</td>
</tr>
<tr>
<td>Lincoln Manor</td>
<td>Public Housing for Elderly and Disabled</td>
<td>10 Franklin Street</td>
</tr>
<tr>
<td>Manville Manor</td>
<td>Public Housing for Elderly and Disabled</td>
<td>155 Church Street</td>
</tr>
<tr>
<td>Washington Hills</td>
<td>Public Housing for Elderly and Disabled</td>
<td>Wake Robin Road</td>
</tr>
</tbody>
</table>

**a Population at Risk**

The use of mass care facilities during an emergency is dependent on a variety of variables. These variables include warning time, public awareness of the hazard, levels of encouragement from public officials, and the availability of shelters. There is one approved mass care facility located within the Town, which is the town’s Senior Center located at 150 Jenckes Hill Road. This is an approved shelter by the American Red Cross that can operate as a mass care facility and it is not located in a flood zone. Total shelter capacity is 460 people. If required for a large scale disaster, additional shelters at the Community College of Rhode Island on Louisquisset Pike have been identified.

**b Property at Risk**

The 100-year flood (base flood) is an event that has a one-percent probability of happening in any given year and is the storm event used to identify the flood zones which impact zoning and building requirements throughout the Town. The Town of Lincoln has enacted a special “Flood Hazard Overlay District”. The purpose of this overlay
district is to minimize hazards to persons and property from inland flooding, to protect
watercourses from encroachment and to maintain the capacity of floodplains to retain and
carry off floodwaters.

Historically, portions of the Town west of the Blackstone River, experience frequent
street and basement flooding during heavy rains. In addition, businesses along the
Blackstone River have experienced considerable flood damage as a result of their close
proximity to the river. Many of these businesses have developed their own flood
mitigation strategies specific to their building and based on their type of business that
operate within the building.

FEMA lists 242 properties in Lincoln that are insured by the National Flood Insurance
Program (NFIP) with a total value of over $61,837,300 as of March 2015. Only 5 of
which are located in the Special Flood Hazard Area. From 1978 through January 2016,
there were 60 flood claims in Lincoln through the NFIP with over $1,830,000 in total
payments to policyholders. A total of 23 claims on 7 properties located along the banks
of the Blackstone River and throughout Lincoln have experienced repetitive loss due to
river flooding events.

There are 19 structures in Lincoln’s Special Flood Hazard Area. Two industries: Fortune
Metal Inc. of RI and J.A.R. Baker’s Supply are located on Crown Point Road which is
bisected by an AE flood zone. Seven commercially zoned properties, and 3 publically
owned structures are located in the SFHA. Only 3 residential structures (not including
accessory buildings) are located in the SFHA.

In addition to flood hazards, property in Lincoln is also at risk from wind. Wind events
are generally normal for Rhode Island and regularly occur each year. Winter storms and
Nor’easters cause high winds in the winter months and severe thunderstorms are
prevalent in the spring and summer seasons. Tropical events or hurricanes provide high
winds in late summer and fall. Most damage that occurs to property from this hazard is
due mainly to fallen trees and limbs.

c Estimating Potential Losses

According to the 2009 Comprehensive Plan, just over 64% of Lincoln’s tax base is
comprised of residential property. If the Town were to lose a portion of these properties
to a natural hazard, the impact on the tax base could be severe and would be felt by
taxpayers’ town wide. Furthermore, Lincoln has several large employers as well as
smaller businesses which contribute to a large day time population that also patronize the
local businesses. A natural disaster that caused the closure of these businesses for any
length of time could potentially destroy the smaller businesses and put them out of
business permanently and the larger ones may choose to relocate. Business accounts for
approximately 23% of Lincoln’s tax base, which could also have detrimental effects on
the Town as a whole if businesses were lost. For the purpose of this plan, it is difficult to
ascertain the amount of damage caused by a natural hazard because the damage will
depend on the hazard’s extent, location, and severity, making each hazard event
somewhat unique.
Future Development Trends

According to the 2009 Town of Lincoln Comprehensive Plan, Lincoln's overall land use pattern is one that is primarily defined by the transportation system that runs throughout the town. Route 146 runs north to south and divides the eastern and western portions of the town. Interstate 295, a four-lane highway, runs east to west and divides the northern section of the town with the southern section. Route 116 runs parallel to I-295 and creates a corridor of easily accessible land between these two highways, a distance ranging from 1/3 to 1/5 mile. The other major factor that defines the overall pattern of land uses in Lincoln is the Blackstone River flowing north to south. The river makes up the town's eastern-most border with Cumberland and Central Falls.

Route 146 and I-295 provide easy access in all directions for all businesses in Lincoln. These prime locations have proved extremely successful for the town. Industrial development is located primarily along the 295/116 corridors and in the industrial park to the southwest of the Route 116 and Route 146 intersection. Prior to industrial park development, the river was the scene of major industrial development at the turn of the century. Functioning, vacant and reused mills can be found along the Blackstone River in Manville, Albion, Lonsdale and Saylesville.

The early mills built along the river gave birth to the villages of Lincoln: Manville, Albion, Quinnville, Lonsdale and Saylesville. These villages provide higher density housing options and each contains small commercial areas designed to serve immediate needs. In general, the villages are located along the river on the eastern border of the town. Density significantly decreases when moving westward across the town.

The interstates and the excellent highway system in Lincoln not only support modern industrial development but also have turned much of Lincoln into a suburban commuting town. Single-family residential development is the predominant land use form as one moves away from the rivers into the higher land of Lincoln.

As large tracks of land become developed into residential neighborhoods, residential infill development will become more prevalent in Town. In-fill projects usually occur in the denser villages in Town which are located along the Blackstone River. As noted previously in this plan, the Blackstone River is susceptible to flooding events due to a number of factors. The Town’s building permit review and approval process contains a review of the existing zoning including any overlay districts. If a property is identified as being located within one of the Town’s overlay district such as; the Blackstone River Valley overlay district or Flood Hazard overlay district, additional consideration and review of the proposed land use and construction methods are performed on the project. This review is conducted in accordance with the State’s building code.

Community buildout is market driven. The type and concentration of future development will be dictated by the adopted zoning ordinance. Near-term development trends within the Town will remain residential in nature. Small subdivisions of 4 to 10 single family housing units will continue to be developed mainly in the Limerock area of Town. Residential in-fill development of 1 to 2 family housing units will continue to be built as space is made available within the denser villages in Town. As New England’s older
population continues to be among the oldest within the country, the market for age restricted communities is expected to rise. However, many people 65 and over relocate south in the winter months when snow, ice, and the cold weather can create hazards.

Since 2005 (the date of the last approved plan), Lincoln’s vulnerability to natural disasters had not significantly changed. In fact, new developments are in compliance with the updated State building codes and stormwater standards. Due to the 1% increase in population since the last plan update, it’s not quite fair to say that vulnerability has decreased but resiliency has improved due to the careful planning effort of the Town.

e. Preservation of Wetlands
The environmental and economic values of wetlands are endless and becoming more realized over time. Wetlands play an important role in flood control. Wetlands collect and detain flood waters, reducing their force and destructiveness. These benefits are readily apparent in southern states where over fifty percent of wetlands have been eliminated. Wetlands also provide a valuable, natural service regarding water quality. Wetlands absorb and filter pollutants that could otherwise degrade the quality of water in rivers, lakes, and ponds. Wetlands provide necessary spawning/rearing habitat and food supply for freshwater fish. Wetlands also provide the critical habitat for most waterfowl, as well as an enormous diversity of plants and animals. Additional benefits of wetlands include: groundwater recharge, erosion control, land formation, and recreation.

Currently, Lincoln has approximately 2,200 acres of wetlands within the Town. Large concentrations of wetlands can be found in the Lonsdale and Albion sections of Lincoln and include: the old Lonsdale Drive-in and Handy Pond. There are also isolated wetlands and detention basins throughout the Town.

f. Risk Assessment Matrix
The Town of Lincoln Natural Hazard Mitigation Committee reviewed the natural hazards that can impact the town. The committee identified areas in town that are at risk and are vulnerable to costly damage and loss of life. Each vulnerable area has been classified by a risk area and is ranked by which mitigation strategies would produce the most benefits for the community. Below is the revised Risk Assessment Matrix (Table 16).
Table 16 Risk Assessment Matrix

<table>
<thead>
<tr>
<th>Rank</th>
<th>Vulnerable Area</th>
<th>Risk Area</th>
<th>Location</th>
<th>Ownership</th>
<th>Natural Hazard</th>
<th>Primary Problem or Effect</th>
<th>Mitigation Benefits</th>
<th>Risk Historic=H Probable=P</th>
<th>2016 Review</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Local Dams</td>
<td>1</td>
<td>See Table 2</td>
<td>Public and Private</td>
<td>*Flood *Wind Event *Earthquake *Heavy Rain</td>
<td>-Loss of Life and Infrastructure -Damage to property downstream</td>
<td>-Decrease potential for dam failure -Reduce liability for damage to private property -Public Safety</td>
<td>P</td>
<td>Several action items have been addressed prior to this update, but issues still remain. See Actions #1-5.</td>
</tr>
<tr>
<td>2</td>
<td>Public Utilities</td>
<td>2</td>
<td>See Table 3</td>
<td>Public and Private</td>
<td>*Earthquake *Flood *Fire *Hurricane/Nor’easter *Ice Storm *Heavy Rain</td>
<td>-Hazardous waste contamination -Public Safety -Loss/damage of lives and property</td>
<td>-Minimize contamination to residential areas -Decrease costs of cleanup -Public Safety</td>
<td>H</td>
<td>Several action items associated with the Public Sewer System and Public Water System have been implemented. See Actions #6-8.</td>
</tr>
<tr>
<td>3</td>
<td>Local Bridges</td>
<td>3</td>
<td>See Table 4 and Appendix H</td>
<td>Public</td>
<td>**Wind Event *Ice Storm *Hurricane/Nor’easter *Snow Storm *Earthquake *Flood *Fire *Heavy Rain</td>
<td>-Loss of life and infrastructure -Disruption of arterial traffic flow -Economic disruption -Disruption of evacuation routes</td>
<td>-Protection of life and infrastructure -Maintain evacuation routes -Public Safety</td>
<td>P</td>
<td>Since this section is largely handled by RIDOT we will continue to work with them on mitigation actions. See Actions #9-12.</td>
</tr>
<tr>
<td>4</td>
<td>Local Roadways Subject to Flooding</td>
<td>4</td>
<td>Town-wide</td>
<td>Public</td>
<td>*Flooding *Hurricane *Heavy Rain</td>
<td>-Disruption of arterial traffic flow -Disruption of evacuation routes -Damage to private property -Cost of cleanup</td>
<td>-Public Safety -Improve evacuation routes -Reduce liability for damage to private property -Decrease costs of cleanup</td>
<td>H</td>
<td>Drainage issues in several areas were address, however, many other mitigation measures remain. See Actions #13a-16.</td>
</tr>
<tr>
<td>5</td>
<td>Tree Damage</td>
<td>5</td>
<td>Public and Private</td>
<td>*Hurricane</td>
<td>-Power outages</td>
<td>-Enhance communication</td>
<td></td>
<td>H</td>
<td>Ongoing efforts to reduce</td>
</tr>
<tr>
<td>Rank</td>
<td>Vulnerable Area</td>
<td>Risk Area</td>
<td>Location</td>
<td>Ownership</td>
<td>Natural Hazard</td>
<td>Primary Problem or Effect</td>
<td>Mitigation Benefits</td>
<td>Risk Historic=H Probable=P</td>
<td>2016 Review</td>
</tr>
<tr>
<td>------</td>
<td>----------------</td>
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<td>-------------------</td>
<td>---------------------------</td>
<td>-------------</td>
</tr>
<tr>
<td></td>
<td>wide</td>
<td>Private</td>
<td></td>
<td></td>
<td>*Windstorm</td>
<td>-Loss of drinking water, heat, communications</td>
<td>systems</td>
<td></td>
<td>damage from downed trees. See Action #17.</td>
</tr>
<tr>
<td>7</td>
<td>Local EMA</td>
<td>7</td>
<td>Town-wide</td>
<td>Public</td>
<td>All</td>
<td>-Independent response to hazards, -Increased communication breakdown during an event</td>
<td>-Coordinated effort with the School Department, -Coordinated hazard planning effort with the 6 fire districts, -Coordinated efforts with the privately owned medical and extended care facilities.</td>
<td>P</td>
<td>Completed. See Actions #19-21</td>
</tr>
<tr>
<td>8</td>
<td>Public Infrastructure</td>
<td>8</td>
<td>See Table 6</td>
<td>Public</td>
<td>*Wind Event, *Ice Storm, *Hurricane/Nor’easter, *Snow Storm, *Earthquake, *Flood, *Fire, *Heavy Rain</td>
<td>-Damage to infrastructure, -Disruption of emergency services, -Loss/damage of lives and property</td>
<td>-Minimize disruption to emergency services, -Public Safety, -Protection of essential services</td>
<td>P</td>
<td>Some actions have been completed that improve roads and bridges. See Actions #22-23.</td>
</tr>
<tr>
<td>9</td>
<td>Care Facilities</td>
<td>9</td>
<td>See Table 15</td>
<td>Private</td>
<td>*Hurricane, *Wind Event</td>
<td>--Increased vulnerability due to the</td>
<td>-Public safety, -Protect social well-being</td>
<td>P</td>
<td>New Vulnerable Area. See Actions #24.</td>
</tr>
<tr>
<td>Rank</td>
<td>Vulnerable Area</td>
<td>Risk Area</td>
<td>Location</td>
<td>Ownership</td>
<td>Natural Hazard</td>
<td>Primary Problem or Effect</td>
<td>Mitigation Benefits</td>
<td>Risk Historic=H Probable=P</td>
<td>2016 Review</td>
</tr>
<tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>*Ice Storm</td>
<td>population’s reduced mobility</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*Nor’easter</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*Snow Storm</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*Earthquake</td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*Flood</td>
<td></td>
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<td></td>
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<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>*Fire</td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*Heavy Rain</td>
<td></td>
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</tr>
</tbody>
</table>
g. Risk Summary
The town’s vulnerability to natural disasters must be measured in terms of the population, property and natural and economic resources at risk, as well as the probability and magnitude of the event. Since the 2005 version of this plan, the committee reaffirmed the three major areas of vulnerability that the committee feels should continue to be addressed as the Town continues to implement the recommendations of the Comprehensive Plan as well as this plan. The three major areas of vulnerability are: structural integrity of the local dams, protection of the public utilities, and the structural integrity of public bridges located within Town. Actions that will address these areas of vulnerability are listed in Section 5 of this plan.

h. Risk Map
Map 2: Risks in Lincoln. At-risk facilities including structures in the floodplain, emergency response facilities, dams, bridges, and senior living.

Map 2: Risk Areas in Lincoln, RI
h. Vulnerability Changes

The 2005 hazard mitigation plan, “Strategy for Reducing Risks from Natural Hazards in Lincoln, RI” identified some of the same vulnerable areas as this 2016 update. The chart below lists how they have changed.

<table>
<thead>
<tr>
<th>Vulnerable Area</th>
<th>2005 Rank</th>
<th>2016 Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local Dams Subject to Flooding</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Utilities</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Local Bridges</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Local Roads Subject to Flooding</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Tree Damage</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Residential Homes</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Schools</td>
<td>7</td>
<td>-</td>
</tr>
<tr>
<td>Public Infrastructure</td>
<td>8</td>
<td>7</td>
</tr>
<tr>
<td>Extended Care Facilities</td>
<td>9</td>
<td>8</td>
</tr>
<tr>
<td>Medical Facilities</td>
<td>10</td>
<td>-</td>
</tr>
<tr>
<td>Industries in the Floodplain</td>
<td>11</td>
<td>-</td>
</tr>
</tbody>
</table>

The top ranked vulnerable areas have not changed since the last plan update. The 2016 update does not identify schools, medical facilities, and industries in the floodplain as vulnerable areas. The hazard mitigation committee decided not further analyze those areas that were not located in flood hazard zones.

As residential development continues to rise, there will be more structures that are in the path of destructive storms and extreme temperatures. However, anticipated stronger building codes will make homes more resistant to damage. New development has to meet newer, stronger, modern building codes. Exposure stays the same, however vulnerability decreases.
Section 4 Capability Assessment

The Town Lincoln has initiated studies and activities over the years that have laid the foundation for the development of this mitigation strategy. This capability assessment examines the existing studies, plans, programs, and policies that have incorporated hazard mitigation and other pro-active tools into the Town system. The purpose of the capability assessment is to highlight successes, identify shortcomings, and to lay the groundwork for possible improvement. Lincoln recognizes that the inclusion of mitigation initiatives would not only benefit the community by reducing human suffering, damages and the costs of recovery, but would also help build and maintain the sustainability and economic health of the Town. Mitigation planning elements and new maps will be incorporated as necessary during the regular updates or as required. The following details the Town’s existing plans, ongoing programs, and policies.

REGULATIONS & PLANS

The Town of Lincoln enforces Rhode Island State Building Code which incorporates the International Building Code (IBC). The IBC provides comprehensive construction requirements designed to mitigate the impacts from natural hazards, such as high wind events. The 2010 RISBC also requires one foot of freeboard for all new and substantially improved construction in the floodplain. The Code is enforced by the Lincoln Building Department and provides an additional layer of regulatory control to those discussed above.

The Town of Lincoln participates in the State Dam Safety Program because 9 of the 28 high hazard dams within the State are in Lincoln. The State Dam Safety Program was created to facilitate the enforcement of the primary dam inspection law (RIGL 46-19, Inspection of Dams and Reservoirs). RIGL 46-19 states that dam owners are responsible for the safe operation, maintenance, repair, and rehabilitation of a dam, which are the essential elements in preventing dam failure; furthermore, dam owners are liable for the consequences of accidents or failures of their dams. According to the State of Rhode Island 2014 Dam Safety Program Report, the following have been identified as program limitations: unclear ownership of numerous high hazard dams, construction of buildings within inundation areas below dams, lack of funding to repair of remove privately owned dams, inadequate spillway capacities and engineering analyses, lack of Emergency Action Plans across the state, inadequate staffing, increase in rainstorm intensities.

In 1970, the Town developed its first Comprehensive Plan, which was most recently updated in 2009. Lincoln’s Comprehensive Plan identifies actions that can be taken to address increased development pressures, economic stability, open space and recreation issues, and public infrastructure and facilities. It outlines goals, policies, issues, and actions to provide a framework for everyday operations within the Town.

Lincoln has recognized the importance of incorporating mitigation initiatives (both Pre- and Post-Disaster) into the Comprehensive Plan and has adopted the mitigation strategy and planning process into its publicized Town-planning initiatives. Further revisions of the Comprehensive Plan will reflect the mitigation actions set forth in this plan, as well as revisions of such, when setting goals for the Town, which will allow all Town plans to incorporate comprehensive mitigation planning for the Town. Hazard mitigation
identification and activities are expected to be incorporated into the updated Comprehensive Plan update that is currently under way as per State recommendations.

Last updated in 2013, Lincoln’s **Capital Improvement Plan (CIP)** prioritizes public infrastructure projects over the next five years. Actions identified in this tool are reviewed when updating the natural hazard mitigation plan.

The Town recently updated its **Emergency Operations Plan (EOP)**. This plan addresses the response to extraordinary emergency situations associated with natural, man-made, and technological disasters. The Town’s Emergency Operations Plan further addresses pre- and post-disaster strategies to affectively deal with the hazards addressed in this plan such as hurricane and flooding evacuation, public warning and sheltering during natural disasters. Lincoln’s plan combines mitigation, preparedness, response, and recovery. Future revisions of the EOP by the Lincoln Emergency Management department will continue to incorporate mitigation activities; including those listed in the Plan. This plan is reviewed and updated every few years to include changes in policy, new information, or changes in hazard threats.

Lincoln’s **Continuity of Operations Plan (COOP)/Continuity of Government (COG)** plan provides a strategy for uninterrupted essential services to the public, regardless of circumstances. The plan provides an overview of continuity of operations efforts. Departments have further specific plans outlining procedures necessary to maintain essential services on a day-to-day basis.

Lincoln’s **Zoning Ordinance** enforced by the Zoning Department, manages growth and land use. As discussed in Article VIII, Section 260-46 of the Zoning Ordinance, Lincoln’s Flood Hazard Overlay District was created to minimize hazards to persons and property from inland flooding, to protect water courses from encroachment and to maintain the capacity of floodplains to retain and carry off floodwaters.

The **Land Development and Subdivision Regulations**, written and approved by the Planning Board, promotes safety from fire, flood, and other hazards or damages.

Participation in the **National Flood Insurance Program (NFIP)** enables Lincoln residents to purchase flood insurance to protect their property against flood losses. The local NFIP Coordinator (Building Inspector) is available for floodplain management questions and compliance issues.

The Town works regularly with other communities along the Blackstone River, such as Cumberland, Pawtucket, Central Falls and Woonsocket, via **mutual aid agreements**, to protect valuable natural resources and preserve open space along the river which has helped to reduce flooding and pollution risks. Future revisions of this Hazard Mitigation Plan will incorporate mitigation actions that can be jointly undertaken with other communities, such as those listed above, to further protect life and property along the Blackstone River.
ADDITIONAL PROGRAMS AND DEPARTMENTS

The Lincoln Engineering Department reviews development plans, manages Lincoln’s Stormwater Management Plan, investigates Public Works complaints such as drainage, sewers, traffic, etc. The Engineering department in coordination with the Planning Department, is also responsible for GIS data and mapping. This hazard mitigation plan will help prioritize public improvement projects and provide maps highlighting vulnerable areas.

The Planning Department is the lead on the hazard mitigation plan update. Elements from their work on the Comprehensive Plan, and Land Development and Subdivision Regulations Revisions are incorporated into the hazard mitigation plan. Actions as outlined in this hazard mitigation plan will help prioritize the growth and resiliency goals of the community.

Lincoln Public Works Department manages public infrastructure projects including the sewer system, town owned roads, and the municipal tree services. Elements of this hazard mitigation plan will help the public works department prioritize projects and facilitate grant applications for funding. This department is out in the Town every day and offers firsthand experience on vulnerable systems, and infrastructure needs. The Lincoln Public Works Department, in conjunction with National Grid, engage in an ongoing tree-trimming program which reduces the probability of downed utility lines, and reduces storm debris.

Police and Fire Departments in Lincoln ensure the safety and wellbeing of town citizens. As part of the hazard mitigation planning committee, members of the police and fire departments can suggest actions that can improve disaster response. They can also use this plan as guidance when applying for grant funding.

The Lincoln Town Council is comprised of 5 members. These elected members are the governing body by which new plans and policies may be adopted. They take a holistic view of the Town’s operations when formulating policies and exercising town powers. Educating the Town Council members about the importance of hazard mitigation is not only beneficial for the Town’s resiliency but also facilitates plan adoption.
Section 5 Mitigation Actions

In completing the risk and vulnerability analysis, the Lincoln Natural Hazard Mitigation Committee considered projects and actions that would reduce the town’s vulnerability to the identified hazards. The Risk Assessment Matrix presented in Table 16 is the basis for the Mitigation Actions presented in Section 5.4.

The Committee considered the goals of this plan and prioritized the matrix and the associated actions based on historical damage, safety of the population, property protection and consistency with Town-wide goals and objectives presented with the Comprehensive Plan. Since there were no detailed records of past damage in the Town, the Committee used the Hazard Profile Summary to determine what natural event poses the greatest danger to the community and what areas would be affected. Once this was determined, the Committee created the Risk Assessment Matrix and assigned priority to each risk area and associated Mitigation Action. The criteria used to prioritize each Mitigation Action was based on which risk area was most vulnerable with regards to public health risks, evacuation and mass care considerations, disruption of essential services and potential economic losses to the Town.

The following list of actions (organized by risk area) address each identified vulnerability. While some hazards such as hailstorms, lightning, earthquakes, and brushfires are profiled in Section 3, their occurrence and potential damage is low. Therefore the Committee decided to develop actions that met their most vulnerable populations/areas. These areas are subject to change during each plan update.

Section 5.1 Goals

The goals of the proposed actions are to reduce or eliminate long-term risk to people and their property from the effects of natural hazards (i.e. wind, fire, floods, Nor’easters, hurricanes, and earthquakes).

Preventative measures can significantly reduce the cost of post-disaster clean-up. In addition, mitigation actions conducted before hazards occur greatly reduces the impact and costs associated with the aftermath of a natural hazard. By planning ahead, the Town of Lincoln will minimize economic and social disruption that can result from natural hazards (the loss or interruption of jobs and the loss of businesses).

Section 5.2 Methodology

Once all the possible actions are on the table, there must be a way to determine whether they are appropriate measures to solve the identified problems. Using some basic evaluation criteria can help to decide which actions will work best. The most important criterion is whether the proposed action mitigates the particular hazard or potential loss. Each action should also be examined for conflict with other community programs or goals: How does this action impact the environment? It is very important to consider whether the proposed action will meet state and local environmental regulations? Does the mitigation action affect historic structures or archeological areas? Does it help achieve multiple community objectives? Another important issue is timing: How quickly does the action have to take place to be effective? Which actions will produce quick
results? It is particularly important to consider if funding sources have application time limits, if it’s the beginning of storm season, or if the community is in the post-disaster scenario, where everyone wants to recover at maximum speed.

STAPLEE is an acronym for a general set of criteria common to public administration officials and planners. It stands for the Social, Technical, Administrative, Political, Legal, Economic, and Environmental criteria for making planning decisions. The specific applications of these terms are further described as follows:

- **(S) Social:** Is the proposed action socially acceptable to the Community? Are there equity issues involved that would mean that one segment of the Community is treated unfairly? Will the action cause social disruption?

- **(T) Technical:** Will the proposed action work? Will it create more problems than it solves? Does it solve a problem or only a symptom? Is it the most useful action in light of other Community goals?

- **(A) Administrative:** Can the Community implement the action? Is there someone to coordinate and lead the effort? Is there sufficient funding, staff, and technical support available? Are there ongoing administrative requirements that need to be met?

- **(P) Political:** Is the action politically acceptable? Is there public support both to implement and to maintain the project? Will the Mayor, his Cabinet, County Council and other decision-making political bodies support the mitigation measure?

- **(L) Legal:** Is the Community authorized to implement the proposed action? Is there a clear legal basis or precedent for this activity? Is enabling legislation necessary? Are there any legal side effects? (e.g., could the activity be construed as a taking?) Will the Community be liable for action or lack of action? Will the activity be challenged?

- **(E) Economic:** What are the costs and benefits of this action? Does the cost seem reasonable for the size of the problem and the likely benefits? Are maintenance and administrative costs taken into account as well as initial costs? How will this action affect the fiscal capability of the Community? What burden will this action place on the tax base or the local economy? What are the budget and revenue effects of this activity? Does the action contribute to other community goals, such as capital improvements or economic development? What benefits will the action provide?

- **(E) Environmental:** What is the action’s impact on the environment? Does the action promote a sustainable and environmentally healthy community? Does implementation of the action cause temporary or permanent negative impacts on the environment? Does the action result in benefits to the environment? Lincoln Natural Hazard Mitigation Committee selected the STAPLEE criteria as the best method to prioritize mitigation actions, and each of the mitigation strategies was evaluated by utilizing these criteria. The Committee asked and then answered questions in order to determine how acceptable the proposed mitigation action is when being viewed in terms of seven criteria. A numeric score of “1” (indicating poor acceptance), “2” (indicating average acceptance), or “3” (indicating good acceptance) was assigned to each criterion. These numbers were then
toted and developed into an overall priority score. The results of the evaluation are presented in Table 17.

**Table 17. STAPLEE Evaluation of 2016 Mitigation Actions**

<table>
<thead>
<tr>
<th>Proposed Action</th>
<th>S</th>
<th>T</th>
<th>A</th>
<th>P</th>
<th>L</th>
<th>E</th>
<th>E</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Evaluation of Structural Integrity of Dams</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>20</td>
</tr>
<tr>
<td>2. Research Use of Computer Based Models to Simulate Dam Failure</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>14</td>
</tr>
<tr>
<td>3. Establish a Priority List of Dam Repair</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>19</td>
</tr>
<tr>
<td>4. Public Education and Outreach for Downstream Residents</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>15</td>
</tr>
<tr>
<td>5. Improve Existing Conditions of Dams</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>14</td>
</tr>
<tr>
<td>6. Evaluation of Functionality of Local Utilities</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>20</td>
</tr>
<tr>
<td>7. Establish a Priority List for Utilities</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>3</td>
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<tr>
<td>8. Improve Existing Conditions of Local Public Utilities Structures</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>16</td>
</tr>
<tr>
<td>9. Evaluate Structural Integrity of Bridges</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>20</td>
</tr>
<tr>
<td>10. Establish a Priority List for Repairs</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>20</td>
</tr>
<tr>
<td>11. Public Education and Outreach for Bridge Users</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>16</td>
</tr>
<tr>
<td>12. Improve Existing Conditions of Bridges</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>2</td>
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<td>3</td>
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<tr>
<td>13a. Priority List of Street Repair Subject to Flooding</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>20</td>
</tr>
<tr>
<td>13b. Create a Standard to Review Drainage on New Developments/Projects</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>20</td>
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<tr>
<td>14a. Public Education and Outreach for Property Owners along</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>18</td>
</tr>
<tr>
<td>Proposed Action</td>
<td>S</td>
<td>T</td>
<td>A</td>
<td>P</td>
<td>L</td>
<td>E</td>
<td>E</td>
<td>Total</td>
</tr>
<tr>
<td>--------------------------------------------------------------------------------</td>
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</tr>
<tr>
<td>Blackstone River</td>
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</tr>
<tr>
<td>14b. Evaluate Which Properties are Subject to Basement Flooding and Educate Owners</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>19</td>
</tr>
<tr>
<td>14c. Explore Possibility of Acquiring Repetitive Loss Property</td>
<td>3</td>
<td>3</td>
<td>3</td>
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<td>3</td>
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<td>3</td>
<td>21</td>
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<tr>
<td>15. Improve Existing Conditions of Properties and Streets Subject to Flooding From Poor Drainage</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>18</td>
</tr>
<tr>
<td>16. Join Community Rating System</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>3</td>
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<td>17. Continue Working Relationship with Tree Companies</td>
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<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
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<tr>
<td>18a. Public Education and Outreach for Town Residents to Identify Readiness</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>19</td>
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<tr>
<td>18b. Develop and Distribute Educational Pamphlet</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>3</td>
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<tr>
<td>18c. Establish Area on Town Website to Post Fire Rating</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>3</td>
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<td>19</td>
</tr>
<tr>
<td>19. Develop Working Relationship with School Departments</td>
<td>3</td>
<td>3</td>
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<td>3</td>
<td>3</td>
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<td>20. Continue Working with Police and All 6 Fire Districts on Natural Hazard Planning</td>
<td>3</td>
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<td>1</td>
<td>3</td>
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<td>21. Develop Working Relationship with Privately Owed Medical Facilities</td>
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<td>3</td>
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<td>3</td>
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<td>22. Increase Pump Station Functionality</td>
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<td>3</td>
<td>3</td>
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<td>3</td>
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<tr>
<td>23. Improve Electrical Safety of Public Buildings</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>21</td>
</tr>
<tr>
<td>24. Maintain Safety</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>19</td>
</tr>
</tbody>
</table>
The Lincoln Hazard Mitigation Committee determined that the identified objectives can be realized by considering mitigation actions aligned to the following methodology:

- Hazard Mitigation Planning and Regulations
- Property Protection, Structural Projects and Maintenance (acquisition, elevation, flood gates, sewers, repairs)
- Public Information and Outreach, Incentive Programs
- Emergency Services (Protection of Critical Facilities)
- Post Disaster Opportunities

This Committee has worked to set goals and objectives, as defined in the Action Plan (Section 5.3), that are bounded by a time frame and are compatible and consistent with State Hazard Mitigation Goals. The ranges provided are measured from the plan adoption date but are non-binding. The time frame used for this strategy is as follows:

**Short Term:** within 1 year  
**Medium Term:** within 2-3 years  
**Long Term:** 3-5 years

The mitigation actions below are grouped by the identified risk area. The plan documents steps that the Town will take (or has taken) to achieve a specific mitigation action that reduces risk to people or property. While plan approval and adoption is an important component of the process, the Town of Lincoln will continue to implement mitigation strategies to reduce their risks from natural hazards.

### Section 5.3 Previous Actions

The table below lists the actions proposed in the 2005 plan and their current status.

#### Table 18 Status of 2005 Actions

<table>
<thead>
<tr>
<th>Proposed Action</th>
<th>S</th>
<th>T</th>
<th>A</th>
<th>P</th>
<th>L</th>
<th>E</th>
<th>E</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>and Care of Facility Residents</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Risk Area 1: Dams</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Evaluation of Structural Integrity of Dams</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>Completed</strong></td>
</tr>
<tr>
<td>2. Research Use of Computer Based Models to Simulate Dam Failure</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>On Hold</strong></td>
</tr>
<tr>
<td>3. Establish a Priority List of Dam Repair</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>Completed</strong></td>
</tr>
<tr>
<td>4. Public Education and Outreach for Downstream Residents</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>Not Completed</strong></td>
</tr>
<tr>
<td>5. Improve Existing Conditions of Dams</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>Not Completed</strong></td>
</tr>
</tbody>
</table>
## Actions in 2005 Plan

<table>
<thead>
<tr>
<th>Risk Area 2: Public Utilities</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>6. Evaluation of Functionality of Local Utilities</td>
<td>Completed</td>
</tr>
<tr>
<td>7. Establish a Priority List for Utilities</td>
<td>Completed</td>
</tr>
<tr>
<td>8. Improve Existing Conditions of Local Public Utilities Structures</td>
<td>Not Completed</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Risk Area 3: Bridges</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>9. Evaluate Structural Integrity of Bridges</td>
<td>Completed</td>
</tr>
<tr>
<td>10. Establish a Priority List for Repairs</td>
<td>Completed</td>
</tr>
<tr>
<td>11. Public Education and Outreach for Bridge Users</td>
<td>Not Completed</td>
</tr>
<tr>
<td>12. Improve Existing Conditions of Bridges</td>
<td>Not Completed</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Risk Area 4: Streets Prone to Flooding</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>13a. Priority List of Street Repair Subject to Flooding</td>
<td>Completed</td>
</tr>
<tr>
<td>13b. Create a Standard to Review Drainage on New Developments/Projects</td>
<td>Completed</td>
</tr>
<tr>
<td>14a. Public Education and Outreach for Property Owners along Blackstone River</td>
<td>Not Completed</td>
</tr>
<tr>
<td>14b. Evaluate Which Properties are Subject to Basement Flooding and Educate Owners</td>
<td>Not Completed</td>
</tr>
<tr>
<td>14c. Explore Possibility of Acquiring Repetitive Loss Property</td>
<td>Not Completed</td>
</tr>
<tr>
<td>15. Improve Existing Conditions of Properties and Streets Subject to Flooding From Poor Drainage</td>
<td>Not Completed</td>
</tr>
<tr>
<td>16. Join Community Rating System</td>
<td>Completed</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Risk Area 5: Damage from Downed Trees</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>17. Continue Working Relationship with Tree Companies</td>
<td>Completed</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Risk Area 6: Public Education</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>18a. Public Education and Outreach for Town Residents to Identify Readiness</td>
<td>Not Completed</td>
</tr>
<tr>
<td>18b. Develop and Distribute Educational Pamphlet</td>
<td>Not Completed</td>
</tr>
<tr>
<td>18c. Establish Area on Town Website to Post Fire Rating</td>
<td>Not Completed</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Risk Area 7: Lincoln EMA Involvement</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>19. Develop Working Relationship with School Departments</td>
<td>Completed</td>
</tr>
<tr>
<td>20. Continue Working with Police and All 6 Fire Districts on Natural Hazard Planning</td>
<td>Completed</td>
</tr>
<tr>
<td>21. Develop Working Relationship with Privately Owned Medical Facilities</td>
<td>Completed</td>
</tr>
</tbody>
</table>

### Section 5.4 Action Plan

The following mitigation actions use the Risk Assessment Matrix (Table 16) to identify areas at risk, offer mitigation strategies and consider benefits. Each action offers a
discussion of the project and if applicable, includes the options considered. Multiple actions associated with a vulnerable area reflect Town priorities and are simply prioritized high, medium, or low. If known, the actions include cost estimations and assign responsible parties to lead the efforts to complete the action. Other relevant departments/agencies that can offer support to the project are also identified, as well as funding options. The benefit of each action is also listed, which was used to determine the cost vs. benefit when prioritizing each action. The various time frame and priority levels were identified as:

<table>
<thead>
<tr>
<th>Time Frame</th>
<th>Priority Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short Term: within 1 year</td>
<td>High: Reduces the greatest risks, is important to accomplish first</td>
</tr>
<tr>
<td>Medium Term: within 2-3 years</td>
<td>Medium: May need other actions to be completed first</td>
</tr>
<tr>
<td>Long Term: 3-5 years</td>
<td>Low: Less of an impact on safety and property</td>
</tr>
</tbody>
</table>

Since it has been over ten years since Lincoln updated their plan, there are necessary planning elements that need to be completed before additional mitigation actions can be considered. The LNHPC has identified a range of actions below, some of which are planning. However, there is a mitigation action identified for each vulnerable area where applicable.

PLEASE NOTE: Upon review of the actions in the 2005 plan, the LNHMC decided to keep the same action items, noting the status of each. Actions marked complete will be removed in the subsequent natural hazard mitigation plan.

**Risk Area # 1 – Goal: Protect the community from failure of all dams located within the Town (2005 Natural Hazard Mitigation Plan).**

**Existing conditions** - There are a total of twenty (20) dams located throughout town. Several dams exhibit visual signs that they may not be structurally sound and need to be evaluated further to determine the impact to the community if they were to fail. Dams are subject to structural failure that will possibly create flooding hazards downstream.

Structural failure of a dam can be caused by intense wind events, earthquakes, and/or heavy rains. Structural failure of any one of the dams could cause injury and/or loss of life, damage and/or loss of public infrastructure, environmental damage to the waterbody and downstream of the dam, damage and/or loss to private property downstream of the dams.

Mitigating the effects of natural hazards on a dam and the surrounding area, and restoring the overall condition of each dam will decrease the potential for dam failure, reduce the liability from damage to public and private property, and improve overall public safety.

**Action 1 – Evaluation of Structural Integrity of Dams**

Conduct an evaluation of each identified dam in town to determine its structural integrity. The appearance of some of the dams leads us to believe they are in poor condition and susceptible to failure. Therefore a structural evaluation needs to be conducted.
This action falls under the jurisdiction of the Rhode Island Department of Environmental Management (RIDEM) who administers and enforces the state-wide Rhode Island Dam Safety Program. The objective of this program is to inspect all dams within the State of Rhode Island to determine their condition, to review and approve plans for construction or substantial alteration of a dam, to order the owner to make repairs or to take other necessary action to make a dam safe. In accordance with the RI Dam Safety Program, each dam located within the State is inventoried and classified by size and hazard ratings. The hazard classifications are defined in the Dam Safety Regulations, as follows:

- **High Hazard** – means a dam where failure or misoperation will result in a probable loss of human life.
- **Significant Hazard** – means a dam where failure or misoperation results in no probable loss of human life but can cause major economic loss, disruption of lifeline facilities or impact other concerns detrimental to the public’s health, safety or welfare.
- **Low Hazard** – means a dam where failure or misoperation results in no probable loss of human life and low economic losses.

**Action Type:** Planning  
**Priority:** High  
**Responsible Party:** Rhode Island Department of Environmental Management (RIDEM), Army Corps of Engineers,  
**In Coordination With:** Town Administrator, Director of Public Works, Town Engineer, Town’s Capital Development Committee, Town’s Budget Board  
**When:** Continuous Program  
**Benefit:** Decrease potential for dam failure, liability from damage to private property and increased public safety  
**Estimated Cost:** To be determined based on the extent of recommended reconstruction design.  
**Funding Source:** NA

**Action 1 Update: COMPLETED**

Completed by the RIDEM Dam Safety Program in 2007. In 2004, several dams located within the Town were re-classified by the Rhode Island Department of Environmental Management as “High Hazard”. The Town was determined to be the owner of four of these dams. Ultimately, the Town entered into a “Consent Agreement” with RIDEM where the Town was responsible for improving the subject dams in order to comply with State requirements. To date, the Town has invested $1,407,000 into this unanticipated public infrastructure project. Below is a list of the publically and privately owned dams within town that have been reconstructed as of 2013:

- Barney’s Pond Dam was reconstructed in 2012. This dam is now in compliance with the State’s dam regulations,
- Lime Rock Dam was reconstructed in 2011. This dam is now in compliance with the State’s dam regulations,
- Bridlewood Pond Dam, which is owned by a private entity, was inspected by DEM’s engineering consultant in June 2010 and forwarded the report to DEM
in September 2010. The owner also expeditiously addressed the unsafe condition and entered a Consent Agreement with DEM in December 2011 that included monitoring the seepage area for one year. A final monitoring report from the owner’s engineer is expected in 2013.

- Handy Pond Upper Dam received extensive maintenance as specified in a consent agreement with the RIDEM. This dam is now in compliance with the State’s dam regulations; however, the Town is moving forward with exploring reconstruction options. This project would require the hiring of an engineering team with experience in dam construction.

**Future Course of Action** - The town has worked with the RIDEM to determine the dams in the greatest need of repair and a priority list was developed. This list was presented and discussed with the Capital Development Committee (CDC) who annually makes recommendations to the Town regarding capital investments. The Town has been working with the Budget Board to fund these reconstruction projects based on the dams with the greatest needs and the available funding in any particular year.

Butterfly Dam received extensive maintenance as specified in a consent agreement with the RIDEM. The consent agreement specified two options that the Town can do with the dam. One option is to repair the low level gate. The other option is to permanently lower the water level at Butterfly Dam. The Town hired an engineering consultant in August 2013. RIDEM granted approval for the proposed improvements to repair the low level gate in July 2014. The Town intends to have the work constructed in the fall/winter of 2015.

**Action 2 – Research Use of Computer Based Models to Simulate Dam Failure**

a) In order to properly prioritize a dam’s vulnerability to failure and to mitigate a potential dam failure, a simulation of where the water is projected to flow needs to be conducted.
Action Type: Planning
Priority: High
Responsible Party: Lincoln Director of Public Works
In Coordination With: none
When: Short term
Benefit: Protection of life and property
Estimated Cost: No additional costs
Funding Source: Public Works budget

Action 2 Update: ON HOLD

The Town’s GIS consultant said that it is very difficult to simulate a dam failure using existing GIS base dataset and available dam simulation software. The GIS information would need to contain elevation data of a number of features. The GIS consultant reached out to members on her team. She was told that to perform a proper simulation, extensive research would be needed to establish a variety of elevation points surrounding the dam and within the dam basin. There are no current available data that contain this information. Therefore, the Town would have to hire an engineering consultant and land surveyor team to determine these elevation points than input them into a computer program. The cost of a project such as this would be considerable. It was determined by the committee that it was cost prohibit at this point.

Action 3 – Establish a Priority List

a) Evaluate results of structural integrity valuation and rate dams accordingly.

Action Type: Planning
Priority: High
Responsible Party: Lincoln Director of Public Works
In Coordination With: Town Administrator, Town Engineer, Town’s Capital Development Committee, Town’s Budget Board
When: Short term
Benefit: The most vulnerable areas to a dam failure will be ranked
Estimated Cost: Staff time
Funding Source: Public Works budget

Action 3 Update: COMPLETED

Completed by the RIDEM Dam Safety Program in 2007. The RIDEM Dam Safety Program has classified five (5) local dams as high hazard. The town has worked with the RIDEM to determine the dams in the greatest need of repair and a priority list was developed. This list was presented and discussed with the Capital Development Committee (CDC) who annually makes recommends to the Town regarding capital investments. The Town has been working with the Budget Board to fund these reconstruction projects based on the dams with the greatest needs and the available funding in any particular year.
Four of the re-classed dams are publicly owned by the Town while the other high-hazard dam is privately owned.

The five high-hazard Town owned dams are:
1. Lincoln Handy Brook Handy Pond Upper (Handy Pond Dam)
2. Lincoln Moshassuck River Butterfly Pond (Butterfly Pond Dam)
3. Lincoln Moshassuck River Barney Pond (Barney Pond)
4. Lincoln Moshassuck River Limerock Reserve (Manton Dam)
5. Lincoln Moshassuck River-Trib Bridlewood Upper End (Bridlewood Dam)

Table 19 lists all of the dams located within Lincoln according to the RIDEM Dam Safety Program. The table also notes the dam’s classification as well as its ownership.

Table 19: State List of Dams

<table>
<thead>
<tr>
<th>Name</th>
<th>Classification</th>
<th>Ownership</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lincoln Handy Brook Handy Pond Lower (#390)</td>
<td>Low</td>
<td>Private</td>
</tr>
<tr>
<td>Lincoln Handy Brook Handy Pond Upper (#391)</td>
<td>High</td>
<td>Public/Town</td>
</tr>
<tr>
<td>Lincoln Moshassuck River Butterfly Pond (#097)</td>
<td>High</td>
<td>Public/Town</td>
</tr>
<tr>
<td>Lincoln Moshassuck River Peace Pond (#098)</td>
<td>Low</td>
<td>Private</td>
</tr>
<tr>
<td>Lincoln Moshassuck River Moffett Pond (#099)</td>
<td>High</td>
<td>Private</td>
</tr>
<tr>
<td>Lincoln Moshassuck River Barney Pond (#101)</td>
<td>High</td>
<td>Public/Town</td>
</tr>
<tr>
<td>Lincoln Moshassuck River Bleachery Pond (#104)</td>
<td>High</td>
<td>Private</td>
</tr>
<tr>
<td>Lincoln Moshassuck River Limerock Reserve (#295)</td>
<td>High</td>
<td>Public/Town</td>
</tr>
<tr>
<td>Lincoln Moshassuck River Old Louisquisset Road Pond (#653)</td>
<td>Low</td>
<td>Private</td>
</tr>
<tr>
<td>Lincoln Moshassuck River-Trib Goldfish Pond (#100)</td>
<td>Low</td>
<td>Public/State</td>
</tr>
<tr>
<td>Lincoln Moshassuck River-Trib Bridlewood Pond (#408)</td>
<td>High</td>
<td>Private</td>
</tr>
<tr>
<td>Lincoln Moshassuck River-Trib Bridlewood Upper End (#649)</td>
<td>High</td>
<td>Private</td>
</tr>
<tr>
<td>Lincoln Mussey Brook - Meader Pond (#086)</td>
<td>Low</td>
<td>Private</td>
</tr>
<tr>
<td>Lincoln Mussey Brook - Memorial Park (#465)</td>
<td>Low</td>
<td>Public/Town</td>
</tr>
<tr>
<td>Lincoln Threadmill Brook Olney Pond (#102)</td>
<td>High</td>
<td>Public/State</td>
</tr>
<tr>
<td>Lincoln Threadmill Brook Lincoln Woods Circulation (#607)</td>
<td>Low</td>
<td>Public/State</td>
</tr>
<tr>
<td>Lincoln West River-Trib CCRI Upper (#625)</td>
<td>Low</td>
<td>Public/State</td>
</tr>
<tr>
<td>Lincoln West River-Trib CCRI Lower (#626)</td>
<td>Low</td>
<td>Public/State</td>
</tr>
<tr>
<td>Lincoln West River-Trib Lincoln Downs (#627)</td>
<td>Low</td>
<td>Private</td>
</tr>
<tr>
<td>Lincoln/North Smithfield Crookfall Brook-Woonsocket Reservoir (#070)</td>
<td>High</td>
<td>Public/City</td>
</tr>
</tbody>
</table>

Source – 2013 RIDEM Dam Safety Report and RIDEM Dam Inventory

Action 4 – Public Education and Outreach

a) In the event that the dam is found to be structurally compromised, educate those individuals within the path of the water flow on how they can protect themselves and seek shelter.

Action Type: Public Education and Awareness
Priority: Medium
Responsible Party: Lincoln Emergency Management Director
In Coordination With: Natural Hazard Mitigation Committee, Lincoln Emergency Management Agency (LEMA)
When: After results of dam evaluation
Benefit: Protection of life and property
Estimated Cost: $5,000
Funding Source: Emergency Management budget

Action 4 Update: NOT COMPLETE

No action taken since 2005

Action 5 – Improve Existing Conditions of Dams

Following RIDEM’s visual inspections (every 2 years for high hazard dams, and every 5 years for significant and low hazard dams), improve structural integrity of dams if unsafe conditions exist.

Action Type: Mitigation/Property Protection
Priority: Medium
Responsible Party: Director of Public Works
In Coordination With: Lincoln Emergency Management Director, Hazard Mitigation Committee, Lincoln Emergency Management Agency (LEMA), Department of Public Works, Town Administrator, Town’s Capital Development Committee, Town’s Budget Board
When: After results of dam evaluation
Resources available: FEMA, Army Corps of Engineers, Rhode Island Department of Environmental Management (RIDEM), RIEMA, private engineering companies
Benefit: Protection of life and property, reduce liability, increase public safety
Estimated Cost: Varies. There are currently no dams that are unsafe. The town has worked with the RIDEM to determine the dam in the greatest need of repair. A priority list was developed. This list was presented and discussed with the Capital Development Committee (CDC) who annually makes recommendations to the Town regarding capital investments. The Town has been working with the Budget Board to fund these reconstruction projects based on the dams with the greatest needs and the available funding in any particular year.
Funding Source: Town Public Works

Action 5 Update: NOT COMPLETE

[This is an ongoing Town capability and will be moved to the Capabilities section in the next plan update unless there are specific dams that need to be fixed.]

Barney’s Pond Dam was reconstructed in 2012. This dam is now in compliance with the State’s dam regulations.

Limerock Reserve (Manton Dam) was reconstructed in 2011. This dam is now in compliance with the State’s dam regulations.
Handy Pond Upper Dam received extensive maintenance as specified in a consent agreement with the RIDEM. This dam is now in compliance with the State’s dam regulations.

Butterfly Dam received extensive maintenance as specified in a consent agreement with the RIDEM. The consent agreement specified two options to bring the dam into compliance with the State’s dam regulations. One option is to repair the low level gate. The other option is to permanently lower the water level at Butterfly Dam. The Town hired an engineering consultant in August 2013. RIDEM granted approval for the proposed improvements to repair the low level gate in July 2014. The Town intends to have the work constructed in the fall/winter of 2015.

Bridlewood Pond Dam, which is owned by a private entity, was inspected by DEM’s engineering consultant in June 2010 and forwarded the report to DEM in September 2010. The owner also expeditiously addressed the unsafe condition and entered into a Consent Agreement with DEM in December 2011 that included monitoring the seepage area for one year. A final monitoring report from the owner’s engineer was submitted to DEM in June 2013, which indicated that the dam was returned to a safe condition. The Consent Agreement was closed in June 2013.

Risk Area # 2 – Goal: Protect the community from a failure of Town-wide public utilities (2005 Natural Hazard Mitigation Plan).

Existing conditions – Public utilities have the potential to adversely impact several neighborhoods if they were to fail. Potentially millions of dollars in property damages and risks to lives would result from a failure. The entire Town of Lincoln is serviced by public water, sewer, gas, and electric. The town currently has 32 sewer pumping stations, four public water storage tanks, and regional electric, gas, and regional sewer mains throughout the town. The Town of Lincoln is responsible for the local public sanitary
sewer (wastewater) system. The Narragansett Bay Commission (NBC), a quasi-state agency, owns and operates several sewage interceptors that connect to the local system and ultimately carry the majority of the town’s wastewater to their Bucklin Point facility. Wastewater from the southwestern portion of town goes to the NBC’s Field’s Point Facility. The NBC also owns and operates three pump stations; two of which are located in town. These pump stations include Saylesville Pump Station and Washington Highway Pump Station. The Lincoln Water Commission, a quasi-municipal agency, operates the local public water system distribution system. Drinking water from all sources is delivered to the consumers in Lincoln through a distribution system that includes five (5) pumping stations, five (5) storage tanks, and 133 miles of pipes. Water services to each building include a connection to the main pipe, a shut-off valve, and a water meter. Water is available for firefighting through more than one thousand public and private fire hydrants. The Lincoln Water Commission maintains pipeline connections with the surrounding communities of Woonsocket, Cumberland, and Pawtucket to provide water in case of emergencies or during periods of high demand. No water was provided by these sources in 2013.

National Grid is responsible for delivering natural gas and electricity throughout town. While regional gas, electric, and sewer utilities are regularly maintained by the entities that own them, the Town’s public utility infrastructure is maintained as needed. This plan will address the responsibilities of the local entities to protect the community from a failure of town-wide public utilities.

**Action 6 – Evaluation of Functionality of Local Utilities (Sewer, Water, Electricity, Gas)**

Conduct an evaluation of local utilities to determine functionality – High priority. Due to age of the systems, it is suspect that their potential to fail may be high.

- **Action Type**: Planning/Property Protection
- **Priority**: High
- **Responsible Party**: Lincoln Director of Public Works, Lincoln Water Commission
- **In Coordination With**: Department of Public Works/Engineering, regional utility companies
- **When**: Short term and future capability
- **Resources**: Town, private engineering companies
- **Benefit**: Ensure continued use of essential utilities during an event
- **Estimated costs**: Staff time
- **Funding Source**: Public Works budget
- **Funding Source**: NA

**Action 6 Update: COMPLETED**

SEWERS: The evaluation of the functionality of the Town’s Public Sanitary Sewer (Wastewater) System was completed by our Department of Public Works in 2006. This study produced a comprehensive Wastewater Facilities Plan for a 20-year planning period. The plan evaluated the current and anticipated future needs for management of wastewater generated within the Town of Lincoln. Based on the findings of the plan, a
Comprehensive Conditions Survey and Report was completed in September 2011 in which each of the Town’s 32 pump stations were evaluated to identify deterioration or other shortcomings at each station and to recommend the required repairs or rehabilitation.

WATER: The Lincoln Water Commission's Clean Water Infrastructure Plan, which has been approved by the State Department of Health, evaluates water delivery infrastructure and sets priorities for all maintenance and improvement work undertaken in the system. Pumping, storage and distribution are focal points of the plan. Over the last 15 years, the Commission has provided additional storage to the system with the construction of a 1 million gallon high service tank and has inspected, cleaned and repaired its four other tanks. The system's pump stations are not considered part of the long range infrastructure rehabilitation plan; however, normal maintenance on the grounds, buildings, pumps and appurtenant equipment is performed continuously and paid for out of the Commission's annual operating budget. Lastly, the Commission has endeavored to replace or clean and reline its distribution piping focusing on older residential neighborhoods. Project limits are defined by the actual neighborhoods and not individual streets to insure that maximum water quality improvements are realized. More than 60,000 feet of distribution system piping has been rehabilitated over the last six years. Future planned improvements consist of these same types of activities as well as a major storage upgrade at Westwood Road and significant distribution upgrades in Fairlawn.

**Action 7 – Establish a Priority List**

Evaluate results of public utilities study and rate public utilities accordingly.

- **Action Type:** Planning
- **Priority:** Medium
- **Responsible Party:** Lincoln Director of Public Works, Lincoln Water Commission
- **In Coordination With:** Department of Public Works/Engineering
- **When:** Short term and future capability
- **Benefit:** Ensure continued use of essential utilities during an event
- **Estimated costs:** Staff time
- **Funding Source:** NA

**Action 7 Update: COMPLETED**

SEWERS: The Town’s 2006 Wastewater Facilities Plan established the general scope of work and cost estimate for the public sewer system. The 2011 Comprehensive Conditions Survey and Report established a detailed priority list of the Town’s 32 pumping stations.

WATER: The Lincoln Water Commission's Clean Water Infrastructure Plan establishes a priority list of projects that will be completed over a specific time period.

**Action 8 – Improve Existing Conditions of Local Public Utilities System/Structures.**
Based on the results of the public utilities study and subsequent ranking, improve functionality of public utilities’ structures.

**Action Type:** Mitigation/Property Protection  
**Priority:** Medium  
**Responsible Party:** Lincoln Water Commission  
**In Coordination With:** Emergency Management Director, Hazard Mitigation Committee, Lincoln Emergency Management Agency (LEMA), Department of Public Works, Lincoln Water Commission, Town Administrator  
**When:** Medium term - After results of local public utilities’ evaluations  
**Benefit:** Ensure continued use of essential utilities during an event  
**Estimated Cost:** Estimated cost for sewers is $18.5 million over the next 20 years.  
**Funding Source:** State Revolving Fund (SRF) program, Army Corps of Engineers, Rhode Island Department of Environmental Management (RIDEM)

**Action 8 Update: NOT COMPLETE**

**SEWER:** Since the 2011 Comprehensive Conditions Survey and Report Repairs, the Town began a comprehensive repair program for its entire waste water facilities with the goal of improving their overall functionality of the system.

The repairs at the one screw pumping station (Lower River Road Pump Station) includes new pumps and pump controls, a new building enclosure, a new generator, new ventilation and lighting systems and structural maintenance. The repairs to this pumping station were completed in the spring of 2013.

The repairs to the 26 submersible pumping stations commenced in the spring of 2013 and were completed during the summer of 2015. These repairs include replacing pump controls in new stainless steel enclosures, replacing some of the older pumps, improving the electrical controls, and other miscellaneous minor repairs and upgrades.

The repairs at the Town’s five major pumping stations included repairing existing buildings and enclosures, replacing the ventilation systems, dehumidifiers, sump pumps, pump controls, and other equipment, repairing generators, and other miscellaneous minor repairs and upgrades. Construction commenced at two of the five major pumping stations in August 2014. These two pumping stations were prioritized based on their overall condition and volume of wastewater that the stations service. Once complete, the repairs to the remaining three major pumping stations will commence. The repairs to the five major pumping stations are scheduled to be complete by the end of 2016.
Funding for this project was obtained through the State Revolving Fund (SRF) program. The State Revolving Fund (SRF) co-managed by the R.I. Clean Water Finance Agency (RICWFA) and Office of Water Resources, provides below market rate loans for the construction and upgrade of wastewater collection systems & treatment facilities. In fiscal year 2009-2010, the Town Council established a separate sewer enterprise fund for the breakout of revenue, expenses, borrowing, and asset recognition for the maintenance of the town sewer system. The ordinance authorizing the enterprise fund was approved at the meeting of May 19, 2009. The separation allowed for the town to implement the necessary upgrading of the system pumping stations, many of which were failing or in need of substantial repair. Also, state regulations mandate a visual review of all lines in order to prevent groundwater infiltration or to identify damage to lines that will require repair.

WATER: The Lincoln Water Commission's Clean Water Infrastructure Plan, which has been approved by the State Department of Health, evaluates water delivery infrastructure and sets priorities for all maintenance and improvement work undertaken in the system. Pumping, storage and distribution are focal points of the plan. Over the last 15 years, the Commission has provided additional storage to the system with the construction of a 1 million gallon high service tank and has inspected, cleaned and repaired its four other tanks. The system's pump stations are not considered part of the long range infrastructure rehabilitation plan; however, normal maintenance on the grounds, buildings, pumps and appurtenant equipment is performed continuously and paid for out of the Commission's annual operating budget. Lastly, the Commission has endeavored to replace or clean and reline its distribution piping focusing on older residential neighborhoods. Project limits are defined by the actual neighborhoods and not individual streets to insure that maximum water quality improvements are realized. More than 60,000 feet of
distribution system piping has been rehabilitated over the last six years. Future planned improvements consist of these same types of activities as well as a major storage upgrade at Westwood Road and significant distribution upgrades in Fairlawn.

**Risk Area # 3 – Goal:** Protect the community from failure of all bridges located within the Town (2005 Natural Hazard Mitigation Plan).

**Existing conditions** - Although there are several bridges throughout town, most of them are owned and maintained by the Rhode Island Department of Transportation. These bridges are part of the state-wide transportation infrastructure and are located within regional transportation corridors. Failure of one of these bridges would not directly impact property or critical facilities/infrastructure if they were to fail for any reason. However, some of the bridges over the Blackstone River have the potential to jeopardize transportation routes to safety. This plan will only address town owned bridges. In the Town of Lincoln’s case, the town owns only one bridge. This bridge is located at the intersection of Moshassuck Road and Industrial Circle. This bridge provides a short crossing over the River for a very limited amount of travelers of this industrial/commercial area.

**Action 9 – Evaluation of Structural Integrity**

Conduct an evaluation of each identified bridge in town to determine its structural integrity. The evaluation of structural integrity should begin with bridges that cross the Blackstone River and other bridges identified as key transportation routes in case of emergency.

**Action Type:** Planning  
**Priority:** Medium  
**Responsible Party:** Lincoln Director of Public Works, Rhode Island Department of Transportation (RIDOT)  
**In Coordination With:** Department of Public Works, Army Corp of Engineers, Rhode Island Department of Environmental Management (RIDEM), and Rhode Island Department of Transportation (RIDOT)  
**When:** Medium term  
**Resources available:** Army Corps of Engineers, RIDEM, RIDOT, RIEMA, FEMA  
**Benefit:** Ensure continued use of critical infrastructure/evacuation routes during an event  
**Estimated Cost:** Staff time  
**Funding Source:** NA
**Action 9 Update: COMPLETED**

Rhode Island Department of Transportation (RIDOT) is responsible for evaluating the structural integrity of state owned bridges.

The Town of Lincoln has performed visual inspection of the one bridge that the town owns. However, a formal inspection was conducted by the Rhode Island Department of Transportation for the Moshassuck Industrial Highway – ID# 037701 on October 02, 2013.

**Action 10 – Establish a Priority List**

Evaluate results of structural integrity valuation and rate bridges accordingly

- **Action Type:** Planning
- **Priority:** Medium
- **Responsible Party:** Lincoln Director of Public Works, Rhode Island Department of Transportation (RIDOT)
- **In Coordination With:** Department of Public Works, Army Corp of Engineers, Rhode Island Department of Environmental Management (RIDEM), and Rhode Island Department of Transportation (RIDOT)
- **When:** Medium term
- **Benefit:** Ensure continued use of critical infrastructure/evacuation routes during an event
- **Estimated Cost:** Staff time
- **Funding Source:** NA

**Action 10 Update: COMPLETED**

The town owns only one bridge. This bridge is located at the intersection of Moshassuck Road and Industrial Circle.

*Town owned bridge at intersection of Moshassuck Road and Industrial Circle*
Action 11 – Public Education and Outreach

In the event that a bridge is found to be structurally compromised, provide all individuals alternate routes to emergency facilities.

**Action Type:** Public Education and Awareness  
**Priority:** Medium  
**Responsible Party:** Lincoln Emergency Management Director  
**In Coordination With:** Hazard Mitigation Committee, Lincoln Emergency Management Agency (LEMA)  
**When:** Long term and future capability  
**Benefit:** Protection of life, designation of alternate evacuation route  
**Estimated Cost:** $5,000  
**Funding Source:** Emergency Management budget, FEMA HMA

**Action 11 Update: NOT COMPLETE**

No action taken on this item.

Action 12– Improve Existing Conditions of Town-owned Bridge

Based on evaluations and subsequent rankings, improve structural integrity of the bridge over the Woonasquatucket River at Conduit Street.

**Action Type:** Mitigation/Emergency Service Protection/Structural Project  
**Priority:** Medium  
**Responsible Party:** Lincoln Director of Public Works, Rhode Island Department of Transportation (RIDOT)  
**In Coordination With:** Hazard Mitigation Committee, Lincoln Emergency Management Agency (LEMA), Department of Public Works, Army Corp of Engineers, Rhode Island Department of Environmental Management (RIDEM), and Rhode Island Department of Transportation (RIDOT)  
**When:** Long term and future capability  
**Benefit:** Ensure continued use of critical infrastructure/evacuation routes during an event.  
**Estimated Cost:** Approximately $50,000 - $65,000  
**Funding Source:** Emergency Management budget, Army Corps of Engineers, Rhode Island Department of Environmental Management (RIDEM), FEMA HMA

**Action 12 Update: NOT COMPLETE**

No action taken on this item.

**Risk Area # 4 – Goal:** Protect present and future residential and commercial structures and infrastructure subject to flooding (2005 Natural Hazard Mitigation Plan).

**Existing conditions** – Several properties and businesses along the Blackstone River experience minor flooding when the river rises after heavy rain. Some individuals have taken steps to alleviate this problem, but others have not. There are also several areas
where basements and streets flood on a regular basis that need to be evaluated to see what can be done to mitigate the situation.

**Action 13 – Establish a List of Properties and Streets Subject to Flooding From Poor Drainage and Run-Off**

A priority list of streets that are subject to repetitive flooding should be created. Once list is compiled, evaluate what steps can be taken (berms, culverts, drainage, etc.) to alleviate the problem. The list should designate those streets that are part of the Town evacuation route or main transportation routes as priority streets.

Based on the Town’s past experience with private properties subject to flooding, the Building Inspector’s office does not receive a list of private properties that have submitted claims to FEMA. Usually, the home owner does not obtain the required building permits and inspections of the work. One suggestion would be that FEMA requires the home owner to obtain the proper building permits and their corresponding inspections according to the IRC section of the Rhode Island State Building Code. The proper permits and inspections would be required before FEMA pays any claims.

**Action Type:** Planning  
**Priority:** Medium  
**Responsible Party:** Lincoln Director of Public Works  
**In Coordination With:** Emergency Management Director, Hazard Mitigation Committee, Lincoln Emergency Management Agency (LEMA), Department of Public Works, Town Administrator, town’s Capital Development Committee, town’s Budget Board  
**When:** Short term and on-going  
**Benefit:** Ensure continued use of evacuation routes, reduce/eliminate street flooding and clean-up costs  
**Estimated costs:** Staff time  
**Funding Source:** NA

**Action 13a Update: COMPLETED**

**PROPERTIES PRONE TO FLOODING**
- Homes located on the western side of Meadowbrook Road and Foxwood Drive
- Homes located on the eastern side of East Butterfly Way
- Homes located on the southern portion of Steeple Lane
- All structures located within the privately owned Lonsdale Bleachery complex (abuts the Blackstone River) – no public infrastructure systems exist within this complex.
- Homes located on Ballou Avenue

**ROADWAYS AND SURROUNDING AREA PRONE TO FLOOD**
- Area near the intersection of Mussey Brook Road and Old River Road (State Roadway)
- Area near the intersection of Mussey Brook Road and Shady Brook Circle
• Surrounding area located between I-295, Albion Road and Meadowbrook Road and Foxwood Drive
• Surrounding area located between Meeting House Road, Commerce Street, and Blackstone Valley Place
• Area near the intersection of Hidden Valley Lane and Avenue F
• Area at the intersection of Kendall Drive and Old Louisquisset Pike
• Areas along Lantern Road
• Areas along East Lantern Road
• Blackstone Canal from Industrial Circle to Higginson Avenue
• Areas along Arnold Street
• Areas along Earl Street
• Areas along Smith Street
• Areas along Oakwood Avenue
• Areas along Parker Street
• Areas along Hill Avenue
• Intersection of Moshassuck Road and Industrial Circle
• Areas along the Moshassuck River located between Moshassuck Road and Higginson Avenue

PUBLIC INFRASTRUCTURE IN NEED OF REPAIR - CULVERT REPAIRS – DRAINAGE IMPROVEMENTS
• Possible undersized box culvert located under Briarwood Road
• Possible undersized box culvert located under Timberland Drive
• Culverts located along trails surrounding Handy Pond
• Spillway located at the end of Lower River Road needs to be rebuilt with a new gate to control flooding of the Blackstone River
• Drainage improvements along Powder Hill Road
• Drainage improvements at the intersection of Wellington Road and Carol Drive
• Drainage improvements along Longmeadow Road
- Drainage improvements along Angell Road between Lennon Road and Riata Drive
- Drainage system that serves residential house located between River Road and Front Street
- Possible undersized culvert under Woodland Street
- Headwall located on Ballou Avenue needs to be rebuilt to include a trash grate (see picture on following page)
- Drainage improvements along Progress Street
- Drainage Improvements along Grandview Avenue

The Town of Lincoln’s Department of Public Works annually designates and budgets for a number of localized neighborhood projects based on the available funding in the fiscal period. Small projects are usually completed with in-house personnel. Large projects are completed by private contracting companies.

Ballou Avenue headwall in need of repair

a) New developments/projects need to be reviewed with respect to drainage and run-off issues to surrounding areas. Establish a standard to review not just the proposed development, but the entire surrounding area to evaluate how the development will affect drainage and run-off in surrounding areas when new developments are proposed.
**Action Type:** Prevention  
**Priority:** High  
**Responsible Party:** Lincoln Planning Board, Director of Public Works  
**In Coordination With:** Department of Public Works/Engineering, Town Planner, Technical Review Committee  
**When:** Medium term  
**Benefit:** Protection of property, minimize the creation of new hazard areas  
**Estimated costs:** Staff time  
**Funding Source:** NA

**Action 13b Update: COMPLETED**

The Town of Lincoln has a well-established Technical Review Committee (TRC) that consists of the Town Planner, Town Engineer, Director of Public Works, Lincoln Water Commissioner, and Zoning Official. The TRC reviews all new residential and commercial projects. All projects are reviewed within the context of the surrounding area where the proposed project will be located and make appropriate recommendations to fix the problem areas.

**Action 14 – Public Education and Outreach**

a) Provide property owners along the Blackstone River with literature that illustrates the steps they can take to eliminate the damage caused by rising water from the River.

**Action Type:** Public Education and Awareness  
**Priority:** Medium  
**Responsible Party:** Lincoln Emergency Management Director  
**In Coordination With:** LEMA, Dept. of Public Works/Engineering  
**When:** Medium term and future capability  
**Benefit:** Protection of life and property  
**Estimated costs:** $5,000  
**Funding Source:** Emergency Management budget, FEMA HMA

**Action 14a Update: NOT COMPLETE**

No action taken at this time.

b) Evaluate which properties are subject to reoccurring basement flooding and educate owners as to what measures they can take to eliminate the damage that is caused (installing sump-pumps, elevating furnishings, etc.)

**Action Type:** Planning  
**Priority:** Medium  
**Responsible Party:** Lincoln Emergency Management Director  
**In Coordination With:** LEMA, Fire Districts, Tax Assessor, Town Planner, Buildings Official  
**When:** Short term and future capability  
**Benefit:** Protection of property, reduce/eliminate repetitive damage claims
Estimated costs: $1,000
Funding Source: Emergency Management budget, FEMA HMA

**Action 14b Update: NOT COMPLETE**

No action taken at this time.

c) Explore feasibility of acquiring property that is subject to repetitive loss under the NFIP.

**Action Type:** Property Protection  
**Priority:** High  
**Responsible Party:** Lincoln Emergency Management Director  
**In Coordination With:** LEMA, Tax Assessor, Town Planner, Building Officials  
**When:** Long term  
**Benefit:** Protection of life and property, reduction of claims  
**Estimated costs:** To be determined depending on number of properties  
**Funding Source:** Emergency Management budget, FEMA HMA grants, CDBG-DR.

**Action 14c Update: NOT COMPLETE**

No action taken at this time.

**Action 15 – Improve Existing Conditions of Properties and Streets Subject to Flooding From Poor Drainage and Run-Off**

Based on evaluations and subsequent rankings, improve structural integrity of identified properties and streets subject to flooding from poor drainage and runoff.

**Action Type:** Mitigation/Property Protection  
**Priority:** High  
**Responsible Party:** Lincoln Emergency Management Director  
**In Coordination With:** Hazard Mitigation Committee, Lincoln Emergency Management Agency (LEMA), Public Works  
**When:** Town annual evaluation conducted every fall. Improvements on an as needed basis.  
**Benefit:** Protection of life and property, continued use of evacuation routes  
**Estimated Cost:** $850,000 (annual appropriation for road improvements)  
**Funding Source:** Emergency Management and Public Works budget, FEMA HMA grant, CDBG-DR, Army Corps of Engineers, Rhode Island Department of Environmental Management (RIDEIM), Rhode Island Department of Transportation (RIDOT)

**Action 15 Update: NOT COMPLETE**
The Department of Public Works annually budgets $150,000 for road improvements. This funding amount is usually allocated to unexpected road repairs or localized neighborhood projects described above. However, in 2010, the town began implementing a town wide roadway resurfacing program. A priority list was developed and implementation began in 2011 with a budget of $850,000.

It is the policy of the town to incorporate areas subject to flooding from poor drainage and run-off into all roadway projects. If a particular roadway is identified for resurfacing, the town will carefully examine the surrounding area for signs of flooding. If areas are discovered, a solution to the problem will be incorporated into the roadway resurfacing project and completed as one project. Below is a list of roadways that were recently resurfaced in town.

REPAVED ROADWAYS
- Joyce Anne Road to Blue Mist Drive
- Entire length of Anna Sayles Road
- Entire length of Simon Sayles Road
- Entire length of Cullen Hill Road
- Entire length of Sherman Avenue
- Entire length of Dexter Rock Road
- Entire length of Pat Drive
- Entire length of David Drive
- Holiday Drive section located between David Drive and Pat Drive
- Entire length of Erica Drive
- Entire Length of Hill Avenue – includes drainage improvements
- Entire length of Stoneybridge Drive
- Sections of Red Chimney Drive
- Sections of Rosewood Drive
- Section of Angell Road starting at the intersection of Jenckes Hill Road
- Sections of Maple Avenue
- Section of Angell Road from Drummond Drive to town border
- Section of Cobble Hill Road
- Section of Progress Street between Hill Avenue and Fairmont Avenue – includes drainage improvements
- Section of Parker Street between Smithfield Avenue and Westwood Road – includes drainage improvements
- Section of Olney Avenue starting at Westwood Road running 200 feet south
- Entire length of Westwood Road – includes drainage improvements
- Entire length of Walker Avenue
- Entire length of Boulevard Avenue
- Entire length of Arnold Street – includes drainage improvements and new curbs and sidewalks
- Entire length of Cullen Avenue – includes drainage improvements and new curbs and sidewalks
- Sections of Grove Street from Front Street to Edendale Drive – includes drainage improvements and new curbs and sidewalks
Intersection of Grandview Avenue and Progress Street – Reconstructed in 2012

Arnold Street – Reconstructed in 2013
Action 16 – Join Community Rating System (CRS)

Investigate the actions that are necessary for the Town to join the CRS in order to save residents money on their NFIP premiums. The Town can utilize its GIS for floodplain mapping.

**Action Type:** Prevention  
**Priority:** None  
**Responsible Party:** Lincoln Emergency Management Director  
**In Coordination With:** Planning Department  
**When:** Short term  
**Benefit:** Better floodplain management, helps residents save money  
**Estimated Cost:** Staff time  
**Funding Source:** NA

*Action 16 Update: COMPLETED*

The Town of Lincoln has decided not to join the Community Rating System due to the low number of properties located within the floodplain. The Town feels that the time and personnel requirements of being a member of the CRS outweigh the benefits it could provide to the limited number of properties currently located within the floodplains.
Risk Area # 5 – Goal: Protect all transportation routes from downed trees caused by natural hazards (2005 Natural Hazard Mitigation Plan).

Existing conditions – The Town of Lincoln has continually inspected and maintained trees on public properties. Currently, the Town retains two local companies to remove and maintain damaged trees throughout the year. In the event of a natural hazard, these companies will respond accordingly. This is the main responsibility of the Town’s tree warden.

Action 17 – Continue the Town’s Working Relationship with Tree Companies

a) This contact information should be incorporated and maintained within the Town of Lincoln’s Emergency Operations Plan.

Action Type: Property Protection
Priority: High
Responsible Party: Lincoln Emergency Management Director
In Coordination With: Hazard Mitigation Committee, Lincoln Emergency Management Agency (LEMA), Public Works
When: Short term
Benefit: Reduce loss of electricity/telephones during an event
Estimated Cost: Staff time
Funding Source: NA

Action 17 Update: COMPLETED

The Town continues this practice. It will be moved to Current Capabilities in the next plan update.

Risk Area # 6 – Goal: Educate entire community regarding the natural hazards that can affect our town and how they can protect themselves (2005 Natural Hazard Mitigation Plan).

Existing conditions – Due to the lack of interest on the community’s behalf while creating this document, the committee realized that more needed to be done to engage and prepare the public. It seems that many residents as well as the business community are complacent in regards to what actions they can take to protect themselves in the event of a natural disaster. Although the Town is preparing to install evacuation route signs, other neighboring towns have indicated that their citizens have no idea what they are for and that they lead to the public shelter.

Action 18 – Public Education and Outreach

Design a questionnaire to be posted on the Town website for members of the community to fill in that will evaluate just how prepared our community is and what further education is needed.

Action Type: Public Education and Awareness
Priority: Medium
Responsible Party: Lincoln Emergency Management Director
In Coordination With: LEMA, Hazard Mitigation Committee
When: Short term
Benefit: Protection of life and property, public safety
Estimated costs: $5,000
Funding Source: Emergency Management budget, FEMA HMA

Action 18a Update: NOT COMPLETE

No action taken at this time.

a) From the results of the questionnaire, develop a pamphlet to be distributed to all residents and business owners that describes the natural hazards that threaten our community and steps they can take for each hazard to protect themselves and their property. Evacuation routes and shelter information should be included.

Action Type: Public Education and Awareness
Priority: Medium
Responsible Party: Lincoln Emergency Management Director
In Coordination With: LEMA, Hazard Mitigation Committee
When: Medium term and future capability
Benefit: Protection of life and property, public safety
Estimated costs: $15,000
Funding Source: Emergency Management budget, FEMA HMA

Action 18b Update: NOT COMPLETE

No action taken at this time.

b) Establish area on the Town website to post the daily fire hazard rating (e.g. if very dry it’s a high hazard condition for fire) and encourage residents to check it regularly.

Action Type: Public Education and Awareness
Priority: High
Responsible Party: Lincoln Emergency Management Director
In Coordination With: Fire Departments, RIDEM
When: Short term
Benefit: Help educate residents to forest fire hazard
Estimated costs: Staff time
Funding Source: Emergency Management budget, RIDEM

Action 18c Update: NOT COMPLETE

No action taken at this time.
Risk Area # 7 – Goal: Strengthen the participation in the Lincoln Emergency Management Agency (2005 Natural Hazard Mitigation Plan).

Existing conditions - Currently, the Town of Lincoln and the School Department each have separate emergency operation plans. A working relationship needs to be developed so the Town and the School Department can capitalize on each other’s resources during a natural hazard. Fortunately, the Town’s public safety agencies participate together on the emergency operation plans and have good working relationships and by continuing these relationships, the Town as a whole will be well prepared for an emergency situation. Finally, privately owned medical facilities and extended care facilities operate independently and in case of a natural hazard, the role of these facilities is unknown.

Action 19 – Develop a working relationship with the School Department to incorporate emergency procedures during a natural hazard.

a) Invite School Department representatives to our LEMA Meetings.

Action Type: Public Education and Awareness
Priority: High
Responsible Party: Lincoln Emergency Management Director
In Coordination With: LEMA, Hazard Mitigation Committee
When: Short term
Benefit: Protection of economic/social well-being, protection of life
Estimated costs: Staff time
Funding Source: NA

Action 19 Update: COMPLETED

Due to recent national school events, including a local event where a resident drove into the high school, the School Department and individual department representatives that make up the LNHMC have concentrated their efforts on improving a variety of emergency plans. Each school has undergone a variety of building safety improvements.

Action 20 – Continue working with the Police and all six fire districts on natural hazard planning.

a) Currently, there is no formal training manual outlining emergency procedures. The Town needs to establish a formal training manual for all emergency responders.

Action Type: Public Education and Awareness
Priority: None
Responsible Party: Lincoln Emergency Management Director
In Coordination With: LEMA, Hazard Mitigation Committee, Police Department and All Six Fire Districts
When: On-going
Benefit: Continued public safety communication/coordination
Action 20 Update: COMPLETED

The Town continues to update its Continuity of Operations Plan (COOP) and Emergency Operations Plan (EOP) according to the requirements set out by RIEMA and FEMA. Town has included all of the independent fire districts.

Action 21 – Develop a working relationship with privately owned medical facilities and extended care facilities located within Town.

a) Lincoln’s Emergency Management Agency and Hazard Mitigation Committee should establish contact with these facilities and develop their coordinated responsibilities.

Action Type: Public Education and Awareness
Priority: None
Responsible Party: Lincoln Emergency Management Director
In Coordination With: LEMA, Hazard Mitigation Committee
When: Short Term
Benefit: Protection of life and economic/social well-being
Estimated costs: Staff time
Funding Source: NA

Action 21 Update: COMPLETED

Risk Area # 8 – Reduce the effects of natural hazards on public buildings and services (2005 Natural Hazard Mitigation Plan).

Existing conditions – Public buildings and the services that are provided from these buildings are located throughout the Town of Lincoln. Damage to these buildings could cause a disruption of emergency services, injury and/or loss of life, loss of public shelters, disrupt the local and regional economy, or be an inconvenience to residents.

Action 22 – Increase minor pump station functionality by obtaining a third portable generator to service a failing pump station.

Action Type: Mitigation/Property Protection
Priority: Medium
Responsible Party: Lincoln Director of Public Works
In Coordination With: Town Engineering and Sewer Departments
When: Short Term
Benefit: Protection of property and public health
Estimated costs: $40,000
Funding Source: Public Works budget, FEMA HMA grants

**Action 22 Update: NOT COMPLETED**

Action 23 – Install and maintaining surge protection on critical electronic equipment in emergency response buildings.

**Action Type:** Mitigation/Emergency Services Protection  
**Priority:** High  
**Responsible Party:** Lincoln Director of Public Works  
**In Coordination With:** Town’s Information Technology Department  
**When:** Medium Term  
**Benefit:** Reduce electrical damage to computers and systems used by first responders  
**Estimated costs:** $40 per unit x 100 installations  
**Funding Source:** Public Works budget, FEMA HMA grant

**Action 23 Update: NOT COMPLETED**

Risk Area #9 – **Goal:** Improve the safety of care facility residents (2005 Natural Hazard Mitigation Plan).

Existing conditions – Special needs populations may have decreased mobility and need special assistance evacuating before an event or getting back home after a storm. Fortunately, none of the care facilities are located in the Special Flood Hazard Area, but wind or snow storms could also result in dangerous conditions.

**Action 24 – Increase the number of Lincoln residents enrolled in the RI Special Needs Emergency Registry**

Lincoln’s Emergency Management Agency will promote the State’s Special Needs Registry, created to identify individuals who may require special assistance during emergencies. A letter from the Lincoln Emergency Management Director will be mailed to the administrators of each care facility in town. By enrolling in the program, first responders can appropriately plan for, prepare for, and respond to the needs of the community.

**Action Type:** Mitigation/Public Education and Awareness  
**Priority:** Medium  
**Responsible Party:** Lincoln Emergency Management Director  
**In Coordination With:** RIEMA  
**When:** Short Term  
**Benefit:** Protection of life and improves response efforts  
**Estimated costs:** Staff time  
**Funding Source:** Emergency Management budget

**Action 24 Update: NOT COMPLETED**
Section 6 - Moving Towards a More Resilient Lincoln

While addressing all of the above noted action items will help mitigate the impact of natural hazards, minimize damage to public and private property, reduce deaths, and speed recovery after an event, the availability of public funding will direct which mitigation action item will be implemented by the Town. Fortunately, since the adoption of the 2005 Natural Hazard Mitigation Plan, the Town of Lincoln has been successful in completing several of the noted action items described in Section 5. This progress was due in part to the implementation and funding of the projects outlined in the Town’s Capital Improvement Program and the corresponding annual operating budgets.

The first official Capital Improvement Program (CIP) was adopted by the Town Council on May 20, 2008. This plan established a priority list of projects that the Town will focus on over a five year implementation period. The large capital investment in these projects was made possible through a variety of funding sources such as a $5 million dollar general obligation bond, gaming revenue generated by a host community agreement, impact fees, Financial Town Meeting resolutions, and Federal and State agencies and grant programs.

As the Town moves forward with its capital improvement program, it is important to restate the objectives of any successful CIP. A CIP involves the scheduling of the cost of public infrastructure over several years. It is a valuable municipal tool designed to anticipate and meet the needs of the community, while at the same time spreading the costs in a deliberate approach. The reason for undertaking this overall approach to capital improvement planning is to balance the varying needs of the Town of Lincoln and to assess the needs in comparison to other needs.

In Lincoln, the CIP process is highly organized; the Capital Development Committee (CDC) is the central advisory group that includes all the major municipal agencies. The CDC members include the Town Administrator, members from the Town Council, members from the Budget Board, the Finance Director, the Public Works Director, Town Planner, Assistant to Town Planner, Buildings Superintendent, the School Superintendent, School Business Manager, Director of Public School Buildings, Grounds, & Transportation, and members from the School Committee. Each edition of the Capital Improvement Plan is reviewed and adopted by the Town Council.

The Town updated the CIP in November 2013. This plan prioritized the renovation and addition of the police station as being the highest priority for the Town.
REFERENCES


Flood Insurance Rate Maps for the Town of Lincoln, Rhode Island.


Town of Lincoln Emergency Operations Plan – 2010

U.S. Census Bureau, 2009-2013 American Community Survey
# APPENDIX A – State and Non-State Owned Bridges in the Town of Lincoln

## State Owned Bridges

<table>
<thead>
<tr>
<th>Bridge ID</th>
<th>Bridge Name</th>
<th>Road Carried</th>
<th>Crossing</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>016301</td>
<td>Albion Trench</td>
<td>School Street</td>
<td>Old Worcester &amp; Boston Canal</td>
<td>Functionally Obsolete</td>
</tr>
<tr>
<td>017901</td>
<td>Kelly House</td>
<td>Lower River Road</td>
<td>Blackstone Canal</td>
<td>Functionally Obsolete</td>
</tr>
<tr>
<td>018801</td>
<td>Reservoir</td>
<td>Rt. 146 Eddie Dowling Hwy</td>
<td>Crookfall Brook</td>
<td>Functionally Obsolete</td>
</tr>
<tr>
<td>019501</td>
<td>Front Street</td>
<td>Rt. 123 Front Street</td>
<td>Mill Pond</td>
<td></td>
</tr>
<tr>
<td>021901</td>
<td>Barney’s Pond</td>
<td>Rt. 126 Smithfield Ave</td>
<td>Moshassuck River</td>
<td>Structurally Deficient</td>
</tr>
<tr>
<td>027601</td>
<td>Old Louisquisset Pike</td>
<td>Rt. 146 Eddie Dowling Hwy</td>
<td>Rt. 116 George Washington Hwy</td>
<td>Structurally Deficient</td>
</tr>
<tr>
<td>027621</td>
<td>Old Louisquisset Pike – Ramp</td>
<td>Rt. 146 Northbound Off Ramp</td>
<td>Rt. 116 George Washington Hwy</td>
<td>Structurally Deficient</td>
</tr>
<tr>
<td>041501</td>
<td>Wilbur Road</td>
<td>Wilbur Road</td>
<td>Rt. 146 Eddie Dowling Hwy</td>
<td></td>
</tr>
<tr>
<td>041601</td>
<td>Breakneck Hill Rd</td>
<td>Rt 123 Breakneck Hill Rd</td>
<td>Rt. 146 Eddie Dowling Hwy</td>
<td>Structurally Deficient</td>
</tr>
<tr>
<td>041701</td>
<td>Twin River Road</td>
<td>Twin River Road</td>
<td>Rt. 146 Eddie Dowling Hwy</td>
<td>Structurally Deficient</td>
</tr>
<tr>
<td>041801</td>
<td>Cobble Hill Road</td>
<td>Rt 146 Eddie Dowling Hwy</td>
<td>Cobble Hill Road</td>
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<tr>
<td>049301</td>
<td>Higginson Avenue</td>
<td>Higginson Avenue</td>
<td>Moshassuck River</td>
<td>Structurally Deficient</td>
</tr>
<tr>
<td>074801</td>
<td>Old Louisquisset Pike – North</td>
<td>I-295 Northbound</td>
<td>Rt. 146 Eddie Dowling Hwy</td>
<td>Functionally Obsolete</td>
</tr>
<tr>
<td>074821</td>
<td>Old Louisquisset Pike - South</td>
<td>I-295 Southbound</td>
<td>Rt. 146 Eddie Dowling Hwy</td>
<td>Functionally Obsolete</td>
</tr>
<tr>
<td>074901</td>
<td>Old River Road</td>
<td>Rt. 126 Old River Road</td>
<td>I-295 Northbound &amp; Southbound</td>
<td>Structurally Deficient</td>
</tr>
<tr>
<td>098501</td>
<td>Blackstone River</td>
<td>Rt. 99 Northbound &amp; Southbound</td>
<td>Blackstone River Providence &amp; Worcester RR</td>
<td>Functionally Obsolete</td>
</tr>
<tr>
<td>098601</td>
<td>Sayles Hill Road</td>
<td>Rt. 99 Northbound &amp; Southbound</td>
<td>Sayles Hill Road</td>
<td></td>
</tr>
<tr>
<td>098701</td>
<td>Rt. 146 - Ramp</td>
<td>Rt. 99 Ramp</td>
<td>Rt. 146 Eddie Dowling Hwy</td>
<td>Functionally Obsolete</td>
</tr>
<tr>
<td>098801</td>
<td>Table Rock Road</td>
<td>Table Rock Road</td>
<td>Barney Pond</td>
<td></td>
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</table>

## Non-State Owned Bridges  
(National Bridge Inventory (NBI)-By Municipality  March 29, 2013)

<table>
<thead>
<tr>
<th>Bridge ID</th>
<th>Bridge Name</th>
<th>Road Carried</th>
<th>Crossing</th>
<th>Condition</th>
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<tr>
<td>037701</td>
<td>Moshassuck Industrial Hwy</td>
<td>Moshassuck Road</td>
<td>Moshassuck River</td>
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</tr>
<tr>
<td>076901</td>
<td>Berkeley</td>
<td>Martin Street</td>
<td>Blackstone River</td>
<td>Rebuilt in 2007</td>
</tr>
<tr>
<td>077401</td>
<td>Martin Street Canal</td>
<td>Martin Street</td>
<td>Blackstone Canal</td>
<td>Rebuilt in 2007</td>
</tr>
</tbody>
</table>
APPENDIX B Technical and Financial Assistance for Mitigation

State Resources

Coastal Resources Center
University of Rhode Island
Narragansett Bay Campus
Narragansett, RI 02882
(401) 874-6224

Coastal Resources Management Council
Steadman Government Center
4808 Tower Hill Road
Wakefield, RI 02879
(401) 222-2476

Department of Administration
Division of Statewide Planning
One Capitol Hill
Providence, RI 02908
(401) 222-6478

Department of Environmental Management
Division of Parks and Recreation
2321 Hartford Avenue
Johnston, RI 02919
(401) 222-2635

Department of Transportation-Design
Section/Bridges
2 Capitol Hill, Room 231D
Providence, RI 02903
(401) 222-2053

Rhode Island Builders Association
The Terry Lane Corporation
Terry Lane
Glocester, RI 02814
(401) 568-8006

Rhode Island Department of Business Regulations
233 Richmond Street
Providence, RI 02903
(401) 222-2246

Rhode Island Emergency Management Agency
645 New London Avenue
Cranston, RI 02920
(401) 946-9996

Public Utilities Commission
100 Orange Street
Providence, RI 02903
(401) 222-3500 ext. 153

State Fire Marshal’s Office
272 West Exchange Street
Providence, RI 02903
(401) 222-2335

State of Rhode Island Building Committee Office
Building Commissioner’s Office
One Capitol Hill
Providence, RI 02903
(401) 222-3529

Rhode Island Banking Commission/
Associate Director
233 Richmond Street
Providence, RI 02903
(401) 222-2405
Federal Resources

Federal Emergency Management Agency
Mitigation Division
Region I Office
99 High Street
Boston, MA
(617) 223-9561

U.S. Department of the Interior
National Park Service
Rivers and Trails Conservation Program
Regional Office
15 State Street
Boston, MA 02109
(617) 223-5203

U.S. Army Corps of Engineers
New England District
696 Virginia Road
Concord, MA 01742-2751
(978) 318-8111

U.S. Fish and Wildlife Service
Northeast Regional Office
U.S. Fish and Wildlife Service
300 Westgate Center Drive
Hadley, MA 01035-9587
(413) 253-8200

U.S. Department of Agriculture
Natural Resources Conservation Service
(formerly Soil Conservation Service)
451 West Street
Amherst, MA 01002
(413) 253-4362

U.S. Department of Housing and Urban Development
Community Development Block Grants
Region I - O’Neill Federal Building
10 Causeway Street
Boston, MA 02222
(617) 565-5354

U.S. Department of Commerce
National Weather Service
Forecast Office
445 Myles Standish Boulevard
Taunton, MA 02780
(508) 823-2262

Small Business Administration
10 Causeway Street
Room 265
Boston, MA 02222
(617) 565-5590

Economic Development Administration
Philadelphia Regional Office
The Curtis Center
601 Walnut Street, Suite 140 South
Philadelphia, PA 19106-3323
(215) 597-8822

U.S. Environmental Protection Agency
Region I Offices
5 Post Office Square - Suite 100
Boston, MA 02109-3912
(617) 565 3400

Other Resources

The Association of State Floodplain Managers (ASFPM):
The ASFPM is a professional association with a membership of almost 1,000 state employees that assists communities with the NFIP. ASFPM has developed a series of technical and topical research papers and a series of proceedings from their annual conferences. Many mitigation “success stories” have been documented through these resources and provide a good starting point for planning.
Floodplain Management Resources Center:
The Floodplain Management Resources Center is a free library and referral service of the ASFPM for floodplain management publications. Co-located with the Natural Hazards Center at the University of Colorado in Boulder, staff can use keywords to identify useful publications from the more than 900 flood-related documents in the library.

Institute for Business and Home Safety (IBHS) (formerly Insurance Institute for Property Loss Reduction):
The IBHS is an insurance industry sponsored nonprofit organization dedicated to reducing deaths, injuries and property damage resulting from natural hazards. IBHS efforts are directed at five specific hazards: flood, windstorm, hail, earthquake and wildfire. Through its public education efforts and information center, IBHS communicates the results of its research and statistical gathering, as well as mitigation information, to a broad audience.

Volunteer Organizations:
There are a number of volunteer organizations such as the American Red Cross, the Salvation Army, Habitat for Humanity, Interfaith and the Mennonite Disaster Service, that are often available to help after disasters. Service organization, such as the Lions, Elks and VFW are also available. These organizations have helped others with food, shelter, clothing, money, etc. Habitat for Humanity and the Mennonite Disaster Service provide skilled labor to help rebuild damaged buildings incorporating mitigation or flood proofing concepts. The offices of individual organizations can be contacted directly or the FEMA Regional office may be able to assist.

Flood Relief Funds:
After a disaster, local businesses, residents and out-of-town groups often donate money to local relief funds. They may be managed by the local government, one or more local churches or an ad hoc committee. No government disaster declaration is needed. Local officials should recommend that the funds be held until an applicant exhausts all sources of public disaster assistance. Doing so allows the funds to be used for mitigation and other projects that cannot be funded elsewhere.

New England States Emergency Consortium (NESEC) – Lakeside Office Park:
NESEC conducts public awareness and education programs on natural disaster and emergency management activities throughout New England. Brochures and videotapes are available on such topics as earthquake preparedness, mitigation and hurricane safety tips. NESEC maintains a web site that is accessible at http://www.serve.com/NESEC.

The New England Floodplain and Stormwater Managers Association (NEFSMA):
The NEFSMA is a professional organization for New England’s floodplain and stormwater managers. This organization provides workshops, conferences and a newsletter to its membership and interested individuals and companies. NEFSMA web site is accessible at http://www.seacoast.com/~nefsma.
APPENDIX C – Existing Protection Systems – State and Federal

State Protection Systems

Earthquakes and Hurricanes:
A certain amount of funding is allotted to each state per year based on a risk formula for earthquakes. Coastal states are allocated funds based on a risk formula for hurricanes. Each state receiving such funds has the ability to grant project funds to a community. There is not a match requirement on the part of the community, but the funds are limited and are generally only available once a year. The projects or products proposed for such funding must demonstrate that earthquake or hurricane risk will be reduced or eliminated and that the proposed projects or product is a cost-effective measure (a stringent cost/benefit analysis need not be performed). Information about the amount of funding available per year and the state requirements for eligibility and performance may be obtained from RIEMA at (401) 946-9996.

Economic/Community Development:
Programs exist to help flood proof homes using Community Development Block Grant funds. There may be housing assistance programs in Lincoln that can be used following a major flood, achieving both the objectives of reducing flood damage and improving the community’s housing stock (see Appendix A, “Federal Resources” for more information).

Evacuation Plans and Systems:
The Lincoln emergency operations center has evacuation plans in place. RIEMA has additional evacuation plan information.

Land Use Restrictions:
There are several federal and state regulations that serve to restrict land use in certain areas that may help reduce flood hazard vulnerability. Open land owned by the state or federal government, requires permits from RI DEM for development in freshwater wetlands. In addition, the state Wetlands Protection Act regulates the development of all lands identified as significant to the protection of resources identified in the act.

Septic Systems:
In areas in the community not served by a public sewer system, state septic system regulation influence development and may be a consideration for mitigation alternatives that include rebuilding and elevation of structures. Specific design requirements must be met for any construction in coastal velocity zones or river floodways.

Generally, an inspection of a septic system is required if there is a change in use of the structure, an increase in flow or failed system. Limited inspections are required if the footprint of the structure is being changed. Upgrades are required by the state if an inspection reveals a failed system. However, local regulations may be more restrictive than state requirements, requiring inspections or upgrades in other cases.
Federal

Community Rating System (CRS)
A voluntary initiative of the NFIP, the CRS was developed to encourage communities to perform activities that exceed the minimum NFIP floodplain management standards. Flood insurance premiums paid by policy holders in a community will be reduced by 5 to 45 percent if that community, participating in the CRS, performs activities that include maintaining records for floodplain development, publicizing the flood hazard, improving flood data and conducting floodplain management planning. Developing a flood mitigation plan will help communities gain additional credit under the CRS.

Hazard Mitigation Grant Program (HMGP)
Also known as the 404 Program or HMGP, this program is available only after a federally declared disaster occurs. It represents an additional 15 percent of all the infrastructure and individual assistance funds that are provided to states to repair damages and recover from losses. This program is administered by the state in partnership with FEMA. Having a plan or a completed mitigation action matrix prior to a disaster event is required by FEMA and is extremely helpful in meeting the states’ deadlines for applications and ensuring the project is eligible and technically feasible.

The HMGP provides 75/25 matching grants on a competitive basis to state, local and tribal governments, as well as to certain nonprofit organization that can be matched by either cash or in-kind services. The grants are specifically directed toward reducing future hazard losses and can be used for projects protecting property and resources against the damaging effects of floods, earthquakes, wind and other hazards. Specific activities encouraged under the HMGP include acquiring damaged structures to turn the land over to the community for open space or recreations use, relocating damaged or damage-prone structures out of the hazard area and retrofitting properties to resist the damaging effects of disasters. Retrofitting can include wet- or dry-flood proofing, elevation of the structure above flood level, elevation of utilities or proper anchoring of the structure.

Two programs that have been authorized under the National Flood Insurance Reform Act of 1994 include the Flood Mitigation Assistance (FMA) program and a provision for increased cost of compliance (ICC) coverage. FMA makes grants available on a pre-disaster basis for flood mitigation planning and activities, including acquisition, relocation and retrofitting of structures. FMA grants for mitigation projects will be available only to those communities with approved natural hazard mitigation plans. ICC coverage has recently been implemented for all new NFIP policies and renewals and is intended to be “mitigation insurance” to allow homeowners whose structures have been repeatedly or substantially damaged to cover the cost of elevation and design requirements for rebuilding with their flood insurance claim up to a maximum of $15,000.

A certain amount of funding is allotted to each state per year based on a risk formula for floods. Each state has the discretion to award funds to communities or to state government agencies. States may use whatever criteria or method they choose to award
the funds as long as the applicant and the proposal are eligible. The program may fund up to 75 percent of the total cost of the proposed project, with a minimum of 25 percent of the cost coming from the community. A minimum of half the community share must be cash or “hard match”. Funds can also be granted to communities to help them prepare local flood mitigation plans. The same match requirements apply. Once a community receives a planning grant, however, it is not eligible to receive additional planning grants for another five years. For further information on the FMA program or ICC coverage, contact the RIEMA at (401) 946-9996.

National Flood Insurance Program (NFIP):

All of Rhode Island’s 39 municipalities participate in the NFIP. This program is a direct agreement between the federal government and the local community that flood insurance will be made available to residents in exchange for community compliance with minimum floodplain management regulations. Communities participating in the NFIP must:

1. Adopt the flood insurance rate maps as an overlay regulatory district,
2. Require that all new construction or substantial improvement to existing structures in the flood hazard area be elevated or (if nonresidential) flood proofed to the identified flood level on the maps,
3. Require design techniques to minimize flood damage for structures being built in high hazard areas, such as floodways or velocity zones.

In return for community adoption of these standards, any structure in that community is eligible for protection by flood insurance which covers property owners from losses due to inundation from surface water of any source. Coverage for land subsidence, sewer backup and water seepage is also available subject to the conditions outlined in the NFIP standard policy (see Appendix A, “Federal Resources” for contacts regarding insurance coverage and purchase). Since homeowners insurance does not cover flooding, a community’s participation in the NFIP is vital to protecting property in the floodplain as well as being essential to ensure that federally backed mortgages and loans can be used to finance flood prone property.
APPENDIX D – Public Meeting Notices
TOWN OF LINCOLN NATURAL HAZARD MITIGATION COMMITTEE

The Town of Lincoln will hold a meeting at the Lincoln Town Hall, 100 Old River Road, Lincoln, RI 02865 at 10:00 a.m. on Thursday, January 20, 2011, on the update for the Town of Lincoln Natural Hazard Mitigation Plan.

The current plan is available for review in the Planning office at Town Hall 9:00 am – 4:30 pm, Monday through Friday. All interested parties are invited to attend said meeting and be heard. Those individuals requesting interpreter services must call the Town Clerk’s office, 333-1100, 72 hours in advance of said meeting.

Albert V. Ranaldi, Jr., AICP
Lincoln Town Planner

Posted January 18, 2011
TOWN OF LINCOLN NATURAL
HAZARD MITIGATION COMMITTEE

The Town of Lincoln will hold a meeting at the Lincoln Town
Hall, 100 Old River Road, Lincoln, RI 02865 at 10:00 a.m. on
Monday, January 30, 2012, on the update for the Town of
Lincoln Natural Hazard Mitigation Plan.

The current plan is available for review in the Planning office at
Town Hall 9:00 am – 4:30 pm, Monday through Friday. All
interested parties are invited to attend said meeting and be heard.
Those individuals requesting interpreter services must call the Town
Clerk’s office, 333-1100, 72 hours in advance of said meeting.

Albert V. Ranaldi, Jr., AICP  Lincoln Town Planner

Posted January 25, 2012
TOWN OF LINCOLN NATURAL HAZARD MITIGATION COMMITTEE

The Town of Lincoln will hold a meeting at the Lincoln Town Hall, 100 Old River Road, Lincoln, RI 02865 at 2:00 p.m. on Thursday, August 30, 2012, on the update for the Town of Lincoln Natural Hazard Mitigation Plan.

The current plan is available for review in the Planning office at Town Hall 9:00 am – 4:30 pm, Monday through Friday. All interested parties are invited to attend said meeting and be heard. Those individuals requesting interpreter services must call the Town Clerk’s office, 333-1100, 72 hours in advance of said meeting.

Albert V. Ranaldi, Jr., AICP Lincoln Town Planner

Posted August 27, 2012
TOWN OF LINCOLN NATURAL HAZARD MITIGATION COMMITTEE

The Town of Lincoln will hold a meeting at the Lincoln Town Hall, 100 Old River Road, Lincoln, RI 02865 at 2:00 p.m. on Thursday, June 6, 2013, on the update for the Town of Lincoln Natural Hazard Mitigation Plan.

The current plan is available for review in the Planning office at Town Hall 9:00 am – 4:30 pm, Monday through Friday. All interested parties are invited to attend said meeting and be heard. Those individuals requesting interpreter services must call the Town Clerk’s office, 333-1100, 72 hours in advance of said meeting.

Albert V. Ranaldi, Jr., AICP 
Lincoln Town Planner

Posted June 3, 2013
Welcome to the Town of Lincoln, Rhode Island...

We hope that our website helps you to quickly find the information you need, as you live and work in the Town of Lincoln.

Want to know more about a Town department? Do you have a question? We're here to answer them. Our site gives you access to information about the services we offer, as well as guidelines for getting the most out of our resources.

We want you to know that we can't help you with a question that's beyond the scope of this site. However, we're happy to help you find the information you need. You can contact us through our Contact Us page.

We hope you find this website useful and we think it's great to hear from you. Let us know what you think about it. We're always looking for ways to improve it.