

## **5. MITIGATION STRATEGY**

### **5.1 Mitigation Goals, Objectives, and Initiatives**

Hazard mitigation, as defined by the Disaster Mitigation Act of 2000, is any sustained action taken to reduce or eliminate the long-term risk to human life and property from hazards. Studies on hazard mitigation show that for each dollar spent on mitigation, society saves an average of four dollars in avoided future losses. (Multihazard Mitigation Council, 2005) Mitigation can take many different forms from construction projects to public education.

The development of a mitigation strategy allows the State of North Dakota to create a vision for preventing future disasters, establish a common set of mitigation goals across state, tribal, and local agencies, prioritize actions, and evaluate the success of such actions. The North Dakota Mitigation Strategy is based on the results of the statewide risk assessment, local and tribal risk assessments and mitigation strategies, and additional recommendations by mitigation stakeholders. The goals are broad, visionary, forward-looking statements that outline in general terms what the state would like to accomplish. Goals are usually not measurable or fully attainable but rather ideals to which the state and jurisdictions should strive for as they develop and implement mitigation projects.

The following goals outline the overall hazard mitigation strategy for the State of North Dakota. The goals listed have been revised from the previous mitigation plan to reflect a greater emphasis and focus on mitigation as opposed to preparedness, response, or recovery. Preparedness, response, and recovery are vital elements of emergency management, and the goals and objectives related to them should not be minimized by their exclusion from this mitigation strategy.

**Goal 1: Encourage sound state and local planning related to hazard understanding and mitigation.**

Planning is an ongoing activity at the state level and has a prominent place in the overall mitigation strategy. Through planning, we learn our capabilities and our strengths as well as areas that need to be addressed in different ways. Planning is not an activity that occurs every three years or only after a disaster; it's an integral part of the overall system. As new technology and methods are developed and new ideas are presented, plans are adapted in order to keep pace with an ever-changing world. This goal supports mitigation for each of the hazards.

Objective 1.1: Increase and improve mitigation planning efforts at the state, tribal, and local levels through technical assistance, plan development, and plan updates.

*Mitigation Planning*

Mitigation plans can be developed at all levels of government, private companies, and non-profit organizations. All tribal and local jurisdictions are encouraged to develop and adopt a mitigation plan that meets the requirements of the Disaster Mitigation Act of 2000 and meets the needs of the jurisdictions. In some cases, grant funding is contingent on a mitigation plan approved by the Federal Emergency Management Agency. North Dakota Department of Emergency Services provides technical and financial assistance to those jurisdictions developing or updating their mitigation plans. Improvements can additionally be made to existing plans. Similarly, Community Wildfire Protection Plans that specifically address mitigation for wildland fires may be required for jurisdictions to receive wildfire mitigation funding. The North Dakota Forest Service can provide technical assistance regarding Community Wildfire Protection Plans.

*Basin-Wide Water Management Planning*

Comprehensive basin-wide planning in the five major basins in North Dakota – the Missouri River Basin, the James River Basin, the Souris River Basin, the Red River Basin, and the Devils Lake Basin – allows for a consistent and collaborative approach to flood and drought mitigation plans and projects. Looking at the issues that face the basins from a regional perspective rather than through single jurisdictions typically results in a more favorable and thorough plan of action.

Objective 1.2: Improve hazard understanding and risk assessments through individual hazard studies and analyses using digital data.

*Data Digitization*

Digital data is especially important for Geographic Information System (GIS) analyses. Current technology allows for the comparison of assets with hazard areas and a variety of other analyses. HAZUS-MH is one example of a loss estimation model that can quantify potential losses from a variety of hazards when provided with the appropriate digital data. Digitization of data such as state-owned buildings, critical facilities and infrastructure, dam inundation areas, and floodplains would allow for a better understanding of hazard vulnerabilities and improve mitigation planning in North Dakota.

*Impacts Database*

An all-hazard database that outlines the impacts of disasters such as physical and economic losses for the State of North Dakota would significantly increase the understanding of the hazards that threaten the

state. A large number of agencies, such as the Federal Emergency Management Agency, the US Department of Agriculture, the US Department of Health and Human Services, firefighting agencies, the insurance industry, and each of their state counterparts, play important roles in disaster response and recovery. Unfortunately, because so many agencies are involved, capturing information regarding disaster losses and impacts is very challenging. A centralized, accessible source of disaster impact information that provides loss estimates for historical disasters of all types would allow for a more comprehensive risk assessment. For example, since winter weather is regular occurrence in North Dakota, understanding the level at which such weather events create significant impacts is still relatively unknown. A database that outlines the winter weather conditions (snow depth, temperature, wind, snowfall rates, water content, and duration) and the problems (number of accidents, condition of roadways, electric damages, and services needed) would allow officials and meteorologists to better understand those conditions that severely threaten life and property.

#### *Hazardous Materials Field Study*

Hazardous materials are transported throughout the state in vehicles, trains, and planes. Generally, the types and quantities of hazardous materials at fixed facilities are known through reporting requirements. Much less is known about mobile hazardous materials. A study that estimates the types of hazardous materials transported on which roadways, railways, and airports using field data would allow for a more accurate portrayal of the hazard.

#### *Utility and Critical Material Studies*

Individual studies of the utilities and critical materials such as fuel, food, water, and agricultural supplies would promote a better understanding of the circumstances that may cause shortages or outages. Such studies could then be used to mitigate and prepare for future outages and shortages.

#### *Transportation Database*

A database that outlines the number and severity of accidents on North Dakota roadways, railways, and airports would allow for focused mitigation to reduce future losses. Similarly, compiling data on roadway, railway, air traffic, and airport use would pinpoint the areas that could most benefit from improvements.

#### *Wildland Fire Database*

Since many agencies are involved in wildland firefighting efforts across the state, a centralized, accessible, digital database that contains information such as start location, cause, area burned, suppression costs, and damage would allow for a more comprehensive analysis of the history and risk of wildfires in North Dakota.

#### *Floodplain Map Modernization*

Flood insurance rate maps (FIRMs) produced through the National Flood Insurance Program (NFIP) are widely used for insurance and risk assessment purposes. Many maps throughout the state are becoming dated as new technology has improved mapping methodologies. Updating and digitizing the maps allows for a more accurate understanding of the flood hazard and improves the basis for the NFIP.

**Goal 2: Enhance the public's awareness of hazards.**

Awareness activities educate the general public to the hazards they may encounter in the state. Since an informed public can better prepare themselves for any disaster situation, awareness activities continue to be a vital part of the overall mitigation strategy in North Dakota. This goal supports one or more awareness activities for each hazard. Special emphasis for public awareness activities is on special needs and vulnerable populations.

Objective 2.1: Provide the public with information that allows individuals to make sound personal and financial decisions before a disaster threatens.

*Public Education*

The individual is a powerful element of disaster mitigation. The more people that understand the hazards that threaten them and what can be done to mitigate the effects, the more likely such measures will be undertaken and future losses averted. For example, the public can be educated to recognize unusual behavior and seek help for those that may be preparing for a violent act or terrorist attack. As technology improves and new studies are conducted, the new hazard information and best practices need to be distributed to the public. Public education can be used as a mitigation measure for essentially any hazard, even those that are difficult to otherwise mitigate.

*Situational Awareness*

Increasing the understanding of and communicating hazard forecasts and outlooks can assist individuals and agencies in making sound decisions regarding the protection of lives and property. For example, farmers and ranchers can choose alternative crop or land practices if severe drought conditions are expected. The anticipation of flood conditions may allow for wiser water management decisions. The public may also make smarter pre-emptive choices that reduce the potential loss of life knowing that severe winter weather or thunderstorms are expected.

*Insurance Education*

Informing the public of their insurance options and the associated hazards may increase their financial protection from disaster. For example, many standard homeowners' insurance policies do not cover flood losses. Educating those in flood hazard areas regarding their financial vulnerabilities may increase their participation in the National Flood Insurance Program. Similarly, educating agricultural producers regarding crop insurance may decrease their financial losses from drought, hail, and other severe weather events.

**Goal 3: Reduce the impact future development has on potential losses and vulnerabilities.**

Hazard mitigation becomes much more cost effective when handled before structures and infrastructure are placed in hazardous areas. Restricting development in known hazard areas or enforcing measures that mitigate the potential impacts in such areas lessens the likelihood that future disasters will affect the development. Future development is not a huge concern in North Dakota currently, but mechanisms for reducing risk are best developed and considered before development pressures become significant.

Objective 3.1: Use land management tools to mitigate disasters before construction occurs.

*Building Codes*

North Dakota has a state building code. The North Dakota State Building Code consists of the 2003 International Building Code, International Residential Code, International Mechanical Code, and International Fuel Gas Code, with some state amendments. The adoption and enforcement of the State Building Code is the responsibility of the individual jurisdictions within the state. Through the State Building Code Advisory Committee, the State Building Code can be modified and strengthened. Local jurisdictions can also make their own improvements to suit their needs. Those jurisdictions that have not adopted the State Building Code can do so and improve their future development's disaster resistance. An emphasis on enforcement is encouraged for those communities that have adopted the codes. Additional improvements to the State Life Safety and Fire Codes could further reduce losses.

*Zoning and Ordinances*

Local governments in North Dakota are given zoning authority through zoning and planning boards and commissions. Master plans and/or comprehensive plans may be required as part of the zoning authority. Zoning and ordinances can be used to regulate development in hazardous areas. A common example of a local ordinance is the floodplain ordinance. Those communities lacking floodplain ordinances are encouraged to adopt them and join the National Flood Insurance Program. With the appropriate data, zoning in dam inundation areas could also be used. Another example encouraged by the pipeline industry is zoning critical and special needs facilities away from high pressure pipeline areas. Zoning and ordinances are tools that local jurisdictions can use to improve the disaster resistance of their future development.

*Restrictive Covenants*

Restrictive covenants, also known as deed restrictions, can be placed upon real estate, with some restrictions. These covenants provide regulations to the property owners and are usually governed by a homeowners' association. Covenants are typically put in place by developers or associations as opposed to government agencies. Restrictive covenants can be a way for developments to continue disaster resistance beyond the initial development phase and beyond government regulations.

**Goal 4: Reduce impacts of flooding to people and property in North Dakota.**

Responsible floodplain management is crucial to preventing loss of life and damage to property from floods. Careful floodplain management, including the acquisition of structures currently in the floodplain, particularly repetitive loss properties, is an ongoing state priority. Other actions taken can protect infrastructure and minimize losses from floodwaters. This goal supports the broad range of the flood mitigation measures outlined in this strategy.

Objective 4.1: Prevent floodwaters from entering developed areas.

*Bank Stabilization*

The stabilization of riparian areas, wetlands, and roadways can reduce flood losses through the retention of water and soil in floodplains and other natural wetlands and by slowing flow velocities. Bank stabilization projects can take many forms and careful planning regarding the best solution for a given location is an important step.

*Flood Control*

Flood control projects are generally used to physically prevent flood waters from entering an area. Examples include levees, flood walls, channel diversions, dams, channelization, flood gates, and retention basins. Flood control projects can protect specific facilities such as water treatment plants or entire communities. Flood control projects must be approached with caution, however, because they can sometimes create additional hazards such as dam or levee failure or cause increased flooding in upstream or downstream areas.

*Waffle® Flood Mitigation*

The Waffle® concept involves augmenting current flood control measures through the temporary storage of springtime runoff in existing depressions within the Red River Basin until major flood crests pass. Existing depressions include low-relief fields bounded by raised roads, ditches, and wetlands. These storage areas, supplemented by roads and drainage structures, could act as a network of channels and control structures to slowly release stored water into the Red River as the flood crest passes. The feasibility of the Waffle® concept is being investigated through the University of North Dakota, Energy and Environmental Research Center.

Objective 4.2: Reduce property and infrastructure losses to developed areas during periods of flood.

*Property Acquisition, Relocation, and Elevation*

Removing properties from flood hazard areas by purchasing property or easements, relocating structures, or elevating structures or infrastructure reduces potential losses from future flood events. These types of measures are generally permanent in reducing flood losses. A particular emphasis and priority is on severe repetitive loss and repetitive loss structures through the National Flood Insurance Program.

*Storm Water Management and Roadway Protection*

Effective storm water systems can prevent flood damages in developed areas. Development such as buildings and pavement reduce the absorption of water into the ground and can create runoff problems. Storm water management systems and their improvements can reduce problems in flood prone areas.

Similarly, roadways often cross paths with waterways, and the water can be directed through bridges or culverts. Improvements to the bridge and culvert systems can mitigate future losses to road infrastructure. Culverts, drainage systems, storm sewers, bridge and road improvements, and ditches are examples of storm water management and roadway protection tools.

#### *Floodproofing*

Floodproofing structures does not eliminate the flood hazard, but reduces the losses that may occur during a flood. All types of structures including critical facilities, utility infrastructure, government buildings, and residential structures can be floodproofed. Examples of floodproofing include anchoring buildings and tanks, reinforcement of walls with water resistant materials, installing watertight doors and windows, sealing basements and walls to prevent seepage, installing permanent pumps, installing backflow prevention valves on utilities, and elevating utility systems and other equipment. Creative floodproofing measures can be used to protect ecologic and other values. For example, fisheries could be protected through measures that prevent the crossover of species during floods.

Objective 4.3: Prevent flood losses due to dam failures.

#### *Dam Safety*

An improved comprehensive dam safety program for the inspection, maintenance, and repairs of dams in North Dakota would reduce the risk of dam failure. Federal, state, local, and private dams in North Dakota need a program that allows for consistency and enforcement of dam regulations. A comprehensive program could be achieved through legislation and the associated funding to improve the existing state program. Emergency action plans for all high hazard dams should be required and enforced through the program.

**Goal 5: Mitigate the effects severe summer and winter weather have on people and property.**

Weather impacts in North Dakota can have devastating consequences. In most cases, weather events such as tornadoes, severe hail, strong winds, blizzards, extreme wind chills, and winter storms cannot be prevented, however, property can be better protected through a variety of activities. This goal strives to mitigate the impacts such events have on the communities and the state.

Objective 5.1: Improve severe weather warnings and public notifications to increase personal protective actions during severe summer and winter weather.

*Warning Systems*

Systems that alert the public of immediate weather threats can allow the population, including those in critical and special needs facilities, to take protective actions that may prevent the loss of life and injuries. Examples of warning systems include warning sirens in populated areas, television and radio emergency alert systems, automated community notification systems, and NOAA Weather Radios. Specially built NOAA Weather Radios have the capability to alert individuals, businesses, agencies, and organizations of immediate storm threats. Warning systems can also generally be used for other hazards besides severe summer and winter weather.

*Weather Spotter Training*

Volunteers trained by the National Weather Service have the ability to report real-time, ground truth information to the National Weather Service. These reports help forecasters with decisions related to weather warnings and alerting the population of the life-threatening hazards. Such reports are especially critical in areas with poor radar coverage.

Objective 5.2: Provide safe places for the public to take protective actions during extreme weather events.

*Tornado Safe Rooms and Shelters*

Rooms designed specifically to withstand tornadoes and strong winds provide emergency protection to the population during such events. Buildings with large span roofs, community gathering places, mobile home parks, and individual homes could all be well served by tornado safe rooms and shelters.

*Window Safety Film*

Safety films can be placed on glass windows and doors that strengthen and prevent the shattering of glass during high wind and impact events. Facilities such as schools, assisted living facilities, businesses, and community centers could benefit through injury prevention during events that break windows such as strong winds, hail, and explosions. The film may also have the added benefit of protecting from vandalism and other intentional acts.

Objective 5.3: Protect electric and transportation infrastructure from strong wind and heavy snow events.

*Electric Infrastructure Protection*

Electric infrastructure can be protected to reduce future service failures. Upgrading and maintaining electric distribution and transmission systems for snow and wind resistance is one example of protecting the infrastructure from future hazards. Burying lines in particularly hazardous areas is another example.

*Snow Fences*

Tree or vegetation shelter belts can provide wind breaks along highways and other infrastructure prone to blowing snow and other winter weather problems. Targeting key areas may allow transportation to continue safely during winter weather and strong winds. Such efforts may also be compatible with the Waffle® flood mitigation concept in the Red River Valley through the use of hydrophilic vegetation. Traditional snow fences are another option.

**Goal 6: Reduce impacts of drought and wildland fires on North Dakota communities.**

With drought regularly affecting the state, several communities have sustained prolonged shortages of water due to silt, sand buildup, and water intake pipes no longer reaching water sources. A crucial part of the mitigation plan for North Dakota is to mitigate instances where emergency water supplies for communities are needed. Areas of the state that have suffered from floods are also being urged to identify long-term water needs and plan for emergency drought situations. This goal supports the drought mitigation measures outlined in this strategy. Most wildfire seasons lead to the evacuation or threatening of structures because of wildland fires. Actions taken to protect homes from wildfires reduce the burden on firefighters and improve the structures' survivability from an approaching fire.

Objective 6.1: Support practices that reduce drought losses and impacts.

*Drought Water Management*

During periods of drought, water conservation measures can be effectively employed by farmers and ranchers to reduce the amount of water required. The choice of irrigation system, its maintenance, and water storage options are individual choices that can be promoted among water users to reduce the water demand during drought periods. The effective management of water rights can also reduce the number of conflicts during droughts.

*Drought Land and Crop Practices*

The choice of drought-resistant crops, crop rotation and soil conserving tillage practices can reduce the losses suffered by farmers and ranchers during periods of drought. Establishing conservation buffers around water sources can also reduce the amount of evaporation and runoff. Recognizing and managing livestock's forage and water needs during periods of drought can also mitigate the need for emergency supplies. Educating the farmers and ranchers in effective land and livestock practices will increase their ability to sustain during periods of drought.

*Weather Modification*

Years of application and research by the North Dakota Atmospheric Resources Board has found that cloud seeding operations reduce hail impacts and increase rainfall. Continued research and application of weather modification techniques may lead to the reduction of future losses from hail, drought, and other weather-related hazards.

*Water Supply Intakes*

When water levels are low during periods of drought, water supply intakes for municipal water systems and power generation can become damaged or unusable. Moving or modifying the water supply intakes can reduce the impacts of low water levels and allow operations to continue.

Objective 6.2: Reduce the vulnerability of homes and businesses from approaching wildland fires.

*Firewise Programs*

Community and individual Firewise-type programs encourage wildfire protection measures around homes and businesses such as reducing fuels, using fire resistant plants and mulch, regular mowing around structures, and building with fire resistant materials. These concepts when applied can protect structures

from approaching wildland fires. Firewise principles can also be applied along roads and utility infrastructure.

#### *Firebreaks*

Firebreaks consisting of bare ground, non-combustible materials such as stone, or fire resistant vegetation may prevent the spread of wildfires into communities and inhabited areas. Firebreaks between fire prone landscapes such as grasslands, CRP acres, and forests and homes, businesses, farms, and communities may prevent wildfire losses and help contain the fire.

#### *Emergency Haying and Grazing*

During severe droughts and periods of extreme wildfire danger, land participating the Community Reserve Program (CRP) may be authorized to hay and/or graze those CRP lands that must otherwise be left in their natural state. During these periods, haying and grazing of the lands may prevent the spread of wildfire. Caution must be emphasized with this mitigation measure, however, since equipment used in haying and grazing operations can ignite fires and create a larger hazard.

**Goal 7: Reduce population and property losses from human-caused hazards.**

Hazard mitigation has traditionally focused on natural hazards. Concerns over human-caused hazards are continuously increasing. Certain aspects of human-caused hazards are regulated through industry standards and legislation. Activities that reduce the long-term disaster risk from the human-caused hazards are supported by this goal and are considered in this multi-hazard mitigation plan.

Objective 7.1: Prevent intentional and accidental acts through observations, regulations, and enforcement.

*Transportation Inspection Programs*

The creation, support, management, and improvement of inspection programs on vehicles, trucks, trains, and planes may mitigate hazardous material releases and intentional attacks.

*Household Hazardous Waste Regulations*

The development of a statewide hazardous waste collection program and disposal regulations may reduce the amount of hazardous chemicals that can contaminate drinking water supplies. Similarly, stricter regulations on storage tanks containing hazardous materials may reduce the chances of a spill.

*Security*

Increased security measures at critical facilities and infrastructure may reduce the risk of an intentional attack or vandalism. Private facilities such as industrial plants, power plants, and oil fields that have the potential to release hazardous materials or are critical to energy production are especially important to protect.

Objective 7.2: Reduce the impact of human-caused hazards by lessening the probability of disasters or by keeping a small disaster from becoming larger.

*Back-up Power*

Failures in electric service can happen because of almost any hazard or can become its own hazard. Back-up generators or alternative solutions such as solar panels can maintain emergency power until the service is restored. Critical facilities, special needs facilities, utility infrastructure, and emergency shelters could all benefit from back-up power should electricity fail, particularly during a disaster or severe weather conditions.

*Transportation Engineering and Systems*

Improvements made to transportation infrastructure through engineering and the subsequent road and barrier designs could reduce transportation accidents and prevent mass casualty incidents.

*Smoke Detectors and Sprinkler Systems*

The loss of life and property from urban fire can be mitigated through the installation of smoke detectors and/or sprinkler systems. The requirements of such are determined by the State Fire Marshal's office. Essentially any structure can benefit from the installation of such systems.

Many initiatives can reduce losses for more than one hazard. Table 5.1A shows the types of hazards each initiative may mitigate.

**Table 5.1A Hazards Mitigated by Each Proposed Initiative**

	Communicable Disease	Dam Failure	Drought	Flood	Hazardous Material Release	Homeland Security Incident	Shortage or Outage of Critical Materials or Infrastructure	Summer Storm	Transportation Accident	Urban Fire or Structure Collapse	Wildland Fire	Winter Storm
<i>Mitigation Planning</i>	X	X	X	X	X	X	X	X	X	X	X	X
<i>Basin-Wide Water Management Planning</i>		X	X	X			X					
<i>Data Digitization</i>	X	X	X	X	X	X	X	X	X	X	X	X
<i>Impacts Database</i>	X	X	X	X	X	X	X	X	X	X	X	X
<i>Hazardous Materials Field Study</i>					X	X						
<i>Utility and Critical Material Studies</i>	X	X	X	X	X	X	X	X	X	X	X	X
<i>Transportation Database</i>									X			
<i>Wildland Fire Database</i>											X	
<i>Floodplain Map Modernization</i>				X								
<i>Public Education</i>	X	X	X	X	X	X	X	X	X	X	X	X
<i>Situational Awareness</i>	X	X	X	X	X	X	X	X	X	X	X	X
<i>Insurance Education</i>		X	X	X		X		X	X	X	X	X
<i>Building Codes</i>		X		X		X		X		X	X	X
<i>Zoning and Ordinances</i>		X		X	X						X	
<i>Restrictive Covenants</i>		X	X	X	X			X	X	X	X	X
<i>Bank Stabilization</i>		X		X								
<i>Flood Control</i>		X		X								
<i>Waffle® Flood Mitigation</i>		X		X								
<i>Property Acquisition, Relocation, and Elevation</i>		X		X								
<i>Storm Water Management and Roadway Protection</i>		X		X								
<i>Floodproofing</i>		X		X								
<i>Dam Safety</i>		X										
<i>Warning Systems</i>	X	X		X	X	X	X	X			X	X
<i>Weather Spotter Training</i>		X		X				X				X
<i>Tornado Safe Rooms and Shelters</i>								X				
<i>Window Safety Film</i>						X		X				
<i>Electric Infrastructure Protection</i>		X		X		X	X	X			X	X

**Table 5.1A Hazards Mitigated by Each Proposed Initiative (continued)**

	Communicable Disease	Dam Failure	Drought	Flood	Hazardous Material Release	Homeland Security Incident	Shortage or Outage of Critical Materials or Infrastructure	Summer Storm	Transportation Accident	Urban Fire or Structure Collapse	Wildland Fire	Winter Storm
<i>Snow Fences</i>		X	X	X				X	X			X
<i>Drought Water Management</i>			X									
<i>Drought Land and Crop Practices</i>			X									
<i>Weather Modification</i>			X					X			X	
<i>Water Supply Intakes</i>			X				X					
<i>Firewise Programs</i>											X	
<i>Firebreaks</i>											X	
<i>Emergency Haying and Grazing</i>			X								X	
<i>Transportation Inspection Programs</i>					X	X			X			
<i>Household Hazardous Waste Regulations</i>					X							
<i>Security</i>	X				X	X						
<i>Back-up Power</i>	X	X		X		X	X	X			X	X
<i>Transportation Engineering and Systems</i>					X				X			
<i>Smoke Detectors and Sprinkler Systems</i>						X				X	X	

## 5.2 Statewide Mitigation Initiatives

Statewide mitigation initiatives are those activities that can be implemented at the state government level. Many mitigation projects across the state are initiated and implemented at the local or tribal level. Often state government provides technical assistance and supports the mitigation activities. Clearly, state government cannot dictate the actions local and tribal governments take or do not take. Therefore, this section focuses on those activities which the state can undertake and implement.

Each of the proposed initiatives has value, however, time and financial constraints do not permit all of the proposed initiatives to be implemented immediately. By prioritizing the initiatives, the most critical, cost effective projects can be achieved in the short term. The prioritization of the projects serves as a guide for choosing and funding projects, however, depending on the funding sources and personnel resources, some actions may be best achieved outside the priorities established here.

To ensure that statewide goals, benefit/cost, and other factors are taken into account when prioritizing initiatives, a prioritization model that uses the following factors has been developed: cost, project management, feasibility, population benefit, property benefit, effectiveness, and hazard rating. Cost considers the annual direct expenses associated with the initiative. Project management evaluates the amount of time needed by state and local government employees to complete or coordinate the project. Feasibility assesses the political, social, and/or environmental ramifications of the project and the likelihood such a project would proceed through permitting, public review, and/or legislative processes. Population benefit considers the possible prevention of deaths and injuries through the initiative's implementation. Property benefit estimates the reduction of property losses, including structures, infrastructure, and values, from the hazard being mitigated. Effectiveness evaluates the successfulness of similar projects in North Dakota or the initiative's potential and amount of maintenance required to keep the mitigation measure effective and useful. The hazard rating is based on the results of the risk assessment and is a measure of the history, probability, severity, and vulnerabilities of the hazard.

Each of the factors was ranked qualitatively for each of the projects. The methods used to assign a category and the associated score can be generally defined as shown in Table 5.2A. The highest possible score is 22. Some factors have a greater range than others, thus indicating a higher weighting. These weightings allow for appropriate prioritization of the project. More specifically, 8 of 22 points account for benefits (population benefit and property benefit), 6 of 22 points account for direct and indirect costs (cost and project management), 4 of 22 points account for the hazard rating (incorporates hazard probability and impacts; see Risk Assessment Summary Section 4.5.4), and 4 of 22 points account for feasibility and effectiveness.

Planning and related projects generally do not result in direct population or property benefits, but they can contribute to increased hazard understanding and project implementation, so their value is seen in other ways. The prioritization of initiatives reflects this.

**Table 5.2A Prioritization Criteria**

Factor	Threshold	Rating	Score
Cost Range: 0-4	Little to no direct expenses	Low (L)	4
	Less than \$100,000	Low-Moderate (LM)	3
	\$100,000-\$499,999	Moderate (M)	2
	\$500,000-\$999,999	Moderate-High (MH)	1
	\$1,000,000 or greater	High (H)	0
Project Management Range: 0-2	Less than 40 hours of staff time	Low (L)	2
	40-80 hours of staff time	Moderate (M)	1
	Greater than 80 hours of staff time	High (H)	0
Feasibility Range: 0-2	Positive support for the project	High (H)	2
	Neutral support for the project	Moderate (M)	1
	Negative support for the project	Low (L)	0
Population Benefit Range: 0-4	Potential to reduce more than 20 casualties	High (H)	4
	Potential to reduce 10-20 casualties	Moderate-High (MH)	3
	Potential to reduce 5-10 casualties	Moderate (M)	2
	Potential to reduce 1-5 casualties	Low-Moderate (LM)	1
	No potential to reduce casualties	Low (L)	0
Property Benefit Range: 0-4	Potential to reduce losses to 100 or more buildings or severe damages to infrastructure or values	High (H)	4
	Potential to reduce losses to 25-99 buildings or substantial damages to infrastructure or values	Moderate-High (MH)	3
	Potential to reduce losses to 10-24 buildings or moderate damages to infrastructure or values	Moderate (M)	2
	Potential to reduce losses to 1-9 buildings or slight damages to infrastructure or values	Low-Moderate (LM)	1
	No potential to reduce property losses	Low (L)	0
Effectiveness Range: 0-2	Proven to be very effective	High (H)	2
	Expected to be moderately effective	Moderate (M)	1
	Effectiveness unknown or high maintenance	Low (L)	0
Hazard Rating Range: 0-4	see Risk Assessment Summary Section 4.5.4	High (H)	4
	see Risk Assessment Summary Section 4.5.4	Moderate (M)	2
	see Risk Assessment Summary Section 4.5.4	Low (L)	0

Table 5.2B shows the evaluation of each statewide initiative and their associated scores. Those initiatives not listed in Table 5.2B are typically best accomplished at the local or tribal level. The primary exceptions are those specific activities conducted on state buildings or infrastructure. Table 5.2C shows the implementation scheme for statewide mitigation initiatives. Please note that all initiatives listed in this strategy are considered worthwhile, otherwise they would be not listed. Therefore, even though a project may be listed as a low priority, the project is still an important piece of the mitigation strategy in the state.

**Table 5.2B Statewide Mitigation Initiative Priorities**

	Cost	Project Management	Feasibility	Population Benefit	Property Benefit	Effectiveness	Hazard Rating	Total Score	Priority
<b>Planning-Related Initiatives</b>									
<i>Mitigation Planning</i>	M	H	H	L	L	H	H	10	High
<i>Data Digitization</i>	M	M	H	L	L	H	H	11	High
<i>Impacts Database</i>	LM	M	H	L	L	H	H	12	High
<i>Hazardous Materials Field Study</i>	M	M	M	L	L	M	M	7	Low
<i>Utility and Critical Material Studies</i>	M	M	M	L	L	M	H	9	Moderate
<i>Transportation Database</i>	M	M	M	L	L	M	L	5	Low
<i>Wildland Fire Database</i>	LM	M	M	L	L	H	M	9	Moderate
<i>Floodplain Map Modernization</i>	H	H	H	L	L	H	H	8	Moderate
<b>Statewide Non-Planning Initiatives</b>									
<i>Public Education</i>	LM	H	H	H	M	M	H	16	High
<i>Insurance Education</i>	LM	H	H	L	H	M	H	14	High
<i>Building Codes</i>	L	H	M	H	H	H	H	19	High
<i>Dam Safety</i>	L	H	M	MH	LM	M	L	10	Low
<i>Weather Modification</i>	MH	H	M	M	H	M	H	13	Moderate
<i>Transportation Inspection Programs</i>	MH	H	M	H	LM	M	M	10	Low
<i>Household Hazardous Waste Regulations</i>	LM	H	M	H	LM	M	M	12	Moderate
<i>Transportation Engineering and Systems</i>	MH	H	M	H	LM	M	M	10	Low

**Table 5.2C Statewide Mitigation Initiatives Implementation Scheme**

<b>Initiative</b>	<b>Objective</b>	<b>Lead State Agencies</b>	<b>Potential Funding</b>	<b>Timeframe</b>
<b>High Priorities</b>				
<i>Mitigation Planning</i>	1.1	DES Forest Service	FEMA PDM FEMA HMGP USFS BLM	Ongoing
<i>Data Digitization</i>	1.2	DES SWC DOT Fire Marshal Forest Service Dept. of Health Dept. of Agriculture	Existing Budgets/ Programs	Ongoing <i>Initial goal of basic data digitization by December 2009</i>
<i>Impacts Database</i>	1.2	DES SWC DOT Fire Marshal Dept. of Health Dept. of Agriculture	Existing Budgets/ Programs	Ongoing <i>Initial goal of establishing the database by December 2008</i>
<i>Public Education</i>	2.1	DES SWC DOT Fire Marshal Forest Service Dept. of Health Dept. of Agriculture	Existing Budgets/ Programs	Ongoing
<i>Insurance Education</i>	2.1	SWC DES Insurance Dept. Dept. of Agriculture	Existing Budgets/ Programs	Ongoing
<i>Building Codes</i>	3.1	DCS DES	Existing Budgets/ Programs	Ongoing <i>Initial goal of recommending changes for the 2009 legislature</i>

**Table 5.2C Statewide Mitigation Initiatives Implementation Scheme (continued)**

<b>Initiative</b>	<b>Objective</b>	<b>Lead State Agencies</b>	<b>Potential Funding</b>	<b>Timeframe</b>
<b>Moderate Priorities</b>				
<i>Utility and Critical Material Studies</i>	1.2	DES	Existing Budgets/ Programs	June 2010
<i>Wildland Fire Database</i>	1.2	Forest Service Fire Marshal DES	Existing Budgets/ Programs	Ongoing <i>Initial goal of establishing the database by January 2009</i>
<i>Floodplain Map Modernization</i>	1.2	SWC	FEMA Map Modernization Funds	Ongoing
<i>Weather Modification</i>	6.1	SWC	Existing Budgets/ Programs	Ongoing
<i>Household Hazardous Waste Regulations</i>	7.1	Dept. of Health	Existing Budgets/ Programs	Ongoing <i>Initial goal of recommending changes for the 2009 legislature</i>
<b>Low Priorities</b>				
<i>Hazardous Materials Field Study</i>	1.2	DOT DES	HMEP	June 2011
<i>Transportation Database</i>	1.2	Highway Patrol DOT Aeronautics Commission	Existing Budgets/ Programs	Ongoing <i>Initial goal of establishing the database by December 2010</i>
<i>Dam Safety</i>	4.3	SWC	Existing Budgets/ Programs	Ongoing <i>Initial goal of recommending changes for the 2009 legislature</i>
<i>Transportation Inspection Programs</i>	7.1	DOT	Existing Budgets/ Programs	January 2012 <i>Initial goal of recommending changes for the 2011 legislature</i>
<i>Transportation Engineering and Systems</i>	7.2	DOT	Existing Budgets/ Programs	Ongoing <i>Initial goal of recommending changes for the 2011 legislature</i>

### 5.3 Local Mitigation Initiatives

North Dakota is diverse in its population and characteristics. Parts of the state can be considered urban, other areas are rural, and many locations are somewhere in between. The needs and capabilities vary widely from one community to the next. Some communities are more concerned with flood whereas others are more concerned with wildland fire. Hazard mitigation is truly a local phenomenon. Federal and state government can provide support, funding, and technical assistance and integrate aspects of mitigation into state laws and programs, but the majority of successful mitigation activities are developed and implemented at the local level. Many activities that can be achieved at the state level can also be conducted at the local level given the appropriate resources. Examples of local mitigation initiatives, as listed in Section 5.1, include, but are not limited to:

- *Mitigation Planning*
- *Basin-Wide Water Management Planning*
- *Data Digitization*
- *Impacts Database*
- *Hazardous Materials Field Study*
- *Transportation Database*
- *Wildland Fire Database*
- *Public Education*
- *Situational Awareness*
- *Insurance Education*
- *Building Codes*
- *Zoning and Ordinances*
- *Restrictive Covenants*
- *Bank Stabilization*
- *Flood Control*
- *Waffle® Flood Mitigation*
- *Property Acquisition, Relocation, and Elevation*
- *Storm Water Management and Roadway Protection*
- *Floodproofing*
- *Warning Systems*
- *Weather Spotter Training*
- *Tornado Safe Rooms and Shelters*
- *Window Safety Film*
- *Electric Infrastructure Protection*
- *Snow Fences*
- *Drought Water Management*
- *Drought Land and Crop Practices*
- *Water Supply Intakes*
- *Firewise Programs*
- *Firebreaks*
- *Emergency Haying and Grazing*
- *Household Hazardous Waste Regulations*
- *Security*
- *Back-up Power*
- *Smoke Detectors and Sprinkler Systems*

Tables 5.3A and 5.3B show the mitigation initiatives listed in the local mitigation plans.

Table 5.3A Mitigation Initiatives Listed in the Local Plans – Part 1

County	Mitigation Planning	Basin-Wide Water Management Planning	Data Digitization	Impacts Database	Hazardous Materials Field Study	Transportation Database	Wildland Fire Database	Public Education	Situational Awareness	Insurance Education	Building Codes	Zoning and Ordinances	Restrictive Covenants	Bank Stabilization	Flood Control	Waffle® Flood Mitigation	Property Acquisition, Relocation, and Elevation	Storm Water Management and Roadway Protection
Adams											X	X						X
Barnes								X	X			X		X	X		X	X
Benson																		
Billings			X					X	X		X							X
Bottineau								X	X	X					X			X
Bowman								X	X	X	X	X						
Burke											X	X						X
Burleigh								X		X					X		X	X
Cass			X					X	X						X		X	X
Cavalier											X	X		X				X
Dickey								X		X				X	X			X
Divide																		
Dunn								X		X	X							X
Eddy											X	X						X
Emmons			X					X	X	X	X	X			X			X
<i>Fort Berthold</i>																		
Foster			X					X	X		X	X						X
Golden Valley			X					X	X								X	X
Grand Forks			X					X	X			X			X			X
Grant																		
Griggs											X	X						X
Hettinger	X							X	X								X	
Kidder								X	X		X	X						X
<i>Lake Traverse</i>																		

Table 5.3A Mitigation Initiatives Listed in the Local Plans – Part 1 (continued)

County	Mitigation Planning	Basin-Wide Water Management Planning	Data Digitization	Impacts Database	Hazardous Materials Field Study	Transportation Database	Wildland Fire Database	Public Education	Situational Awareness	Insurance Education	Building Codes	Zoning and Ordinances	Restrictive Covenants	Bank Stabilization	Flood Control	Waffle® Flood Mitigation	Property Acquisition, Relocation, and Elevation	Storm Water Management and Roadway Protection
LaMoure			X				X	X	X		X			X		X	X	
Logan														X	X			X
McHenry											X	X						X
McIntosh							X	X						X			X	X
McKenzie																		
McLean	X		X	X			X	X	X			X		X	X		X	X
Mercer							X											X
Morton	X						X											
Mountrail							X				X	X						X
Nelson			X				X	X	X	X	X	X			X			X
Oliver							X	X										X
Pembina			X				X		X	X					X		X	X
Pierce			X				X	X	X	X	X	X					X	X
Ramsey			X				X		X	X	X	X		X	X		X	X
Ransom							X							X	X			X
Renville			X				X											
Richland							X							X				X
Rolette																		
Sargent																		
Sheridan																		
Sioux																		
Slope																		
Spirit Lake																		
Standing Rock																		

Table 5.3A Mitigation Initiatives Listed in the Local Plans – Part 1 (continued)

County	Mitigation Planning	Basin-Wide Water Management Planning	Data Digitization	Impacts Database	Hazardous Materials Field Study	Transportation Database	Wildland Fire Database	Public Education	Situational Awareness	Insurance Education	Building Codes	Zoning and Ordinances	Restrictive Covenants	Bank Stabilization	Flood Control	Waffle® Flood Mitigation	Property Acquisition, Relocation, and Elevation	Storm Water Management and Roadway Protection
Stark																		
Steele																		
Stutsman								X	X	X	X			X	X		X	X
Towner			X					X	X	X	X	X						X
Trails										X	X						X	X
<i>Turtle Mountain</i>																		
Walsh			X					X	X	X	X	X		X			X	X
Ward																		
Wells								X	X									X
Williams								X	X	X	X	X						X

Table 5.3B Mitigation Initiatives Listed in the Local Plans – Part 2

County	Floodproofing	Warning Systems	Weather Spotter Training	Tornado Safe Rooms and Shelters	Window Safety Film	Electric Infrastructure Protection	Snow Fences	Drought Water Management	Drought Land and Crop Practices	Water Supply Intakes	Firewise Programs	Firebreaks	Emergency Haying and Grazing	Household Hazardous Waste Regulations	Security	Back-up Power	Smoke Detectors and Sprinkler Systems
Adams		X					X								X		
Barnes	X	X	X	X				X			X				X	X	
Benson																	
Billings															X	X	
Bottineau		X	X					X			X	X				X	
Bowman	X	X						X							X	X	
Burke		X														X	
Burleigh		X	X					X			X	X				X	
Cass	X	X					X										
Cavalier		X					X										
Dickey		X															
Divide																	
Dunn			X	X			X	X	X								
Eddy															X	X	
Emmons		X		X			X	X								X	
<i>Fort Berthold</i>																	
Foster		X					X	X							X	X	
Golden Valley		X					X	X					X			X	
Grand Forks		X						X									
Grant																	
Griggs		X					X									X	
Hettinger			X				X	X					X		X	X	
Kidder			X				X										
<i>Lake Traverse</i>																	
LaMoure		X	X				X	X	X								

Table 5.3B Mitigation Initiatives Listed in the Local Plans – Part 2 (continued)

County	Floodproofing	Warning Systems	Weather Spotter Training	Tornado Safe Rooms and Shelters	Window Safety Film	Electric Infrastructure Protection	Snow Fences	Drought Water Management	Drought Land and Crop Practices	Water Supply Intakes	Firewise Programs	Firebreaks	Emergency Haying and Grazing	Household Hazardous Waste Regulations	Security	Back-up Power	Smoke Detectors and Sprinkler Systems
Logan																	
McHenry		x										x	x				
McIntosh		x					x	x							x	x	
McKenzie																	
McLean		x	x				x	x	x				x			x	
Mercer																	
Morton			x				x									x	
Mountrail		x										x	x		x	x	
Nelson							x	x									
Oliver		x	x				x									x	
Pembina	x	x		x			x	x							x	x	
Pierce		x					x	x								x	
Ramsey		x					x	x		x					x	x	
Ransom		x	x				x	x				x			x	x	
Renville	x		x				x	x								x	
Richland		x	x				x	x	x								
Rolette																	
Sargent																	
Sheridan																	
Sioux																	
Slope																	
<i>Spirit Lake</i>																	
<i>Standing Rock</i>																	
Stark																	
Steele																	

Table 5.3B Mitigation Initiatives Listed in the Local Plans – Part 2 (continued)

County	Floodproofing	Warning Systems	Weather Spotter Training	Tornado Safe Rooms and Shelters	Window Safety Film	Electric Infrastructure Protection	Snow Fences	Drought Water Management	Drought Land and Crop Practices	Water Supply Intakes	Firewise Programs	Firebreaks	Emergency Haying and Grazing	Household Hazardous Waste Regulations	Security	Back-up Power	Smoke Detectors and Sprinkler Systems
Stutsman			X				X	X	X							X	
Towner		X					X	X								X	
Traill										X		X				X	
<i>Turtle Mountain</i>																	
Walsh		X		X			X	X							X	X	
Ward																	
Wells										X						X	
Williams		X	X	X		X	X	X	X		X	X	X		X	X	