

***City of Beatrice***  
***Hazard Mitigation Plan***

*Approved*  
*June 2014*

---

**City of Beatrice Mayor and City Council**

Dennis Schuster .....	Mayor
Bob Morgan .....	Ward I
Philip Cook .....	Ward I
Ted Fairbanks.....	Ward II
Rick Clabaugh.....	Ward II
Rich Kerr.....	Ward III
Dwight Parde .....	Ward III
David Catlin .....	Ward IV
Allen Langdale.....	Ward IV

**Hazard Mitigation Planning Team**

Tobias Tempelmeyer, City of Beatrice .....	City Administrator
Rex Behrends, City of Beatrice.....	City Engineer
Brian Daake, City of Beatrice .....	Fire Chief
Allen Langdale, City of Beatrice .....	City Council Member
Chris Schwan, Beatrice Community Hospital .....	Director of Facilities
Mark Jobman, Beatrice Community Hospital.....	Facilities Supervisor
Matt Bauman, Gage County .....	Gage County Board
Mark Meints, Gage County.....	Gage County Emergency Director
Bob Morgan, Southeast Community College .....	Campus Director
*John Callen, NDNR .....	Natural Resources Planning Coordinator
*Sheila Hascall, NEMA.....	State Hazard Mitigation Officer
*Matthew D. Roque, JEO .....	Planner / Project Coordinator
*Jeffrey B. Ray, JEO .....	Planning Department Manger

*\*Served as an advisory or consultant role*

---

## *Table of Contents*

City of Beatrice Mayor and City Council .....	ii
Hazard Mitigation Planning Team .....	ii
Table of Contents .....	iii
Table of Figures .....	vi
Table of Tables .....	vi
Section One: Introduction .....	1
Hazard Mitigation Planning .....	1
Disaster Mitigation Act of 2000 .....	1
Plan Financing and Preparation .....	2
Plan Organization .....	3
Section Two: Planning Process .....	4
Summary of Changes .....	4
The planning process followed for this plan update was similar to that followed for the prior hazard mitigation plan .....	4
Purpose of the Plan .....	4
Hazard Mitigation Planning Process .....	5
Hazard Mitigation Assistance .....	6
Resource Organization .....	7
Public Involvement and Participation .....	8
Structural Inventory .....	9
Future Development and Land Use Trends .....	10
Plan Approval and Adoption .....	12
General Plans, Documents, and Information .....	12
Plan Update Status .....	14
Section Three: Profile .....	17
City of Beatrice Location and Geography .....	17
Community History .....	17
Demographics and Assets Summary .....	20
Population Analysis .....	20
Highly Vulnerable Areas and Populations .....	21
Housing and Critical Facility Assessment .....	25
National Historic Registry .....	27
Structural Inventory and Valuation Summary .....	28
Critical Facilities .....	28
City of Beatrice Climate Summary .....	31
Temperature, Precipitation, and Snowfall Averages .....	31
Farm Service Agency Small Business Administration Disasters .....	34
Presidential Disaster Declarations .....	35
Section Four: Risk Assessment .....	36
Hazard Identification .....	36
Hazards Not Identified within the City of Beatrice .....	40
Wildfires .....	40
Expansive Soils .....	40
Sink Holes .....	41
Landslides .....	41

---

Hazards within the City of Beatrice.....	43
Severe Winter Storms (Severe Winter Storms and Extreme Cold).....	43
Tornados and High Winds (Tornados and Windstorms).....	48
Severe Thunderstorms (Hailstorm, Thunderstorm, and Lightning).....	55
Flooding (Riverine and Flash).....	61
Extreme Heat.....	68
Drought.....	71
Earthquakes.....	79
Dam Failure.....	83
New HIRA Based Hazards Considered.....	86
Chemical Fixed Sites.....	86
Civil Disorder.....	86
Radiological Fixed Sites.....	87
Radiological Transportation.....	87
Urban Fires.....	87
Animal Disease.....	87
Plant Disease.....	87
Chemical Transportation.....	87
Power Failure.....	87
Terrorism.....	88
Transportation.....	88
Section Five: Mitigation Strategy.....	89
Introduction.....	89
Development of Goals.....	89
Mitigation Alternatives (Action Items).....	90
Completed Mitigation Alternative Action Items.....	92
Removed Mitigation Alternative Action Items.....	93
Mitigation Alternative Action Items.....	93
Mitigation Alternative Action Items Conclusion.....	107
Section Six: Plan Implementation and Maintenance.....	108
Monitoring, Evaluating, and Updating the Plan.....	108
Hazard Mitigation Assistance.....	109
Eligible Mitigation Projects.....	109
Ineligible Mitigation Activities.....	112
Continued Public Involvement.....	114
Incorporation into Existing Planning Mechanisms.....	114
Capabilities Assessment.....	114
Section Seven: Appendices.....	1
Appendix A: Resolution of Adoption.....	1
Appendix B: Documentation of Public Involvement.....	2
Hazard Identification Meetings.....	2
Mitigation Strategies Meetings.....	6
Hazard Identification Worksheets.....	11
Project STAPLEE Sheets.....	15
Appendix D: Annual Update Surveys.....	18



---

## **Table of Figures**

Figure 1 Future Land Use Map.....	12
Figure 2: Location of Beatrice, NE.....	17
Figure 3: Total Population Trend Beatrice and Gage County .....	20
Figure 4: Population by Age.....	21
Figure 5: Beatrice Vulnerable Population Facilities.....	25
Figure 6: Age of Structures.....	27
Figure 7: Beatrice Critical Facilities.....	30
Figure 8: Daily Temperature Averages and Extremes.....	32
Figure 9: Daily Precipitation Averages and Extremes.....	33
Figure 10: Daily Snowfall Averages and Extremes.....	34
Figure 11: USGS Map of Wildfires over 250 acres in U.S. ....	40
Figure 12: U.S.G.S. Expansive Soils Map.....	41
Figure 13: USGS Map of Landslide Potential in Contiguous U.S. ....	42
Figure 14: U.S.A.C.E. Levee Database Map.....	43
Figure 15 SPIA Index .....	46
Figure 16 Annual TORNADOS per State .....	49
Figure 17: Wind Zones in the United States.....	51
Figure 18: Annual Average Number of Thunderstorm Events.....	56
Figure 19: Beatrice Floodplain Map with Structures in Floodplain Identified.....	64
Figure 20: U.S. Seasonal Drought Outlook .....	71
Figure 21: Percent of Nebraska in Drought Stages 2000-2013 .....	73
Figure 22: Palmer Drought Severity Index.....	74
Figure 23 U.S Drought Monitor Scale.....	75
Figure 24: Nebraska Fault Lines.....	79
Figure 25: Beatrice Earthquake Probability.....	81
Figure 26: High Hazard Dams Upstream of Beatrice.....	85

## **Table of Tables**

Table 1: Hazard Mitigation Planning Team.....	7
Table 2: Neighboring Jurisdictions.....	9
Table 3: Structural Inventory .....	10
Table 4: General Plans, Documents, and Information.....	13
Table 5: Plan Update Summary .....	14
Table 6 Vulnerable Populations.....	21
Table 7: Educational Facilities.....	22
Table 8: Hospitals and Care Facilities .....	23
Table 9: Major Employers .....	23
Table 10: Gathering Locations.....	23
Table 11 Household Vulnerabilities .....	26
Table 12: National Historic Registry .....	28
Table 13: Structural Inventory and Valuation Summary.....	28
Table 14: Critical Facilities & Infrastructure.....	29
Table 15: Climate Summary .....	31

---

Table 16: Farm Service Agency Small Business Administration Disasters .....	34
Table 17: Presidential Disaster Declarations .....	35
Table 18: Enhanced Fujita Scale.....	49
Table 19: Enhanced F Scale Damage Indicators .....	50
Table 20: Beaufort Wind Force Rankings .....	53
Table 21: TORRO Hailstone Scale.....	58
Table 22: Structures in the Estimated floodplain.....	63
Table 23: Potential losses to structures in the floodplain .....	66
Table 24: Palmer Classifications .....	74
Table 23: Richter Scale Descriptions.....	79
Table 24: Modified Mercalli Intensity Scale .....	80
Table 27: High Hazard Dams .....	85
Table 28: Number of Structures within the Inundation Area .....	86
Table 29: Eligible Activities by HMA Program.....	109
Table 30: Existing Planning Mechanisms.....	117



## **Section One: Introduction**

### ***Hazard Mitigation Planning***

Natural hazards, such as severe winter storms, tornados and high winds, severe thunderstorms, flooding, extreme heat, drought, earthquakes, landslides, and wildfires are a part of the world around us. Their occurrence is natural and inevitable, and there is little we can do to control their force and intensity.

The city of Beatrice is vulnerable to a wide range of natural hazards that threaten the safety of residents, and have the potential to damage or destroy both public and private property, or disrupt the local economy and overall quality of life.

While the threat from hazards may never be fully eliminated, there is much we can do to lessen their potential impact. The concept and practice of reducing risks associated with known hazards is referred to as hazard mitigation.

Hazard mitigation techniques include both structural measures, such as strengthening or protecting buildings and infrastructure from the destructive forces of potential hazards, and non-structural measures, such as the adoption of sound land use or floodplain management policies or the creation of public awareness programs. A comprehensive mitigation approach addresses hazard vulnerabilities that exist today and in the foreseeable future. Therefore, it is essential that projected patterns of future development are evaluated and considered in terms of how growth may increase or decrease a jurisdiction's hazard vulnerability over time.

The development, adoption, and regular update of a hazard mitigation plan are a critical piece of a jurisdiction's comprehensive approach to reducing the impacts of hazards. A hazard mitigation plan establishes the vision, guiding principles, and specific actions designed to reduce future hazard vulnerabilities. It is most effective when based on an inclusive, comprehensive, long-term plan that is developed before a disaster occurs.

The Beatrice Hazard Mitigation Plan is an effective tool to incorporate hazard mitigation principles and practices into the day-to-day activities of city government. This plan recommends specific actions designed to protect residents, as well as the built environment from those hazards that pose the greatest risk. Identified mitigation actions go beyond simply recommending structural solutions that reduce existing vulnerability, such as elevation, retrofitting, and acquisition projects. The actions include local policies on growth and development, incentives tied to natural resource protection, and public awareness and outreach activities are examples of other actions intended to reduce future vulnerability to identified hazards.

### ***Disaster Mitigation Act of 2000***

In an effort to reduce the nation's mounting natural disaster losses, the U.S. Congress passed the Disaster Mitigation Act of 2000 (DMA 2000) to amend the Robert T. Stafford Disaster Relief and Emergency Assistance Act. Section 322 of the DMA 2000 requires that state and local governments develop, adopt, and routinely update a hazard mitigation plan in order to remain eligible for pre- and post-disaster mitigation



#### ***FEMA definition of Hazard Mitigation***

*“Any sustained action taken to reduce or eliminate the long-term risk to human life and property from [natural] hazards.”*

funding. These funds include the Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation Program (PDM), and the Flood Mitigation Assistance Program (FMA). The previous funding sources are administered by the Federal Emergency Management Agency (FEMA) under the Department of Homeland Security (DHS). Jurisdictions with an adopted and federally approved hazard mitigation plan thereby become pre-positioned and more apt to receive available mitigation funds before and after the next disaster strikes.

This plan was developed in accordance with current state and federal rules and regulations governing local hazard mitigation plans. The plan shall be monitored and updated on a routine basis to maintain compliance with the legislation – Section 322, Mitigation Planning, of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, as enacted by Section 104 of the Disaster Mitigation Act of 2000 (P.L. 106-390) and by FEMA’s Interim Final Rule (IFR) published in the Federal Register on February 26, 2002, at 44 Code of Federal Regulations (CFR) Part 201.

This plan was prepared using current FEMA planning guidance in coordination with the Nebraska Emergency Management Agency (NEMA) in order to ensure that it meets all applicable state and federal mitigation planning requirements. This includes conformance with FEMA’s latest Local Multi-Hazard Mitigation Planning Guidance (dated March 2013).

The Plan Review Tool, (*Appendix A*), provides a detailed summary of FEMA’s current minimum standards of acceptability for compliance with the Disaster Mitigation Act of 2000. References to the IFR throughout the plan provide specific section and subsection notations to aid the review process.

### ***Plan Financing and Preparation***

In regards to plan financing and preparation, in general, the local government (City of Beatrice) is the “sub-applicant” that is the eligible entity that submits a sub-application for FEMA assistance to the “Applicant”. The “Applicant,” in this case is the State of Nebraska. If Hazard Mitigation Assistance (HMA) funding is awarded, the sub-applicant becomes the “sub-grantee” and is responsible for managing the sub-grant and complying with program requirements and other applicable federal, state, territorial, tribal, and local laws and regulations.

The City of Beatrice Plan was financed through the HMGP program after FEMA Disaster DR- 1902 (project 0005). HMGP grants are allocated from FEMA to NEMA using a ‘sliding scale’ formula based on the percentage of funds spent on public and individual assistance programs for each presidentially-declared disaster. For states with a standard state mitigation plan, the formula provides 15 percent of the first \$2 billion of estimated aggregate amounts of disaster assistance; 10 percent for the next portion of amounts between \$2 billion and \$10 billion; and 7.5 percent for the next portion of amounts between \$10 billion and \$35.333 billion.

The City of Beatrice applied for a HMGP planning grant and received federal-cost share in October 2011 to provide 75 percent assistance for the completion of a hazard mitigation plan. A hazard mitigation plan includes any ‘taxing authority’ such as cities, villages, counties, school districts, natural resources districts, or other special districts. In total, one jurisdiction participated in the City of Beatrice Plan.

## ***Plan Organization***

***Section One – Introduction:*** This section introduces hazard mitigation planning, including an overview of the Disaster Mitigation Act of 2000, benefits of utilizing the multi-jurisdictional approach, plan financing and preparation, and plan organization.

***Section Two – Planning Process:*** This section outlines the hazard mitigation planning process used for development of the plan, including the purpose of the plan, hazard mitigation assistance, resource organization, risk assessment, structural inventory, mitigation strategy, and plan implementation and maintenance. The Planning Team, public involvement and participation, participating jurisdictions, as well as general plans, documents, and additional information used throughout the planning process are also listed in this section.

***Section Three – Profile:*** This section provides an overall profile of the City of Beatrice including geography, climate, demographics, and assets.

***Section Four – Risk Assessment:*** This section contains the risk assessment for the City of Beatrice including hazard identification, hazard background, historical occurrences, vulnerability assessment, and potential losses.

***Section Five – Mitigation Strategy:*** This section discusses the establishment of goals and objectives for the City of Beatrice. The goals and objectives provide the framework for identifying mitigation alternatives or ‘action items’, the on-the-ground activities to reduce the effects of natural hazards. All action items were evaluated by the City using the FEMA recommended ‘STAPLEE’ process, and the complete list can be found at the end of this section.

***Section Six – Plan Implementation and Maintenance:*** This section contains recommendations for plan implementation and maintenance, including the monitoring of hazards, establishment of a panel to review the plan annually, and outline the process for updating the plan in the future.

## **Section Two: Planning Process**

### ***Summary of Changes***

The planning process followed for this plan update was similar to that followed for the prior hazard mitigation plan.

### ***Purpose of the Plan***

The purpose of this plan is to identify hazards, assess the vulnerability of each participant to the various hazards, determine potential losses associated with the hazards, and develop sound mitigation alternatives to reduce these vulnerabilities. The hazards which can take place within the planning area have the potential to impact the health, safety, and welfare of all citizens of the City of Beatrice.

Following the requirements of the DMA 2000, this plan establishes specific goals and objectives based on the identified hazards with a potential to impact the City of Beatrice, and develops appropriate mitigation activities specific to each participating jurisdiction. Consistent with FEMA's planning process guidelines; the purpose of this plan is to accomplish the following objectives:

- Minimize the disruption to each jurisdiction following a disaster.
- Establish actions to reduce or eliminate future damages in order to efficiently recover from disasters.
- Investigate, review, and implement activities or actions to ensure disaster related hazards are addressed by the most efficient and appropriate solution.
- Educate citizens about potential hazards.
- Fulfill planning requirements for future hazard mitigation project grants as described by the DMA 2000.
- Facilitate development and implementation of hazard mitigation management activities to ensure a sustainable community.

The benefits of mitigation planning go beyond reducing hazard vulnerability. Measures such as the acquisition or regulation of land in known hazard areas can help achieve multiple local goals, such as preserving open space, improving water quality, maintaining environmental health, and enhancing recreational opportunities. Thus, it is vitally important that any local mitigation planning process be integrated alongside concurrent local planning efforts, and any proposed mitigation strategies must take into account other existing local goals or initiatives that will help compliment or hinder their future implementation.

**Requirement §201.6(b):** *Planning process. An open public involvement process is essential to the development of an effective plan. In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include:*

- (1) An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;*
- (2) An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia and other private and non-profit interests to be involved in the planning process; and*
- (3) Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.*

**Requirement §201.6(c) (1):** *[The plan shall document] the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.*

Mitigation planning offers many benefits, including:

- Saving lives and property
- Saving money
- Speeding up recovery following disasters
- Reducing future vulnerability through wise development and post-disaster recovery and reconstruction
- Enhancing coordination within and across participating jurisdictions
- Expediting the receipt of pre-disaster and post-disaster grant funding
- Demonstrating a firm commitment to improving local health and safety

### ***Hazard Mitigation Planning Process***

The hazard mitigation planning process includes: organizing local resources; identifying and assessing hazard risks; and determining how best to minimize or manage those risks. This process results in a hazard mitigation plan which identifies specific mitigation actions, each designed to achieve both short-term planning objectives and a long-term vision. Plan maintenance procedures are also established to implement, as well as evaluate and enhance the plan as necessary. Developing clear plan maintenance procedures ensures that the plan remains a current, dynamic, and effective planning document over time.

The hazard mitigation planning process has four general steps: organization of resources, assessment of risks, development of mitigation strategies, implementation of the plan, and annual monitoring of progress. The mitigation planning process is rarely a linear process. It is not unusual for the risk assessment to need revision or the addition of new information during the development of the mitigation plan, or that implementation of the plan result in new goals or additional risk assessment. The hazard mitigation planning process consists of four basic phases:

- Organization of Resources
  - Focus on the resources needed for a successful mitigation planning process. Essential steps include:
    - Organizing interested community members
    - Identifying technical expertise needed
- Assessment of Risks
  - Identify the characteristics and potential consequences of the hazard. Identify how much of the jurisdiction can be affected by specific hazards and the impacts they could have on local assets.
- Mitigation Plan Development
  - Determine priorities and identify possible solutions to avoid or minimize the undesired effects. The result is a hazard mitigation plan and strategy for implementation.
- Plan Implementation and Progress Monitoring
  - Bring the plan to life by implementing specific mitigation projects and changing day-to-day operations. It is critical that the plan remains relevant to succeed. Thus, it is important to conduct periodic evaluations and make revisions as needed.

Typically, mitigation planning is described as having the potential to produce long-term and recurring benefits by breaking the repetitive cycle of disaster associated loss. A core assumption of hazard mitigation planning is that pre-disaster investments will significantly reduce the demand for post-disaster assistance by

lessening the need for emergency response, repair, recovery, and reconstruction. Furthermore, mitigation practices will enable local residents, businesses, and industries to re-establish themselves in the wake of a disaster, getting the local economy back on track sooner and with minimal interruption.

### **Hazard Mitigation Assistance**

In addition to the Disaster Mitigation Act of 2000, requirements for mitigation projects funded by FEMA as well as certain planning processes are set forth in four programs, further described below. Although slightly different, all programs outline the same basic planning process. On June 1, 2009, FEMA initiated the Hazard Mitigation Assistance program integration, which aligned certain policies and timelines of the various mitigation programs. Three out of the four programs are available through DHS and FEMA as a part of the HMA Unified Guidance. These HMA programs present a critical opportunity to minimize the risk to individuals and property from hazards while simultaneously reducing the reliance on federal disaster funds. States, territories, Indian tribal governments, and local governments are encouraged to take advantage of funding provided by HMA programs in both pre- and post-disaster timeframes.

Together, these programs offer significant opportunities to reduce or eliminate potential losses to state, tribal, and local assets through hazard mitigation planning and project grant funding. Each HMA program was authorized by separate legislative action, and as such, each program differs slightly in scope and intent. The guidance applies to the following programs; Hazard Mitigation Grant Program, Pre-Disaster Mitigation Program, and Flood Mitigation Assistance Program. While the statutory origins of the programs differ, all share the common goal of reducing the risk of loss of life and property due to hazards.

By incorporating the four programs together the HMA consolidates the common requirements for all programs and explains the unique elements of the programs in individual sections. The HMA clarified the content and ease of use of the guidance by presenting information common to all programs in general order of the grant life cycle. The HMA Unified Guidance can be found on FEMA's website at <http://www.fema.gov>.

- **Hazard Mitigation Grant Program:** To qualify for post-disaster mitigation funds, local jurisdictions must have adopted a mitigation plan that is approved by FEMA. HMGP provides funds to states, territories, Indian tribal governments, local governments, and eligible private non-profits following a presidential disaster declaration. The DMA 2000 authorizes up to seven percent of HMGP funds available to a state after a disaster to be used for the development of state, tribal, and local mitigation plans.
- **Flood Mitigation Assistance Program:** To qualify to receive grant funds to implement projects such as acquisition or elevation of flood-prone homes, local jurisdictions must prepare a mitigation plan. The plan must include specific elements and be prepared in conjunction with the process outlined in the National Flood Insurance Program's (NFIP) Community Rating System. The goal of FMA is to reduce or eliminate claims under the NFIP.

*Mitigation is the cornerstone of emergency management. Mitigation focuses on breaking the cycle of disaster damage, reconstruction, and repeated damage. Mitigation lessens the impact disasters have on people's lives and property through damage prevention, appropriate development standards, and affordable flood insurance. Through measures such as avoiding building in damage-prone areas, stringent building codes, and floodplain management regulations, the impact on lives and communities is lessened.*

*- FEMA Mitigation Directorate*

- ***Pre-Disaster Mitigation Grant Program:*** To qualify for pre-disaster mitigation funds, local jurisdictions must adopt a mitigation plan that is approved by FEMA. PDM assists states, territories, Indian tribal governments, and local governments in implementing a sustained pre-disaster natural hazard mitigation program.
- ***NFIP Community Rating System (CRS):*** The CRS offers recognition to local governments that exceed minimum requirements of the National Flood Insurance Program (refer to *Section Four: Risk Assessment – Flooding*). Recognition comes in the form of discounts on flood insurance policies purchased by citizens. The CRS offers credit for mitigation plans that are prepared according to a multi-step process.

Refer to *Section Five: Mitigation Strategy* for a general list of eligible and ineligible HMA projects.

**Resource Organization**

The primary objective of this planning process was to update the City of Beatrice Hazard Mitigation Plan, approved by FEMA in April 2008.

The City of Beatrice began the process of developing a hazard mitigation plan in March, 2012. JEO Consulting Group, Inc. (JEO) of Lincoln, Nebraska was contracted to guide and facilitate the planning process and assemble the hazard mitigation plan. Tobias Tempelmeyer, City of Beatrice City Administrator, led the development of the plan at the staff level and served as the primary point-of-contact throughout the project. JEO provided an overview of the work to be completed over the next eight months and a discussion of what types of information would need to be provided to the consultant to successfully complete the plan.

The coordination of efforts with local, state, and federal agencies and organizations was the first activity undertaken to begin the development process for the City of Beatrice Plan. Also, the Nebraska Department of Natural Resources (NDNR) and NEMA became involved in the planning process, and have assisted throughout. The City and JEO then worked together to identify elected officials and key stakeholders to lead the planning effort.

***Elected Officials and Key Stakeholders***

At the beginning of the planning process, the Planning Team, comprised of local participants and the consultant, was established to guide the planning process, review the plan, and serve as a liaison for plan participants throughout the City of Beatrice. A list of Planning Team members can be found in the table below. Additional technical support was provided to the Planning Team through staff from NEMA and the NDNR.

**Table 1: Hazard Mitigation Planning Team**

Name	Title	Jurisdiction
Tobias Tempelmeyer	City Administrator	City of Beatrice
Rex Behrends	City Engineer	City of Beatrice
Brian Daake	Fire Chief	City of Beatrice
Allen Langdale	City Council Member	City of Beatrice
Mark Jobman	Facilities Supervisor	Beatrice Community Hospital
Chris Schwan	Director of Facilities	Beatrice Community Hospital

Mark Meints	Emergency Director	Gage County
Matt Bauman	County Board Member	Gage County
Bob Morgan	Campus Director	Southeast Community College
Matthew D. Roque*	Planner/Project Coordinator	JEO Consulting Group, Inc.
Jeffery B. Ray*	Planning Department Manager	JEO Consulting Group, Inc.
Sheila Hascall*	State of Nebraska- NEMA	Nebraska Hazard Mitigation Officer
John Callen*	State of Nebraska -NDNR	Natural Resources Planning Coordinator

\*External Contributors

**Public Involvement and Participation**

Public involvement was stressed throughout the development of this hazard mitigation plan update. The public was invited to two public meetings where they could learn the benefits of having a Hazard Mitigation Plan and how it will benefit their community. At these meetings, they had the opportunity to participate in the process by completing surveys and offering insights and personal experiences. The public was invited to provide information that is helpful in developing a hazard mitigation plan, such as a community risk perspective related to hazards facing the community, records and recollections of historical occurrences, refinement of goals and objectives, and developing specific mitigation strategies and projects to reduce vulnerabilities for the community. Despite multiple opportunities there is little record of significant public involvement in this planning process.

The Hazard Identification Planning Team Meeting and Public Meeting were held on December 6th at the City Offices in Beatrice. Agendas and sign-in sheets from the meetings can be found in Appendix B.

The intent of these meetings was to provide the local officials, stakeholders, and the public with an overview of the work to be completed over the next three months and discuss what types of information would need to be provided to complete the plan. Meeting worksheets were distributed to provide an opportunity for public input on the identification of hazards, records of historical occurrences, establishment of goals and objectives, and potential mitigation alternatives (refer to Appendix C).

Prior to the meetings, JEO reviewed and evaluated the existing City of Beatrice and Lower Big Blue Natural Resources District plans in accordance with the current FEMA Local Multi-Hazard Mitigation Planning Guidance to ensure the updated plan met all applicable state and federal mitigation planning requirements. JEO identified information and data from the existing plans to be incorporated into the updated plan, new information and data available (Census 2010, historical occurrences, etc.), as well as information and data still needed to successfully complete the plan. JEO provided all necessary and potential changes, as per review, to the City of Beatrice and planning team prior to the public and planning team meetings.

The Mitigation Alternative Planning Team Meeting and Public Meeting were held on May 23<sup>rd</sup>, 2013 at the City Offices in Beatrice. Agendas, sign-in sheets, and minutes from the meetings can be found in Appendix B.

The intent of these meetings was to provide an opportunity for elected officials, stakeholders, and the public to review a draft of the plan and collect any additional information necessary to finish the plan. Meeting worksheets were distributed to provide an opportunity for plan participants to evaluate and prioritize

mitigation alternatives, as well as identify critical facilities; highly vulnerable areas and populations; and warning siren locations and ranges (refer to *Appendix C*). JEO worked alongside the City of Beatrice and planning team to revise and evaluate the current list of mitigation alternatives, documented those that have been implemented, and identified, evaluated, and prioritized new potential alternatives (refer to *Section Five: Mitigation Strategy*).

The public meeting provided the residents of the City of Beatrice with an overview of the work completed and a discussion of additional information necessary to complete the plan. The planning team was responsible for completing worksheets, which provided vital information necessary to successfully complete the plan (refer to *Appendix C*). They were also responsible for reviewing draft plan materials and a final review of the plan prior to submittal to FEMA for approval.

**Hazard Mitigation Local Publicity Efforts**

Press releases were sent to the Beatrice Daily Sun for both of the public meetings. These releases included detailed information about the project, as well as how to participate in it. The Planning Team also included representatives from Southeast Community College and the Beatrice Community Hospital

**Neighboring Jurisdictions**

The efforts taken to inform potential participants and provide opportunity for public involvement and participation in the planning process were also extended to neighboring jurisdictions. The figure and table below display the neighboring jurisdictions that were notified throughout the planning process. Refer to *Appendix B* for a copy of the correspondence sent to the neighboring jurisdictions. All jurisdictions are located in Nebraska unless otherwise noted.

**Table 2: Neighboring Jurisdictions**

Neighboring Jurisdictions		
Adams, NE	Barneston, NE	Blue Springs, NE
Clatonia, NE	Cortland, NE	Filley, NE
Liberty, NE	Odell, NE	Pickrell, NE
Virginia, NE	Wymore, NE	

**Structural Inventory**

In order to determine the types and quantity of structures within the City, the previous structural inventory was updated for the entire corporate limits. To accomplish this, building and demolition permit data was obtained from the City of Beatrice and added to the previous inventory to create the final inventory used in this HMP update.

Structures were categorized into the following classifications:

- **Residential**, including all residential structures: single-family dwellings, multi-family dwellings (duplexes, townhomes, and apartments), trailer homes, and retirement villages. High-Density Residential buildings, such as apartment buildings, were also identified. In the process, these were treated as residential structures.

- **Commercial / Industrial**, including all structures associated with commercial or industrial uses, such as motels, restaurants, gas stations, storage facilities, hair salons, manufacturing facilities, grain elevators, etc.
- **Public / Quasi Public**, including structures that are a part of any government facility, religious facility, non-profit organization, or community facility, such as post offices, county buildings, courthouses, city halls, fire stations, schools, churches, water treatment facilities, park facilities, etc.
- **Outbuildings**, including non-occupied buildings, such as garages and sheds of significant value (approximate value of \$5,000 or more).
- **Emergency Sirens**, including the location of each emergency siren and documentation of its approximate range.

**Table 3: Structural Inventory**

Structure Type	2008 HMP	2013 HMP
Residential	5,044	5,095
Commercial / Industrial	507	526
Public	65	71
Outbuildings	126	142
Totals	5,742	5,834

### **Future Development and Land Use Trends**

Comprehensive planning for the present and future begins with data collection. Data was collected that provided a snapshot of the past and present conditions of the planning area. Analysis of data provided the basis for developing forecasts for future land use demands in the planning area. The current development patterns and land use types found in the planning area will influence future development and land use trends.

Hazard prone areas should be strongly considered when communities expand and grow. Future development areas should make it a point to avoid known hazard areas. Additionally, future development can, in some communities, stress existing infrastructure and community services which could result in greater vulnerability for the entire community. Monitoring growth and establishing sustainable growth rates should be a very high priority for all communities. In an effort monitor growth and anticipate future growth a structural inventory was conducted for the City. The structural inventory, in addition to examining growth patterns, examined current land uses within the corporate limits and helped in completing the risk assessment for Section Four.

Future development and land use trends were defined as follows:

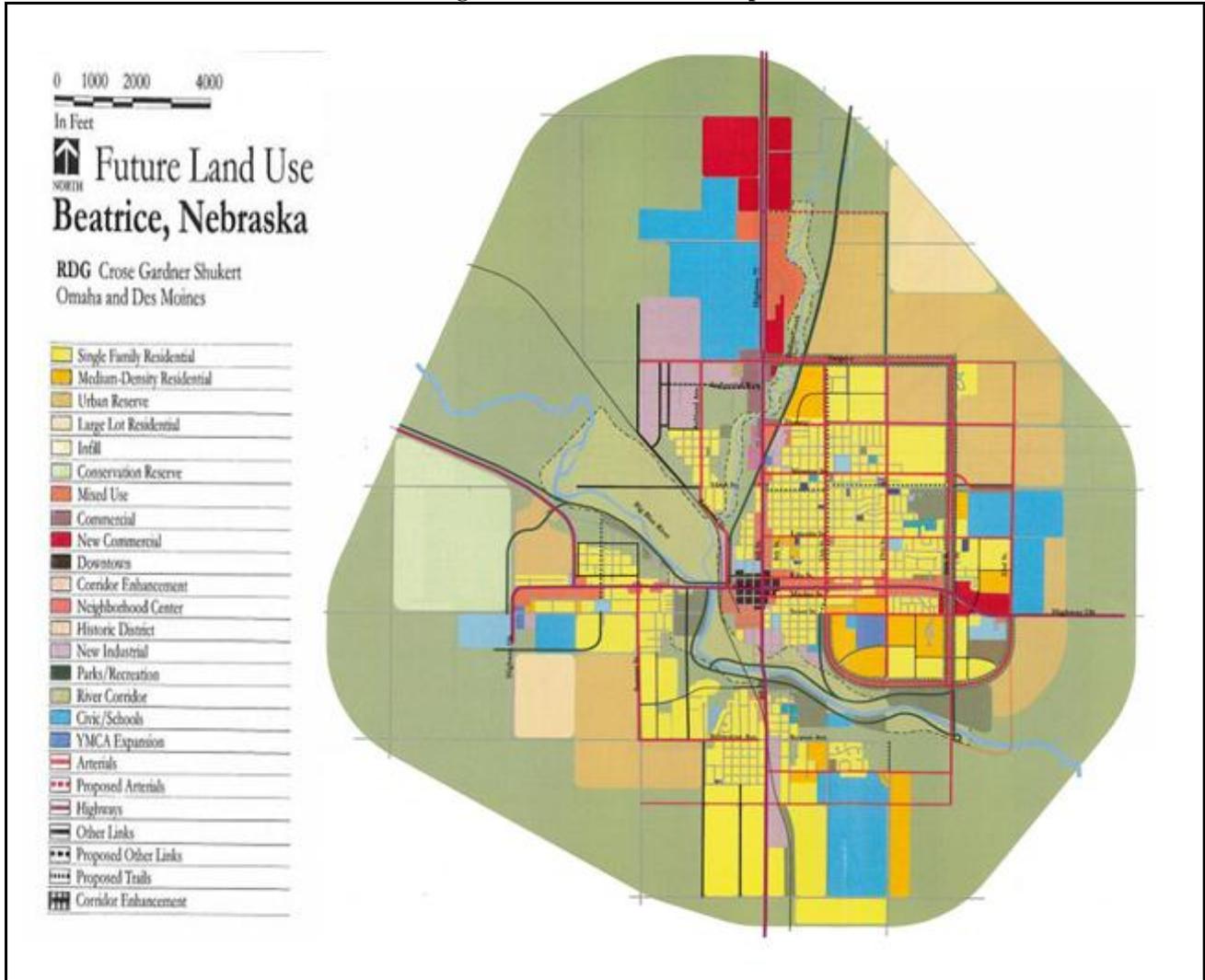
- None –
  - Number of Structures – Zero per year
  - Description – No foreseeable significant development anticipated
- Slight –
  - Number of Structures – One to ten per year

- Description – Gradual and sporadic development expected
- Moderate –
  - Number of Structures – 11 to 50 per year
  - Description – Continuing development expected within subdivided area
- Extensive –
  - Number of Structures – 51 to 200 per year
  - Description – Significant development expected throughout the area
- Widespread –
  - Number of Structures – 201+ per year
  - Description – Continual development expected throughout the area

The city of Beatrice has seen moderate growth over the last five years with the addition of 92 new structures from 2008 to 2013. This level of development has resulted in a responsible and sustainable rate of growth for the community but is lower than the projected growth rate in the community's comprehensive plan of 58 housing units alone per year. The 2001 comprehensive plan (updated in 2006) outlined future growth areas in a manner that should result in healthy and 'orderly' growth patterns for the entire community. Figure 1 shows the future growth map included in the comprehensive plan. The areas identified for future growth are largely outside of known hazard areas (such as floodplains). The comprehensive plan does discuss priority areas for future growth; the plan acknowledges the need for a division between residential development and industrial development. The plan also identifies the need to separate transportation routes for heavy trucks and commercial vehicles from residential areas as much as possible. Future comprehensive plan updates could more thoroughly address development and known hazards.

There is some evidence that the current growth patterns for the City have resulted in a reduced ability to meet the community's needs. An example of this is the 2014 effort to pass a local optional sales tax for public improvements. The City reports an inability to implement some needed roadway projects that date back to the 2000 One and Six Year Road Plan. Beatrice is, however, currently working to meet many of the needs of the City. Current project include resurfacing of roadways, reviewing possible wastewater facility upgrade/improvement, highway re-routing, and the replacement of troublesome water mains. As the community continues to grow the issue of insufficient resources will be an ongoing challenge that must be addressed.

Figure 1 Future Land Use Map



**Plan Approval and Adoption**

Based on FEMA requirements, this multi-jurisdictional hazard mitigation plan must be formally adopted by the City of Beatrice through a formal resolution. This approval will create ‘individual ownership’ of the plan by the City. Formal adoption provides evidence of the City’s full commitment to implement the plan’s goals and objectives and action items.

**Requirement §201.6(c) (5):** For multi-jurisdictional plans, each jurisdiction requesting approval of the plan must document that it has been formally adopted.

Once adopted, the City of Beatrice is responsible for implementing and updating the plan every five year. In addition, the plan will need to be reviewed and updated as appropriate when a hazard event occurs that significantly affects the City.

***General Plans, Documents, and Information***

General plans, documents, and information used throughout the development of the plan are listed below.

**Table 4: General Plans, Documents, and Information**

<b>Document/ Plan</b>	<b>Source</b>
Disaster Mitigation Act of 2000 (DMA)	FEMA
Federal Emergency Management Agency (FEMA)	<a href="http://www.fema.gov">http://www.fema.gov</a>
FEMA Map Service Center	<a href="http://www.msc.fema.gov">http://www.msc.fema.gov</a>
Flood Insurance Study	FEMA
Hazard Mitigation Assistance Unified Guidance	FEMA
High Hazard Dam Inundation Area/Information	NDNR
High Plains Regional Climate Center	<a href="http://www.hprcc.unl.edu">http://www.hprcc.unl.edu</a>
Interim Final Rule (IFR)	FEMA
Local Multi-Hazard Mitigation Planning Guidance (Blue Book)	FEMA
National Agricultural Statistics Service (NASS)	<a href="http://www.nass.usda.gov/">http://www.nass.usda.gov/</a>
National Climatic Data Center (NCDC)	<a href="http://www.ncdc.noaa.gov">http://www.ncdc.noaa.gov</a>
National Drought Mitigation Center	<a href="http://drought.unl.edu">http://drought.unl.edu</a>
National Drought Mitigation Center – Drought Impact Reporter	<a href="http://www.droughtreporter.unl.edu">http://www.droughtreporter.unl.edu</a>
National Drought Mitigation Center – Drought Monitor	<a href="http://drought.unl.edu/dm/monitor.html">http://drought.unl.edu/dm/monitor.html</a>
National Environmental Satellite, Data, and Information Service (NESDIS)	<a href="http://www.nesdis.noaa.gov/">http://www.nesdis.noaa.gov/</a>
National Flood Insurance Program (NFIP)	<a href="http://www.fema.gov">http://www.fema.gov</a>
	<a href="http://dnrdata.dnr.ne.gov">http://dnrdata.dnr.ne.gov</a>
National Flood Insurance Program Bureau and Statistical Agent BureauNet	FEMA
National Flood Insurance Program Community Status Book	FEMA, NDNR
National Historic Registry	<a href="http://www.nps.gov/nr">http://www.nps.gov/nr</a>
National Oceanic Atmospheric Administration (NOAA)	<a href="http://www.noaa.gov/">http://www.noaa.gov/</a>
Natural Resources Conservation Service (NRCS)	<a href="http://www.ne.nrcs.usda.gov">www.ne.nrcs.usda.gov</a>
Nebraska Association of Resources Districts (NARD)	<a href="http://www.nrdnet.org">http://www.nrdnet.org</a>
Nebraska Climate Assessment Response Committee (CARC)	<a href="http://carc.agr.ne.gov">http://carc.agr.ne.gov</a>
Nebraska Department of Natural Resources – Dam Inventory	<a href="http://dnrdata.dnr.ne.gov/Dams/Search.aspx?mode=county">http://dnrdata.dnr.ne.gov/Dams/Search.aspx?mode=county</a>
Nebraska Department of Natural Resources – GIS	<a href="http://dnrdata.dnr.ne.gov">http://dnrdata.dnr.ne.gov</a>
Nebraska Department of Natural Resources (NDNR)	<a href="http://www.dnr.ne.gov">http://www.dnr.ne.gov</a>
Nebraska Department of Revenue	<a href="http://www.revenue.ne.gov">www.revenue.ne.gov</a>
Nebraska Department of Revenue – Property Assessment Division	<a href="http://www.revenue.ne.gov/PAD">www.revenue.ne.gov/PAD</a>
Nebraska Drought Mitigation and Response Plan	Nebraska Climate Assessment and Response Committee (CARC)
Nebraska Emergency Management Agency (NEMA)	<a href="http://www.nema.ne.gov">http://www.nema.ne.gov</a>
Nebraska Forest Service	<a href="http://www.nfs.unl.edu/">http://www.nfs.unl.edu/</a>
Nebraska Forest Service – Wildland Fire Protection Program	Nebraska Forest Service
Nebraska Geological Survey Landslide Study	University of Nebraska at Lincoln – School of Natural Resources
Nebraska Public Power District Service	<a href="http://sites.nppd.com">http://sites.nppd.com</a>

Nebraska State Hazard Mitigation Plan	<a href="http://www.nema.ne.gov/pdf/hazmitplan.pdf">http://www.nema.ne.gov/pdf/hazmitplan.pdf</a>
Storm Prediction Center Statistics	<a href="http://www.spc.noaa.gov">http://www.spc.noaa.gov</a>
The Census of Agriculture	<a href="http://www.agcensus.usda.gov/">http://www.agcensus.usda.gov/</a>
United States Census Bureau	<a href="http://www.census.gov">http://www.census.gov</a>
United States Department of Agriculture – Risk Assessment Agency (RMA)	<a href="http://www.rma.usda.gov">http://www.rma.usda.gov</a>
United States Department of Agriculture (USDA)	<a href="http://www.usda.gov">http://www.usda.gov</a>
United States Department of Commerce	<a href="http://www.commerce.gov/">http://www.commerce.gov/</a>
United States Geological Survey (USGS)	<a href="http://www.usgs.gov/">http://www.usgs.gov/</a>
United States Small Business Administration	<a href="http://www.sba.gov">http://www.sba.gov</a>
University of Nebraska-Lincoln	<a href="http://www.unl.edu">http://www.unl.edu</a>
UNL – CASNR – Schools of Natural Resources (SNR)	<a href="http://snr.unl.edu">http://snr.unl.edu</a>
UNL – CASNR – SNR – Conservation and Survey Division	<a href="http://snr.unl.edu/csd">http://snr.unl.edu/csd</a>
UNL – College of Agricultural Sciences & Natural Resources (CASNR)	<a href="http://casnr.unl.edu">http://casnr.unl.edu</a>
What is a Benefit: Guidance on Benefit-Cost Analysis on Hazard Mitigation Projects	FEMA
Beatrice 2001 (update in 2006) Comprehensive Plan	<a href="http://www.beatrice.ne.gov/pdf/plans/ComprehensivePlan.pdf">http://www.beatrice.ne.gov/pdf/plans/ComprehensivePlan.pdf</a>
Beatrice Zoning Ordinance 2013	<a href="http://www.beatrice.ne.gov/pdf/ZoningOrdinanceUpdate_2013AUGUST.pdf">http://www.beatrice.ne.gov/pdf/ZoningOrdinanceUpdate_2013AUGUST.pdf</a>

### Plan Update Status

The table below compares the tables of contents from the original 2008 Hazard Mitigation Plan with this 2013 plan. Table 5 evaluates each section and provides notations showing the updating of each section.

**Table 5: Plan Update Summary**

Original Plan Table of Contents	Updated Plan Table of Contents	Update Status
<b>Section One: Introduction</b>		
Purpose of the Plan	Moved to Section Two: Purpose of the Plan	Sub-section reviewed and updated.
Organization of the Plan	Plan Organization	Sub-section reviewed and updated.
	Hazard Mitigation Planning Introduction	New Sub-section describing HMPs.
	Disaster Mitigation Act of 2000	New Sub-section outlining the legislation and statutes pertaining to HMPs.
	Plan Financing and Preparation	New Sub-section added.
<b>Section Two: Planning Process</b>		
Preparation of the Plan	Resource Organization	Sub-section reviewed and updated.
Planning Process	Moved to Section One: Plan Financing and Preparation	Updated with relevant information.
Public Involvement	Public Involvement and Participation	Sub-section reviewed and updated.
Methodology	Hazard Mitigation Planning Process	Updated to reflect new FEMA guidance.
Resolution Approving the Plan	Plan Approval and Adoption	Sub-section reviewed and updated.

	General Plans, Documents, and Information	New Sub-section listing the references used throughout the document.
	Plan Update Status	New Sub-section outlining the changes from the previous plan.
<b>Section Three: Community Profile</b>		
Location and Geography	City of Beatrice Location and Geography	Copied from previous document.
Community History	Community History	Copied from previous document.
Population	Demographics and Assets Summary	Updated with 2010 Census Data.
	Population and Housing	Updated with 2010 Census Data.
	National Historic Registry	New Sub-section detailing sites on the National Historic Registry.
	Structural Inventory and Valuation Summary	Updated from previous plan.
	Critical Facilities	Updated from previous plan.
	Highly Vulnerable Areas and Populations	Updated from previous plan.
Developmental Patterns	Future Development and Land Use Trends	Updated with data from new Comp Plan.
Climate	City of Beatrice Climate Summary	Updated with latest climate data.
	Farm Service Agency SBA Disasters	New Sub-section that details the SBA declared disasters.
	Presidential Disaster Declarations	New Sub-section that details presidential disaster declarations.
<b>Section Four: Risk Assessment</b>		
Hazard Identification	Hazard Identification	Updated with new ID methods.
	Hazards Not Identified within the City of Beatrice	New Sub-section detailing the hazards not identified within this plan.
Structural Inventory and Critical Facilities	Moved to Section Two: Structural Inventory	Updated using City building and demolition permits data.
Severe Thunderstorms	Severe Thunderstorms	Updated to reflect new data.
Tornado / High Winds	Tornados and High Winds	Updated to reflect new data.
Severe Winter Storms	Severe Winter Storms	Updated to reflect new data.
Flooding	Flooding	Updated to reflect new data.
Drought	Drought	Updated to reflect new data.
Extreme Heat	Extreme Heat	Updated to reflect new data.
Dam Failure	Dam Failure	Updated to reflect new data.
Earthquakes	Earthquakes	Updated to reflect new data.
	New HIRA Based Hazards Considered	New Sub-section with new hazards added to plan.
	Chemical Fixed Sites	New Sub-section added.
	Civil Disorder	New Sub-section added.
	Radiological Fixed Sites	New Sub-section added.
	Radiological Transportation	New Sub-section added.
	Urban Fires	New Sub-section added.
	Animal Disease	New Sub-section added.

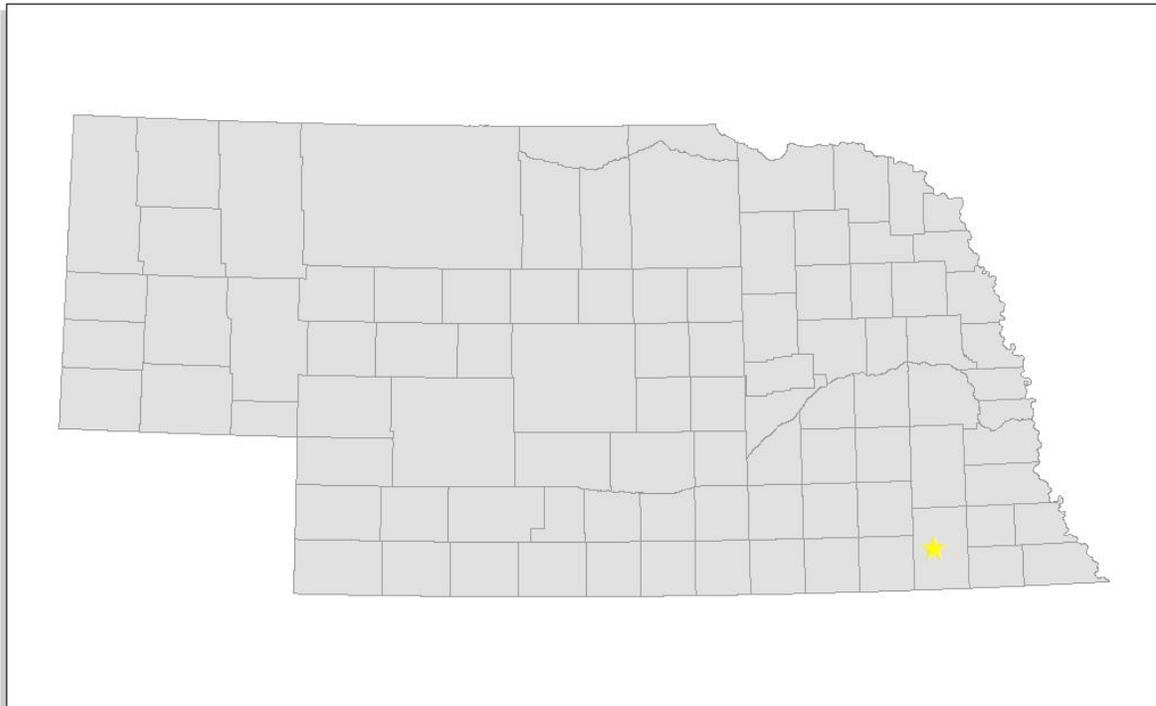
	Plant Disease	New Sub-section added.
	Chemical Transportation	New Sub-section added.
	Power Failure	New Sub-section added.
	Terrorism	New Sub-section added.
	Transportation	New Sub-section added.
<b>Section Five: Mitigation Strategy</b>		
Introduction	Introduction	Updated from previous plan.
Development of Goals	Development of Goals	Copied from previous document.
Mitigation Alternatives	Mitigation Alternatives	Previous plan had the projects in the Appendices. They have been moved into this section of this plan.
	Previous Mitigation Efforts	New Sub-section. The previous plan was the first completed.
<b>Section Six: Plan Implementation and Maintenance</b>		
Monitoring, Evaluation and Updating the Plan	Monitoring, Evaluating, and Updating the Plan	Updated from previous plan.
	Hazard Mitigation Assistance	New Sub-section with relevant information
	Eligible Mitigation Projects	New Sub-section with relevant information
	Ineligible Mitigation Activities	New Sub-section with relevant information
Continued Public Involvement	Continued Public Involvement	Updated from previous plan.
Incorporation into Existing Plans and Mechanisms	Incorporation into Existing Planning Mechanisms	Updated from previous plan.

## **Section Three: Profile**

### ***City of Beatrice Location and Geography***

Beatrice is located in Gage County, in the southeastern part of Nebraska. Located in the center of the County, Beatrice serves as the county seat for Gage County. Beatrice is located 39 miles south of Lincoln, 99 miles southwest of Omaha, and 179 miles northwest of Kansas City. The City is located at the intersection of Nebraska State Highway 4 and U.S. Highways 77 and 136.

**Figure 2: Location of Beatrice, NE**



Beatrice is located in the fertile valley of the Big Blue River, and the terrain in the immediate area is level to gently rolling. The soil type in the area is predominantly silty clay loam. Beatrice is 1,318 feet above sea level. The Big Blue River and Indian Creek run through the City of Beatrice. The Big Blue River generally runs from the northwest to southeast. There is a meander in the river that generally surrounds the downtown area. Indian Creek runs in a north-northeast to south-southwest direction, crossing North 6th Street north of Dorsey Street and joins the Big Blue River north of the bridge across Court Street.

### ***Community History***

Beatrice was founded in 1857, three years after Nebraska was officially organized as a Territory eligible for settlement. At the time of its founding, there was no town any further west located on the south side of the Platte River until a traveler arrived at the “village” of camp followers connected to Fort Kearny. As a result, Beatrice was the last location for civilian justice for over 100 miles. The site for Beatrice was chosen due to the natural ford on the Big Blue River that was readily available in addition to the abundance of game, richness of soil and natural beauty. The area also boasted old growth hardwood trees, natural springs and artesian wells, clay deposits for bricks and limestone for quarrying. Three years after its founding, Beatrice

boasted a population of 85. The 1861 trial of Wild Bill Hickok for the murder of David C. McCanles was held in the first cabin constructed in Beatrice because that was the nearest court of law available.

A trail that had already been established from Brownville (the oldest incorporated town in Nebraska) to Fort Kearney was located to the north of Beatrice. With its settlement, the route was relocated to Beatrice and became known as the DeRoin Trail. From Beatrice it joined the Oregon Trail near the Alexandria, Nebraska area. This was the easiest, most direct route to Fort Kearny (by boat to Brownville, by wagon west.) This old route is now Highway 136 into Beatrice and Highway 4 through Homestead National Monument as it extends to the west; this old freight road is one of the reasons for the selection of this first Homestead location by Daniel Freeman in 1862. These highways continue to be used today as southern alternatives to Interstate 80. The Brownville connection is still important due to the location of the Cooper Nuclear Station in that community. Highway 136 was once known as the Goldenrod Highway, then Highway 3 before being renumbered as a federal highway.

Originally, the road leaving Beatrice went either northeast to Nebraska City or northwest to the Crete area. This changed after 1867 when Lincoln was established as the new State Capital. The first Courthouse was built along this new street in 1870. The site was moved from its original planned location on the road to Brownville. The road to Lincoln became known as Cornhusker Highway and then U.S. Highway 77. It is now a four-lane road connecting Beatrice to Interstate 80 in Lincoln. It has been renamed in honor of the Homestead. It is also a route that still passes directly through Beatrice. Highway 77 and 136 cross at the center of Beatrice at 6th and Court Streets. Whatever is traveling along these routes is brought right into the heart of the historic downtown area.

Beatrice was formally platted and established as a City of the Second Class in 1872. Its population was over 625. This coincided with the arrival of the first railroad in the community, a line that ultimately became associated with the Burlington line. Within the next 20 years, it was joined by the Union Pacific and the Rock Island railroads. At the present time only the original Burlington tracks are still used during the harvest season.

In 1874 Beatrice established building codes to replace the original wooden downtown buildings with stone or brick structures. Town officials began enforcing early fire code standards. The community also had a number of volunteer firefighters. This resulted in the loss of individual buildings rather than whole blocks. The conflagrations that characterized many early frontier settlements were never a reality for Beatrice. Early accounts describe many lightning strikes as people built on the prairie. Although fires resulted, they were controlled without damage to other structures. Presently, the oldest buildings in the downtown area are limestone buildings dating from the early 1870s. Much of the historic building stock in downtown Beatrice dates from this period from the 1870s to the 1890s.

From the 1870s onward, Beatrice was home to many agriculturally-based manufacturing businesses. These included water pumps, windmills, cornhusking hooks, hay balers, barbed wire, along with a creamery (that would later become the multi-national Beatrice Foods Corporation) and a canning factory. This provided complementary jobs in the local economy.

In 1885 the earliest form of the Beatrice State Developmental Center was established on 40 acres donated for that purpose northeast of Beatrice. Since this institution provided 24/7 care from the start, it provided both jobs and housing for many employees. Over the years this has grown to be the largest employer in the community. Although it is still outside city limits, fire services are provided by the City of Beatrice.

Beatrice's first hospital was founded by a local doctor in 1899. The Mennonite Church founded a hospital in 1911 and the Lutherans followed with one of their own in 1913. But since the early 1980s there has been only one organization: the Beatrice Community Hospital. However, the hospital facility and the extended care and assisted living facility are two separate buildings.

Due to its diverse economy, Beatrice survived the Depression of the 1930s with its local banks intact. During the 1930s, the first of two natural gas pipelines was constructed immediately outside the Beatrice city limits. The original homestead of Daniel Freeman was purchased by the Federal Government and made Homestead National Monument of America in honor of the 1862 Homestead Act and its impact on the nation and the world.

Beatrice's strong manufacturing base provided the opportunity for war-related jobs from 1941-1945. The first contracts were received from the Department of the Navy months before the formal declaration of war in December. The six major manufacturers in the area incorporated as Homestead Industries and made unified bids in order to be awarded government contracts. These manufacturers received awards for production and bond sales throughout the war.

In 1946 the Beatrice Municipal Airport was dedicated. It is a general aviation airport located on the north edge of Beatrice.

In the late 1950s and early 1960s Beatrice began to actively seek to bring manufacturers to the community to provide employment opportunities beyond what was available through the "home-grown" options. Two large chemical companies located plants west of the community. The Martin Luther Home (currently Mosaic) was moved from a neighboring town to a campus in southeast Beatrice. This added more employment opportunities in a community that was already serving 100s of developmentally disabled. Recently, there was a large Bio-Diesel Plant constructed on the outer edge of Beatrice. It is a \$52.5 million facility, operated by Duonix Beatrice LP, which produces 50 million gallons of bio-diesel per year.

By the late 1960s, Beatrice had realized another dream by establishing Pershing College. Pershing College, a private 4-year institution, was established west of Beatrice. By the mid-1970s it had become part of the state-funded Southeast Community College and continues in that role at the present time.

In the early 1980s several new industries located in Beatrice and an industrial park was opened on the north edge of Beatrice near the airport. Due to its tremendous success, second and third additions were opened.

The 1990s brought a group of new buildings: a public library, Senior Center, an addition to the YMCA and new High School.

The population for the city of Beatrice has been relatively flat for the last decade and as a result there have been little development within the community. The Beatrice Community Hospital has recently undergone

upgrades and improvements. The Downtown Association has stress revitalization as a necessary strategy for the community and developed a revitalization plan in 2011.

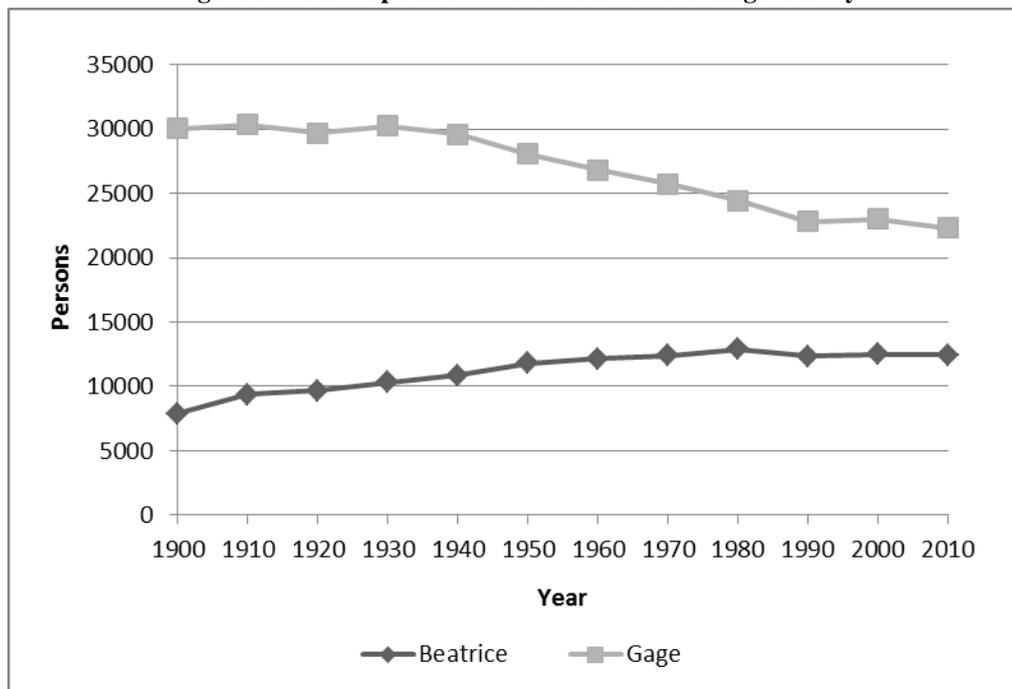
### ***Demographics and Assets Summary***

Demographics and assets information can be used to determine differing levels of vulnerability by analyzing data on population and housing, structural inventories and valuations, critical facilities, and highly vulnerable areas and populations for the City of Beatrice.

### **Population Analysis**

Figure 3 and figure 4 summarize various population and housing characteristics such as population trends; population by age; housing occupancy and tenure; and age of structures. Table 6 highlights selected demographic characteristics including housing units lacking complete facilities, mobile home housing units and population ages 65 and older with a disability.

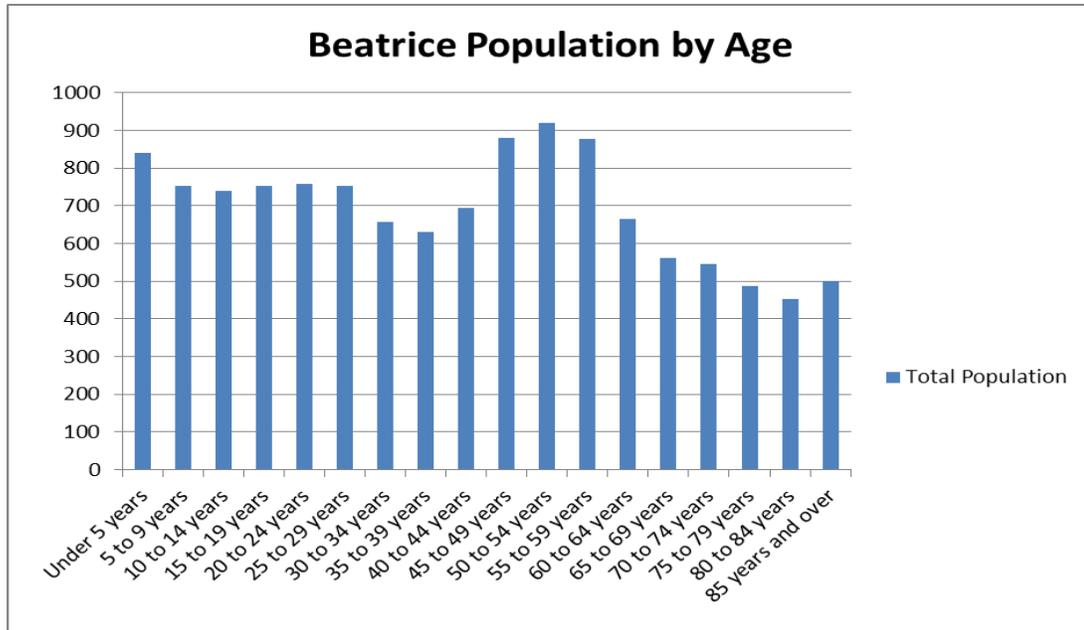
**Figure 3: Total Population Trend Beatrice and Gage County**



Source: United States Census Bureau – 1900 - 2010

The total population of Beatrice in 2000 was 12,510 persons, however, by 2010, it had decreased to 12,459. For the last four decades the population for Beatrice has been mostly flat with little in-migration. While Beatrice has had a relatively consistent population Gage County has seen a consistent decline since a peak in the 1930s. The City’s largest ten-year age cohort is that of 45-54 representing 14.5% of the total population or 1,800 persons. Individuals in this age cohort should, by mostly, be able to provide for themselves and will have a lower overall vulnerability to most natural hazards. The smallest age cohort of 85 and older represents 4.0% or 499 persons. The selected population characteristics include the disability status of the civilian non-institutionalized population age 65 and older, and the percentage of residential units lacking minimum services.

Figure 4: Population by Age



Source: United States Census Bureau – 2010 (DP-1)

**Highly Vulnerable Areas and Populations**

Highly vulnerable areas and populations are considered to be more at risk or susceptible to the effects of hazards. These may include, but are not limited to elderly members of the community, very young members of the community, mobile home parks, nursing homes, campgrounds, fairgrounds, parks, etc.

The City of Beatrice identified highly vulnerable areas and populations where residents and visitors to the City may be more open or exposed to natural hazards both during and after an event and require additional assistance. Highly vulnerable areas and populations were identified at the public meeting through the meeting worksheets (Appendix C). Figure 5, following, displays the highly vulnerable areas and populations identified by the City of Beatrice.

Table 6 Vulnerable Populations

Demographic consideration	Demographic Population	Percent of Population	Hazard(s) of Concern	Reason for Vulnerability
Over the age of 55	4,083	32.8%	Severe Winter Storm	More likely to be injured during strenuous activities (i.e. shoveling snow)
Over the age of 65	2,543	20.4%	Severe Winter Storm	More likely to be injured during strenuous activity (i.e. shoveling snow)
			Tornado	Decreased mobility (less able to seek shelter)
			Severe Thunderstorm	
			Extreme Heat	
Under the age of 19	3,085	24.8%	Severe Winter Storm	Typically reliant upon others for transportation
			Tornado	

			Extreme Heat	Daytime hours in school More seriously impacted by extreme heat
<b>Under the age of 10</b>	1,594	12.8%	Severe Winter Storm Tornado Severe Thunderstorm Extreme Heat	Reliant upon others for transportation Daytime hours in school More seriously impacted by extreme heat More likely to be injured in an event such as a tornado
<b>Households recently moved to the area (2005 or later)**</b>	2,283	43.0%	Severe Winter Storm Tornado Extreme Heat	May not know where emergency services are located May not have a social network May not be familiar with evacuation routes or storm shelters locations May not be familiar with local weather patterns / tendencies
<b>Families and People with Income below Poverty Level*</b>	1,408	11.3%	All	May lack resources to retrofit homes May lack resources to prepare for potential disaster events

Source: 2010 US Census Bureau, 2011 American Community Survey 5-Year Estimates (\*DP03, \*DP04)

Highly vulnerable areas and populations identified below include educational facilities with concentrated populations, hospitals and care facilities with special needs populations, major employers, and gathering locations. These locations have been identified due to the possibility that the populations housed within them, whether due to concentration or other characteristics, may require additional assistance in the event of a disaster. For example, children and the elderly may require additional assistance including reunification with family members.

**Table 7: Educational Facilities**

School or Building Site	Location	2012 Enrollment
Beatrice High School	600 Orange Blvd	657
Beatrice Middle School	215 N 5th St	499
Cedar Elementary School	201 S Cedar St	153
Lincoln Elementary School	500 N 19th	241
Stoddard Elementary School	400 S 7th St	251
Paddock Lane School	1300 N 14th St	367
St Joseph Elementary School	420 N 6th St	78
St Paul's Lutheran Elem School	930 Prairie Lane St	148

**Table 8: Hospitals and Care Facilities**

Facility	Location	Capacity
Beatrice Community Hospital & Health Center	4800 Hospital Parkway	25
Beatrice Manor Care Center	1800 Irving Street	87
Good Samaritan Society – Samaritan Springs	600 South 22 <sup>nd</sup> Street	80
The Kensington	105 North 6th	65
Nebraska Peo Home	413 North 5 <sup>th</sup> Street	20
Homestead House (Assisted Living Concepts, LLC)	2300 Lincoln Street	47
*Beatrice State Development Center	3000 Lincoln Street	120

**Table 9: Major Employers**

Company	Location	Estimated Employment
Beatrice State Development Center	3000 Lincoln Street	697
Exmark Manufacturing	Beatrice, NE	400
Beatrice Community Hospital and Health Center	Beatrice, NE	365
Mosaic	Beatrice, NE	350
City Schools	Beatrice, NE	342
NEAPCO	Beatrice, NE	335
Good Samaritan Society	Beatrice, NE	225
Store Kraft	Beatrice, NE	190
City of Beatrice	Beatrice, NE	139
Southeast Community College	Beatrice, NE	118
Gage County Government	Beatrice, NE	112
Beatrice Manor	Beatrice, NE	100

**Table 10: Gathering Locations**

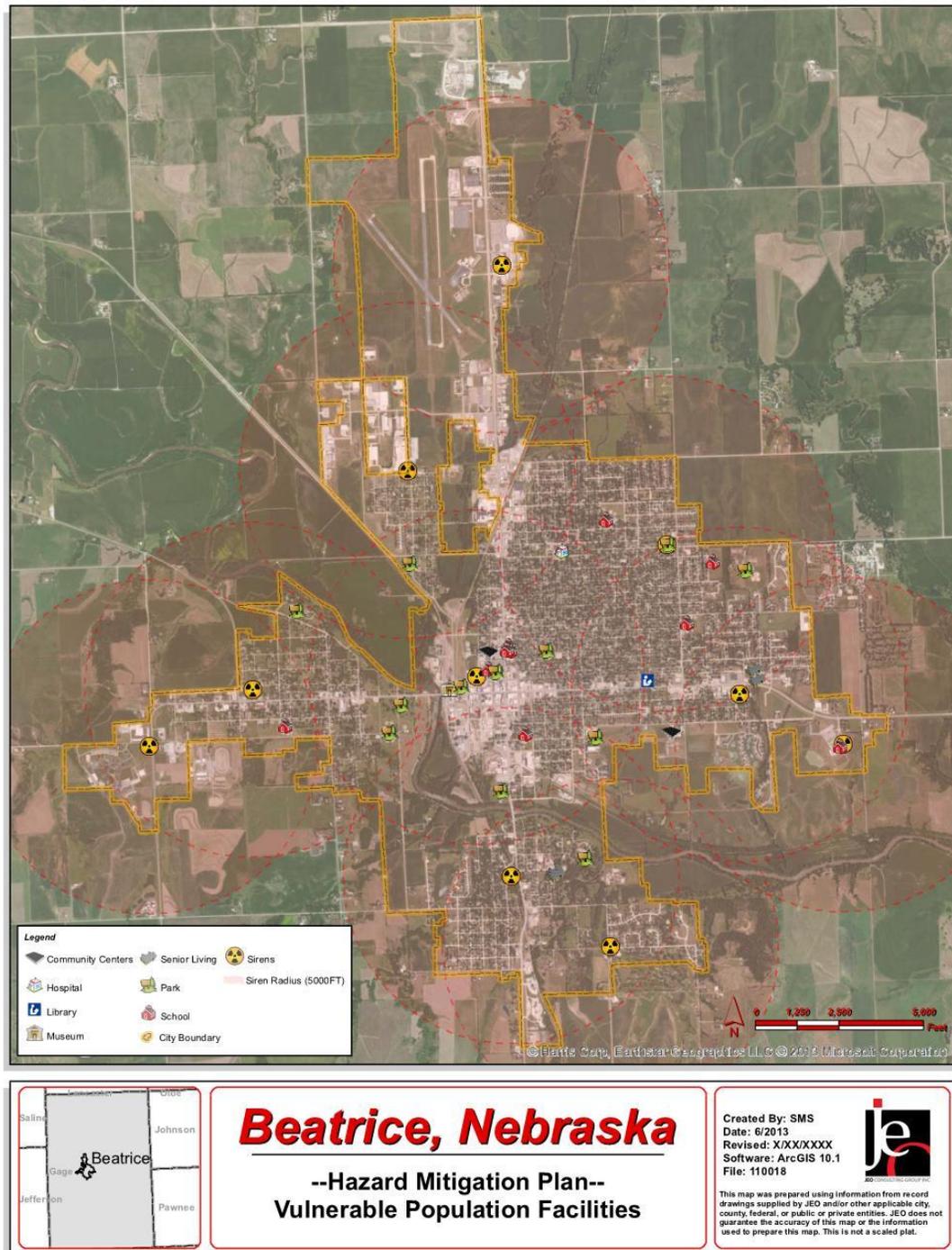
Facility / Area / Site	Location	Activity
Astro Park	19th & Hoyt St.	playground, picnic area
Beatrice Public Library	100 N 16th St.	library
Big Blue Water Park	1200 Scott St.	water park
Charles Park	200 Block N 5th St.	picnic area
Chautauqua Park	9th St. & Grable Ave.	sports fields, playground, picnic area, camping
Dog Run	S 6th St. & Grable Ave.	dog run
Gage County Fairgrounds	Logan & Scott Street	public buildings
Gage County Historical Museum	101 N 2nd St.	museum
Hannibal Park	Half mile east of 19th & Hoyt St.	sports fields, playground, picnic area
Hike & Bike Trail	205 N 4th St.	Park
Nichols Park	200 Block W Court St.	picnic area
Riverside Park	Sumner St. & Pleasant St.	sports fields, playground, picnic area, camping

*Section Three: Profile*

---

Robertson Park	9th St. & High St.	playground, picnic area
Roszell Park	Union St. & Park St.	playground, picnic area
Skate Park	Center St. & W Court St.	skate park
Veterans Memorial Park	1050 S 6th St.	park
YMCA	1801 Scott St.	community center

Figure 5: Beatrice Vulnerable Population Facilities



**Housing and Critical Facility Assessment**

Overall, the number of occupied housing units in Beatrice is 5,384 and the number of vacant housing units is 688. Of the occupied housing units, 3,459 units or 64.2% are owner-occupied and 1,925 units or 35.8% are renter-occupied. Homeowners are typically more able to undertake mitigation measures than renters, who are

limited in their ability to modify the structures. Additionally, vacant housing units may become run down and increase the vulnerability of neighboring structures to hazards such as high winds.

Table #11 shows vulnerable housing conditions and how those situation result in increased levels of vulnerability and the hazards that poses the greatest risk.

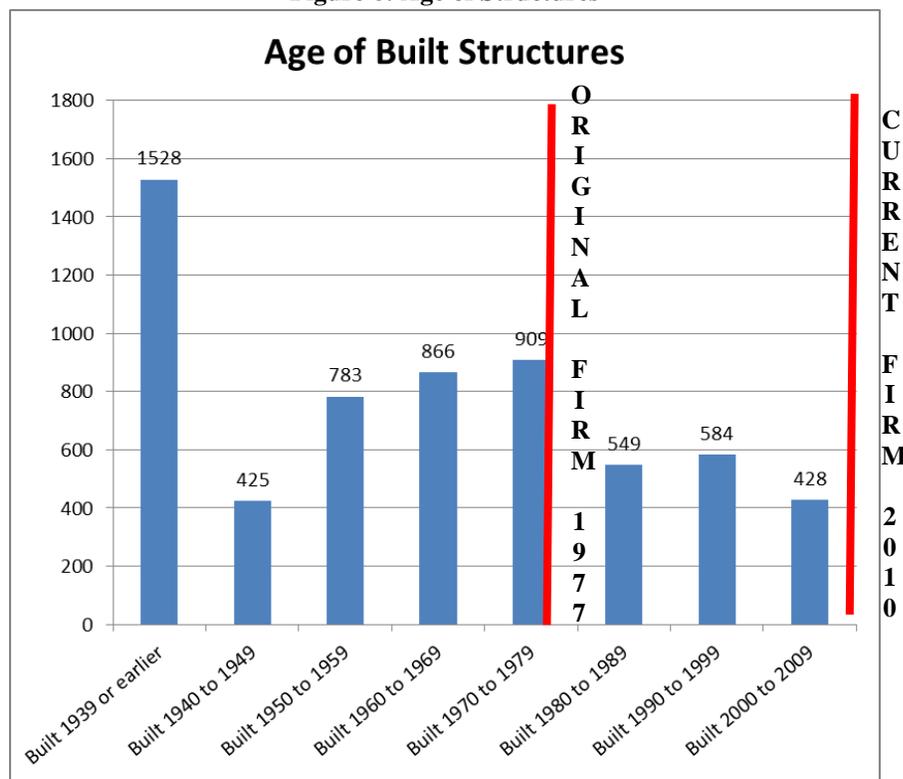
**Table 11 Household Vulnerabilities**

Housing Consideration	Number of housing units	Percentage of housing	Hazard(s) of Concern	Explanation of Vulnerability
Households with individuals over 65 years	1,772 [908 Living Alone]	32.2% [16.6%]	Severe Winter Storm Tornado Severe Thunderstorm Extreme Heat Wildfire Flash Flooding	Decreased mobility Power outages may disrupt medical needs Greater difficulty with evacuations More susceptible to extreme temperatures
Households with Electric Heat only**	1,807	32.9%	Severe Winter Storm Severe Thunderstorm	Downed power lines result in no heat
Households with no vehicle available**	479	9.1%	Severe Winter Storm Tornado Severe Thunderstorm	Reduced ability to evacuate hazard area Reduced ability to seek shelter Reduced ability to procure emergency supplies
Households with no phone available**	246	4.6%	All	Decreased ability to receive warnings of severe weather Decreased ability to request emergency services
Mobile Homes**	50	0.8%	Tornado Severe Thunderstorm Severe Winter Storm Flooding	Can be overturned with 60 mph winds Hail can result in significant damages In floods more likely to be “washed away” than traditional structures
Renter-occupied housing units	2,014	36.6%	Severe Winter Storm Tornado Severe Thunderstorm Extreme Heat Drought Flooding	Structures may not have received sufficient maintenance Occupants are not able to implement retrofits May not have a social network May not be familiar with evacuation routes or storm shelters locations

Vacant Housing Units	566	9.3%	All	<p>More likely to be derelict – therefore may cause debris</p> <p>Can lead to increased crime in neighborhoods and other safety concerns</p> <p>May be used as refuge, despite being substandard</p> <p>Impacts recovery of an impacted community</p>
<p>Source: 2010 US Census Bureau, 2011 American Community Survey 5-Year Estimates, *DP03, **DP04</p>				

The overall age of structures represents vulnerability for the city of Beatrice. A large percentage (28%) of housing units in Beatrice were constructed prior to 1939. Nearly 70 percent of housing units were constructed prior to the development of the FIRM in 1977. Structures of this are vulnerable to dilapidation and disrepair more quickly than newer structures. Older structures built in the floodplain or floodprone areas are highly vulnerable to damages and flood related losses. Structures built in the floodplain prior to the FIRMs may be built to lower elevation increasing the potential for damages and loss.

Figure 6: Age of Structures



Source: United States Census Bureau – 2006-2010 (ACS)

**National Historic Registry**

Historic sites are a concern for many communities due to potential exposure to natural and manmade hazards. Table #12 identifies the historic sites in Beatrice according to the National Register of Historic Places.

**Table 12: National Historic Registry**

Site Name	Date Listed	Address	Urban/ Rural
Homestead National Monument of America	10/15/1966	8523 W State Hwy 4	District
Algernon S. Paddock House	3/14/1973	1401 N. 10 <sup>th</sup> Street	Building
Burlington Northern Depot	5/2/1975	118 Court Street	Building
Beatrice City Library	7/12/1976	200 N. 5 <sup>th</sup> Street	Building
Beatrice Chautauqua Pavilion and Gatehouse	4/9/1979	6 <sup>th</sup> and Grable	Buildings
Samuel D. Kilpatrick House	12/20/1984	701 North 7 <sup>th</sup> Street	Building
Paddock Hotel	11/30/1987	105 N. 6 <sup>th</sup> Street	Building
Gage County Courthouse	1/10/1990	612 Grant Street	District
Hoyt Street Bridge	6/29/1992	Vacated Hoyt road over Big Blue River	Structure
Institution for Feeble Minded Youth Farm	12/8/1997	rural	Rural Buildings
Christ Church Episcopal	11/29/1999	520 N. 5 <sup>th</sup> Street	Building
Beatrice Municipal Auditorium	11/16/2005	205 N. 4 <sup>th</sup> Street	Building
Rachel Kilpatrick Purdy House	11/8/2006	1201 N. 11 <sup>th</sup> Street	Building
J. Schmuck House	7/2/2008	113 N.5 <sup>th</sup> Street	Building
North Eleventh Street Historic District	3/10/2010	Gage	District
North Seventh Street Historic District	3/10/2010	Gage	District
Marion and Ruth Ann Dole House	12/10/2010	1908 South 4 <sup>th</sup> Street	Building

Source: National Register of Historic Places

Based on U.S. Census data, there are 6,072 housing units in the City of Beatrice. Of these, approximately 3,602 housing units, or 59.4%, were constructed prior to 1970 with the majority (25.2%) built prior to 1940. Another 2,042 or 33.6% were built between 1970 and 1999, leaving only 7% of the housing stock built since 2000. The first Flood Insurance Rate Map was created in 1977, indicating that structures built previous to this date close to rivers, streams, and poor drainage areas may not be properly elevated and therefore may be at greater risk from flooding.

**Structural Inventory and Valuation Summary**

Table 13 displays the structural inventory and valuation summaries for the City of Beatrice.

**Table 13: Structural Inventory and Valuation Summary**

Jurisdiction	Residential		Commercial/ Industrial		Out Buildings		Public*		Total	
	#	Value	#	Value	#	Value	#	Value	#	Value
Beatrice	5,095	\$344,375,700	526	\$96,247,275	142	\$0	71	\$87,923,481	5,834	\$528,546,456

Source: Gage County Assessor Data & Nebraska Department of Revenue

**Critical Facilities**

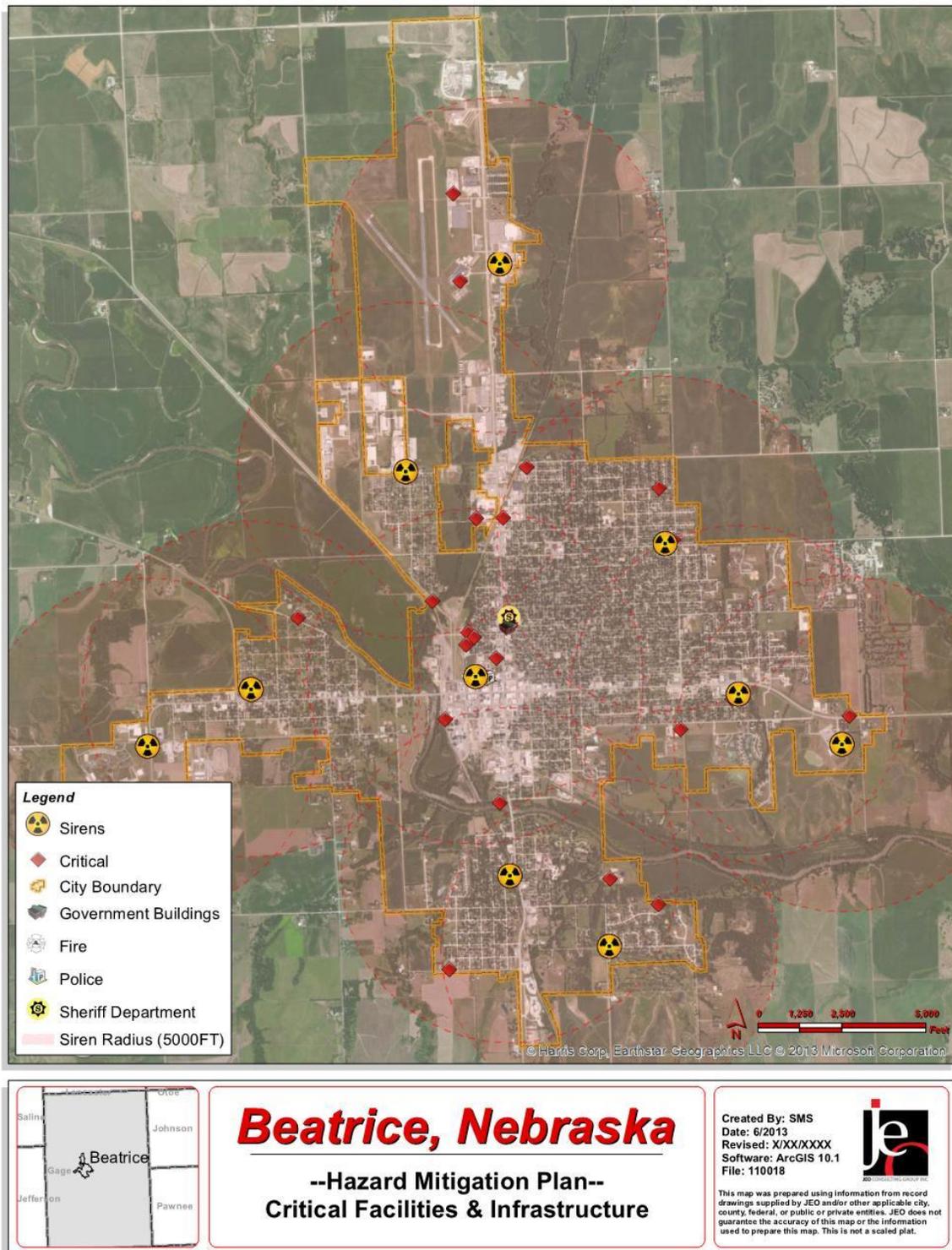
According to FEMA, “A critical facility is a structure that, if flooded (or damaged), would present an immediate threat to life, public health, and safety.” Examples of critical facilities include hospitals, emergency operations centers, schools, wells, and sanitary sewer lift stations, etc.

The City of Beatrice identified critical facilities as those which are vital for disaster response, may provide shelter to the public, or are essential for the resumption of the City's functions during and after a disaster. Table 14 displays the critical facilities identified by the City of Beatrice.

**Table 14: Critical Facilities & Infrastructure**

Type	Address
Beatrice Municipal Airport	3301 N. 6 <sup>th</sup> Street
Fire Department	250 Ella Street
Sheriff Department	650 Lincoln Street
Police Department	200 N. 5 <sup>th</sup> Street
City Hall	205 N. 4 <sup>th</sup> Street
City Maintenance (Complex next to the Airport)	<i>No physical address</i>
Chamber of Commerce	<i>GIS has it at Public School</i>
2 Water pumps, 2 Water Towers	Various Locations
7 Lift Stations	Various Locations
Norris Public Power	606 Irving Street
3 Substations	Various Locations
Wastewater Treatment Facility	S. 13 <sup>th</sup> Street

Figure 7: Beatrice Critical Facilities



### ***City of Beatrice Climate Summary***

The information displayed in the following figures are taken from weather stations 250620 and 250622, near Beatrice (Beatrice COOP). The High Plains Regional Climate Center had one continuous weather station from January 1, 1893 to October 31, 1984. After that time, no further data was recorded at that station; however another station started recording data. The new station has data starting from November 1, 1984 until the present. Because of this, two charts will accommodate each weather variable. The data from this station is provided by the High Plains Regional Climate Center, and is from daily readings between January 1, 1893 and the present. For temperature and precipitation, only single day magnitudes are used in calculating records or averages.

### **Temperature, Precipitation, and Snowfall Averages**

In Table 15, the daily temperature averages and the daily extremes are shown. Extreme Maximum is the highest of all daily temperatures recorded for that day of the year. Average Maximum is the mean of all daily high temperatures recorded for that day of the year. Average Minimum is the mean of all daily low temperatures recorded for that day of the year. Extreme Minimum is the lowest of all daily temperatures recorded for the day of that year. The coldest recorded temperature in the City of Beatrice was -26 degrees Fahrenheit and occurred in 1989. The hottest recorded temperature in the City of Beatrice was 108 degrees Fahrenheit and occurred in 1990.

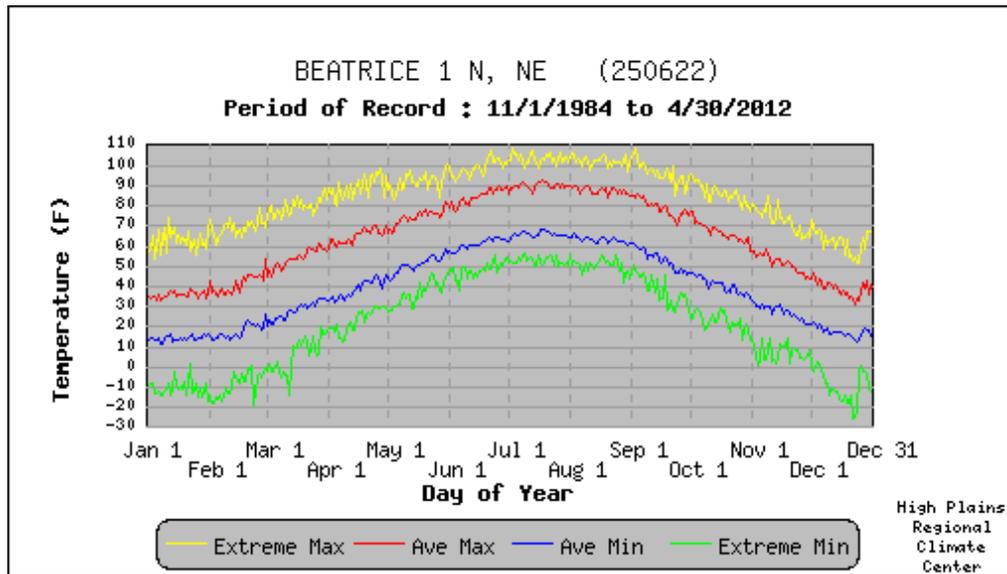
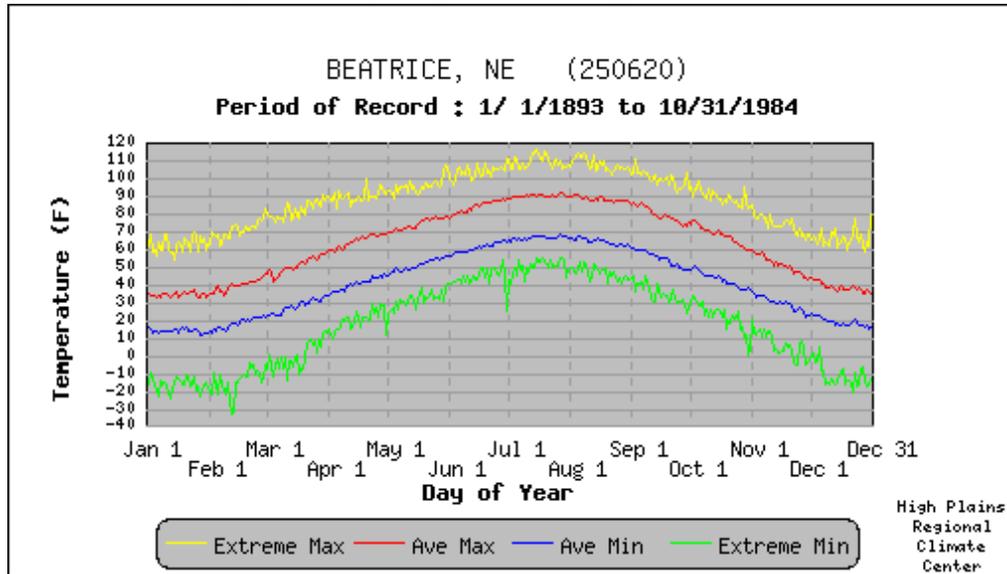
**Table 15: Climate Summary**

<b>Jurisdiction</b>	<b>Avg. High Temp. July</b>	<b>Avg. Low Temp. January</b>	<b>Average Rainfall</b>	<b>Average Snowfall</b>
<b>Beatrice</b>	89°	14°	30.6"	28.3"

*Source: Sperling's Best Places (bestplaces.net)*

Beatrice experiences a period of warming temperatures generally from January to July and a period of cool temperatures from August to December. Average temperatures range from about 14 degrees Fahrenheit in January to about 89 degrees Fahrenheit in July. Typically June, July, and August are the warmest months of the year for Beatrice with average daily high temperatures of 84°F in June, 89°F in July and, 87°F in August. Extreme high temperatures can occur as early as April (record high temperature in April is 98°F) and as late as October (record high temperature for October is 95°F). Often these early season high temperatures and late season high temperatures can have a significant impact on people, livestock, and agricultural products.

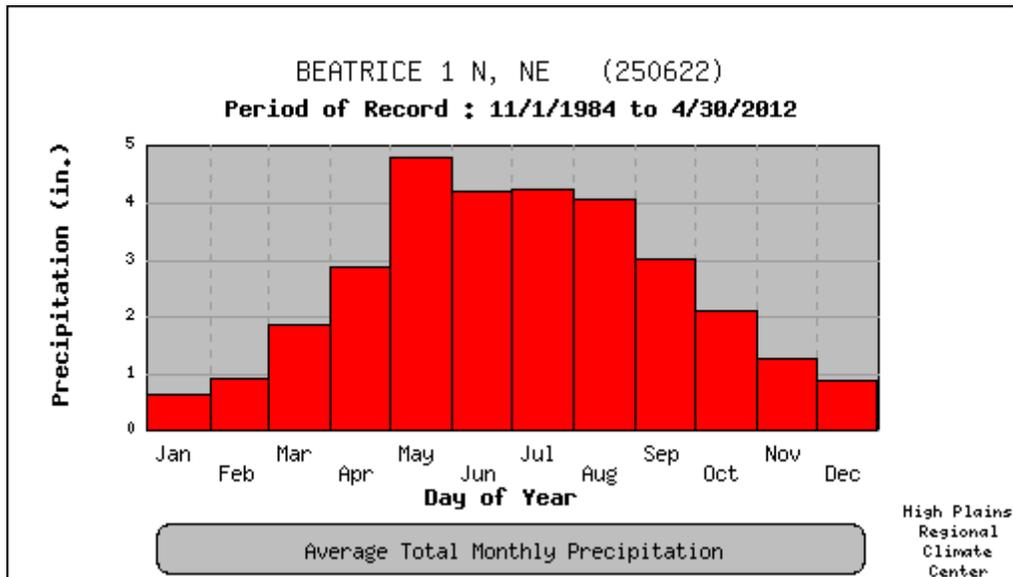
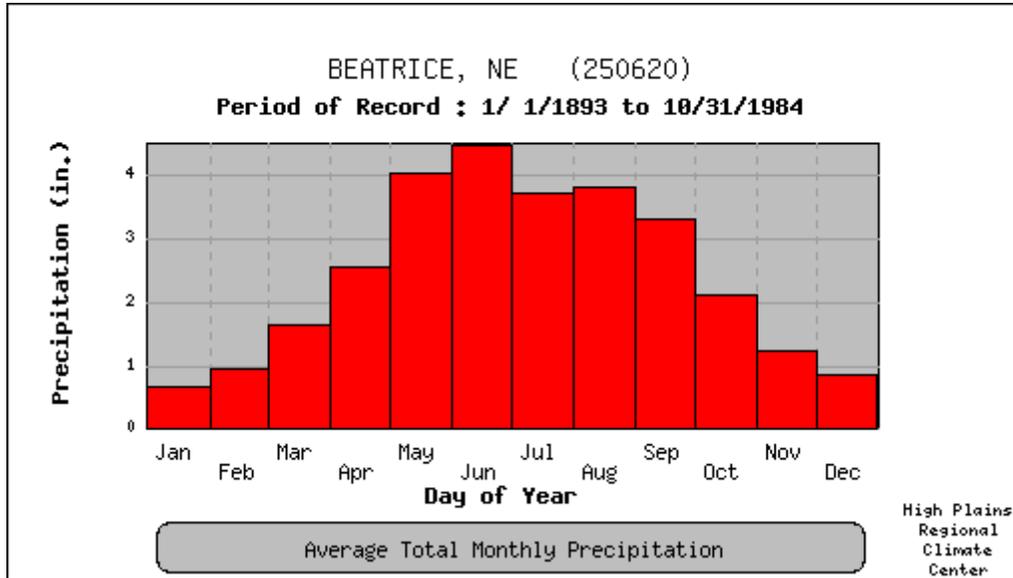
**Figure 8: Daily Temperature Averages and Extremes**



Source: National Climatic Data Center, High Plains Regional Climate Center

Figure 9 shows the average daily precipitation and the daily high precipitation. Beatrice receives the maximum average precipitation during the months of May, June, July, August. On average May, June, July, and August account for more than 55 percent of Beatrice’s annual precipitation. On average, Beatrice receives approximately 31.2 inches of rainfall annually. While drought can occur at any time of the year the impacts of drought are often most noticeable during the summer months. This is a result of impacts on plants and landscapes.

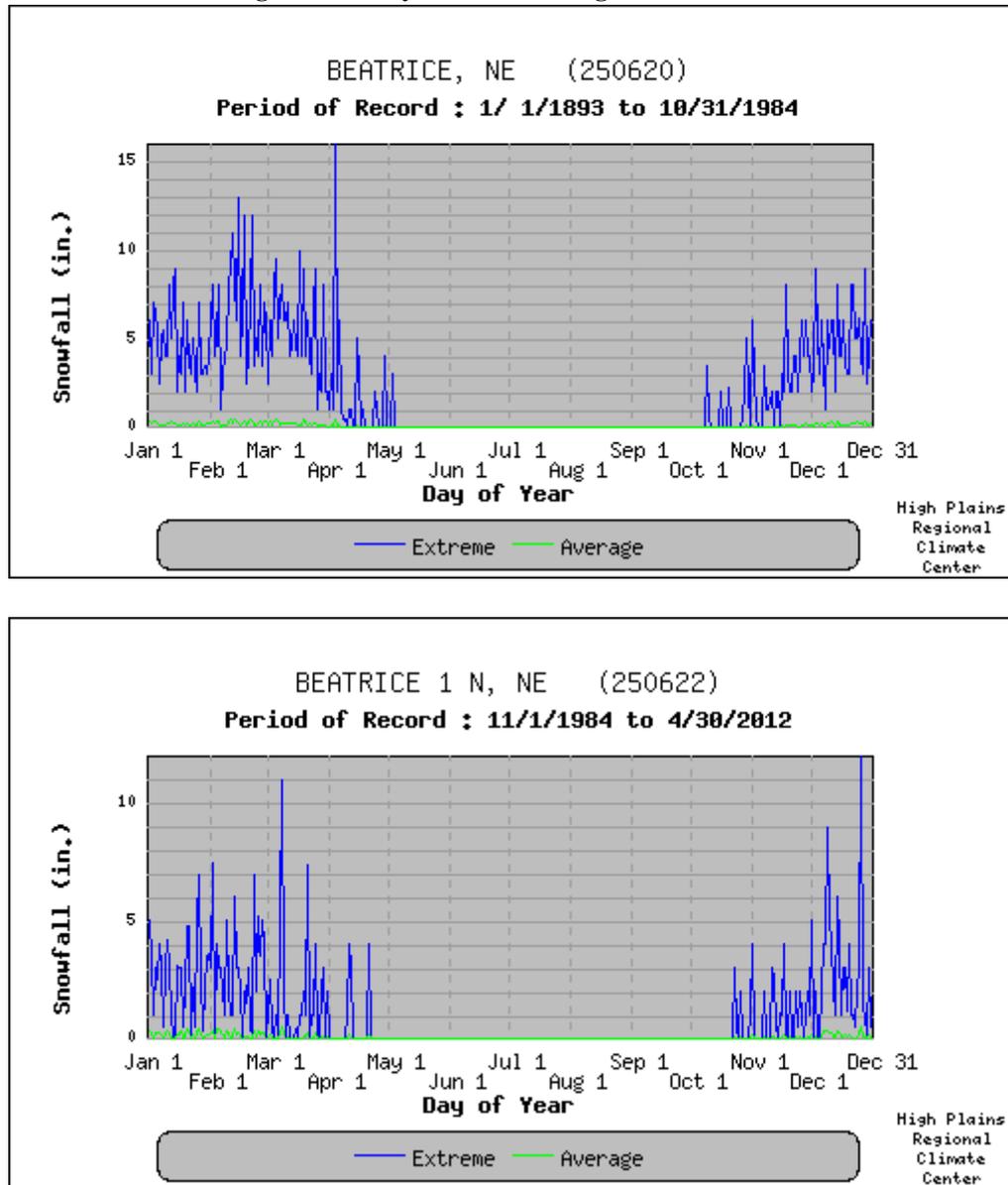
**Figure 9: Daily Precipitation Averages and Extremes**



Source: National Climatic Data Center, High Plains Regional Climate Center

In Figure 10, the daily snowfall averages and highs are shown. The High Snowfall is the greatest daily snowfall recorded for the day of the year. The Average Snowfall is the average of all daily snowfall recorded for the day of the year. Beatrice experiences snowfall generally from November until April. On average, Beatrice receives approximately 28.3 inches of snowfall annually. December, January, February, and March are the months reporting the greatest snow fall amounts but significant accumulations can occur as early as October and as late as May. Late snow storms can result in significant damages to agriculture and landscapes in the city of Beatrice as well as the entire region.

**Figure 10: Daily Snowfall Averages and Extremes**



Source: National Climatic Data Center, High Plains Regional Climate Center

**Farm Service Agency Small Business Administration Disasters**

The U.S. Small Business Administration (SBA) was created in 1953 as an independent agency of the federal government to aid, counsel, assist, and protect the interests of small business concerns, to preserve free competitive enterprise, and to maintain and strengthen the overall economy of our nation. A program of the SBA includes disaster assistance for those affected by major natural disasters.

**Table 16: Farm Service Agency Small Business Administration Disasters**

Declared	Disaster Number	Description and Documents	Primary Counties	Contiguous Counties
8/22/2012	NE-00052	Drought, Excessive Heat, and High Winds	Gage (Multiple)	Multiple

8/15/2012	NE-00051	Drought	Multiple	Gage (Multiple)
-----------	----------	---------	----------	-----------------

Source: United States Small Business Administration.

### **Presidential Disaster Declarations**

The presidential disaster declarations involving Gage County up until July 2013 are summarized in the table below. Declarations prior to 1962 available on the FEMA website, do not list designated counties.

**Table 17: Presidential Disaster Declarations**

<b>Disaster Declaration Number</b>	<b>Declaration Date</b>	<b>Disaster Type</b>	<b>Individual Assistance Counties</b>	<b>Public Assistance Counties</b>
DR-1902	April 21, 2010	Severe Storms, Ice jams, Flooding	--	Gage (Multiple)
DR-1878	February 25, 2010	Severe Winter Storms, Snowstorm	--	Gage (Multiple)
DR-1864	December 16, 2009	Severe Winter Storm	--	Gage (Multiple)
DR-1770	June 20, 2008	Severe Storms, Tornados, Flooding	Gage (Multiple)	Gage (Multiple)
DR-1765	May 30, 2008	Severe Storms, Tornados, Flooding	--	Gage (Multiple)
DR-1739	January 11, 2008	Severe Winter Storm	--	Gage (Multiple)
DR-1706	June 6, 2007	Severe Storms, Flooding, Tornados	--	Gage (Multiple)
DR-1517	May 25, 2004	Severe Storms, Tornados, Flooding	Gage (Multiple)	Gage (Multiple)
DR-1373	May 16, 2001	Severe Storms	--	Gage (Multiple)
DR-1123	June 25, 1996	Flooding	--	Gage (Multiple)
DR-998	July 19, 1993	Flooding, Severe Storms	Gage (Multiple)	Gage (Multiple)
DR-873	July 4, 1990	Flooding, Severe Storm, Tornado	Gage (Multiple)	Gage (Multiple)
DR-716	July 3, 1984	Tornados, Flooding	Gage (Multiple)	Gage (Multiple)
DR-500	April 8, 1976	Ice Storms, High Winds	--	Gage (Multiple)
DR-406	October 20, 1973	Severe Storms, Flooding	Gage (Multiple)	Gage (Multiple)
DR-228	July 18, 1967	Severe Storms, Flooding	Gage (Multiple)	Gage (Multiple)

Source: Federal Emergency Management Agency

## **Section Four: Risk Assessment**

### ***Hazard Identification***

Weather is not a hazard. However, the result of a weather event can create multiple hazards, often many during one event. For example, a single severe thunderstorm event can cause flooding, tornados, and wildfire from lightning. For the purpose of this plan, nine natural hazards were initially considered including severe winter storms, tornados and high winds, severe thunderstorms, flooding, extreme heat, drought, earthquakes, wildfires, and landslides. All were identified as separate potential hazard events as they often pose different threats and potential losses can vary greatly. Man-made hazards, with the exception of dam failure and levee failure, were not included in this plan. Extreme heat, landslides, and levee failures were not considered in the original Beatrice Hazard Mitigation Plan, but were included in the update as they are identified as potential hazards in the State of Nebraska Plan.

The risk assessment for the City of Beatrice was established through public input and information provided by elected officials, key stakeholders, and residents throughout the City, as well as conducting research on each hazard type identified in the State of Nebraska Hazard Mitigation Plan. Risk assessment information was gathered from residents through worksheets distributed at the public meeting, which provided an opportunity for public input on the identification of hazards, records of historical occurrences, establishment of goals and objectives, and potential mitigation alternatives (refer to Appendix C). The risk assessment was compiled after receiving responses from the public, discussing the public responses with the State Hazard Mitigation Officer, and conducting detailed research on the probability, historic occurrence, and the potential impacts of each hazard type.

Descriptions of the criteria used to establish the overall hazard identification and risk assessment are provided below.

**Probability** – What is the likelihood of this hazard occurring in the future?

- **Highly Likely** –
  - Near 100% probability in the next year

**Requirement §201.6(c) (2):** Risk assessment. The plan shall include a risk assessment that provides the factual basis for activities proposed in the strategy to reduce losses from identified hazards. Local risk assessments must provide sufficient information to enable the jurisdiction to identify and prioritize appropriate mitigation actions to reduce losses from identified hazards.

**Requirement §201.6(c) (2) (i):** [The risk assessment shall include a] description of the type ... of all natural hazards that can affect the jurisdiction.

**Requirement §201.6(c) (2) (i):** [The risk assessment shall include a] description of the ... location and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.

**Requirement §201.6(c) (2) (ii):** [The risk assessment shall include a] description of the jurisdiction's vulnerability to the hazards described in paragraph (c) (2) (i) of this section. This description shall include an overall summary of each hazard and its impact on the community.

**Requirement §201.6(c) (2) (ii):** [The risk assessment] must also address National Flood Insurance Program (NFIP) insured structures that have been repetitively damaged floods.

**Requirement §201.6(c) (2) (ii) (A):** The plan should describe vulnerability in terms of the types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard area.

**Requirement §201.6(c) (2) (iii):** For multi-jurisdictional plans, the risk assessment must assess each jurisdiction's risks where they vary from

- **Likely** –
  - Between 10% and 99% probability in the next year, or at least once in 10 years
- **Possible** –
  - Between 1% and 9% probability in the next year, or at least once in the next 100 years
- **Unlikely** –
  - Less than 1% probability in next 100 years
  - No record of occurrence in the past 100 years

**Potential Impacts** – The strength or magnitude of the hazard measured by the number of people to be negatively impacted, the physical or spatial negative impact upon the city, how quickly is the time to respond or react to the hazard.

- **Catastrophic** –
  - More than 50% of the total population of the jurisdiction, high risk to response personnel;
  - More than 50% of the geographic area of the jurisdiction;
  - Property destroyed or damaged beyond repair, complete shutdown of essential facilities for 3 days or more, major long-term environmental impact, severe impacts to the reputation of the jurisdiction
  - Percent Average property damage per Event more than 1.0%
- **Critical** –
  - 25% to 50% of the total population on the jurisdiction, moderate risk to response personnel;
  - 25% to 50% of the geographic area of the jurisdiction;
  - Serious injury and illness, major property damage which threatens structural stability, shutdown of essential facilities and services for 24-72 hours, minor long-term environmental impact, moderate impact to reputation of the jurisdiction
  - Percent Average Damage per Event between 0.5% and 0.9%
- **Limited** –
  - 10% to 24% of the total population of the jurisdiction, moderate risk to response personnel;
  - 10% to 24% of the geographic area of the jurisdiction;
  - Minor injuries and illness, minor property damage not threatening structural stability, shutdown of essential facilities and services for 4 to 24 hours, minor short-term environmental impact, very limited impact to reputation of the jurisdiction
  - Percent Average Damage per Event between 0.1% and 0.4%
- **Negligible** –
  - Less than 10% of the total population of the jurisdiction, no risk to response personnel, or no response needed;
  - Less than 10% of the geographic area of the jurisdiction;
  - Few if any injuries, minor injuries or impacts to quality of life with little or no property damage, brief interruption of essential facilities for less than 4 hours, no environmental impact, no impact to reputation of the jurisdiction
  - Percent Average Damage per Event less than 0.1%

The hazard types identified include those which have occurred, have a significant likelihood to occur again, or have reason to potentially occur in the City of Beatrice, and are discussed in detail below. The City identified

seven of the eleven hazard types as potential threats. These hazard types include severe winter storms, tornados and high winds, severe thunderstorms, flooding, extreme heat, drought, and dam failure. The City did not identify earthquakes, wildfires, landslides, or levee failure as potential threats.

The analysis of hazards includes a damage estimate calculation. This process utilized the estimated value for each structure type using the 2011 Property Type Values as provided by the Nebraska Department of Revenue Property Assessment Division. For example, average residential valuation was calculated by dividing the total number of residential structures identified in the structural inventory by the total residential valuation as reported for 2011.

JEO then used these estimated values and locations of structures to calculate potential losses for each hazard as identified by each individual participant. Developing a common understanding of the structures in the City and a simplified approach to determining their values helped establish the level of vulnerability and assess potential losses the City may experience for each hazard.

Hazard boundaries were defined for the identified hazard types including severe winter storms, tornados and high winds, severe thunderstorms, flooding, extreme heat, drought, and earthquakes, and dam failure. Flooding boundaries were delineated based upon the availability of floodplain maps. Severe winter storms, extreme heat, and drought have similar hazard boundaries as they all typically occur on a regional scale, and can affect the entire City during one single or ongoing event. It is not feasible to define hazard boundaries for tornados and high winds and severe thunderstorms based upon the irregularity with which these events occur throughout the entire regional area.

The State of Nebraska Hazard Mitigation Plan update is currently underway. New standards indicate that including all hazards within the state plan is the optimal choice moving into the future. Because this project was underway when that guidance came out, we have continued to include analysis on natural hazards for the City of Beatrice, and to include the scores and analysis Gage County received within the State Plan for the man-made hazards. This man-made hazards analysis can be found following the hazards analysis below.

**Extent** – The most likely strength or magnitude of the hazard.

### **Event Damage Estimate Formula**

FEMA *Requirement §201.6(c) (2) (ii) (B)* suggests that when the appropriate data is available, hazard mitigation plans should also provide an estimate of potential dollar losses for structures in vulnerable areas. This risk assessment methodology provides potential dollar losses for all hazards, provided appropriate data can be collected related, historic occurrences, quantification of impacts, and changes in jurisdictions that impact the accuracy of the estimate. The method of establishing potential dollar losses related to potential future disaster events is referred to as the Event Damage Estimate Formula.

The Event Damage Estimate Formula is used to estimate the total property damage amount that may occur within a jurisdiction if a particular disaster were to occur. There are three main pieces of data that are used throughout this formula. Each of data set has limitations that will be explained below.

- **Total Damages in Dollars:** This is the total dollar amount of all property damages as recorded in federal, state, and local data sources. The limitation to these data sources is that dollar figures often

do not include all damages from every event, but rather only officially recorded damages from reported events.

- **Total Years of Record:** This is the span of years there is data available for recorded events. The National Climate Data Center data used in this report is from 1950 to July 2012.
- **Total Structural Valuation:** This is the estimated total replacement value of all built structures within the particular jurisdiction. The property value estimates for residential and commercial types can be found in Table 8. This data is often received from County Assessor offices, as they value the property for each jurisdiction. The limitations to this data, is that assessor offices don't evaluate and assign a dollar value to tax-exempt or publicly owned structures. These properties include, city, county and state owned facilities, public or parochial schools, places of worship, and non-profit owned buildings.
- **Frequency of Hazard Event:** This shows how often an event occurs. The frequency of a hazard event will affect how the city responds. A thunderstorm may not cause much damage each time, but multiple storms can have an incremental effort on housing and utilities. In contrast, a rare tornado can have a widespread effect on a city.

An example of the Event Damage Estimate Formula is found below:

$$\begin{aligned} \text{Total Damages in Dollars (\$) / Total Years of Record (62)} &= \text{Average Annual Damages (\$)} \\ \text{Average Annual Damages (\$) / Total Structural Valuation (\$)} &= \text{Structural Valuation Impacted (\%)} \\ \text{Total Damages Recorded (\$) / Total Events Recorded (\#)} &= \text{Average Damage per Event (\$)} \end{aligned}$$

It should be noted that due to the method of data collection for the NCDC the projected losses are for either Gage County or even larger zonal events. This loss estimate is limited in its ability to accurately project losses for a specific community and could be more accurate if the estimate was being completed for a county or region rather than a single jurisdiction.

## ***Hazards Not Identified within the City of Beatrice***

### **Wildfires**

The U.S. Geological Survey (USGS), in the Fact Sheet 2006-3015 “Wildfire Hazards-A National Threat,” identifies locations that experienced wildfire greater than 250 acres from 1980 to 2003. This information comes from sources of the Bureau of Land Management, U.S. Forest Service, U.S. Fish and Wildlife Service, Bureau of Indian Affairs, National Park Service and the USGS National Atlas. From this data, and the fact that no area in, or around, Beatrice has experienced wildfire, it was determined by the planning team that there is not a significant enough threat to warrant detailed discussion in this plan.

**Figure 11: USGS Map of Wildfires over 250 acres in U.S.**



Source: USGS Fact Sheet 2006-3015; [http://walrus.wr.usgs.gov/infobank/programs/html/factsheets/pdfs/2006\\_3015.pdf](http://walrus.wr.usgs.gov/infobank/programs/html/factsheets/pdfs/2006_3015.pdf)

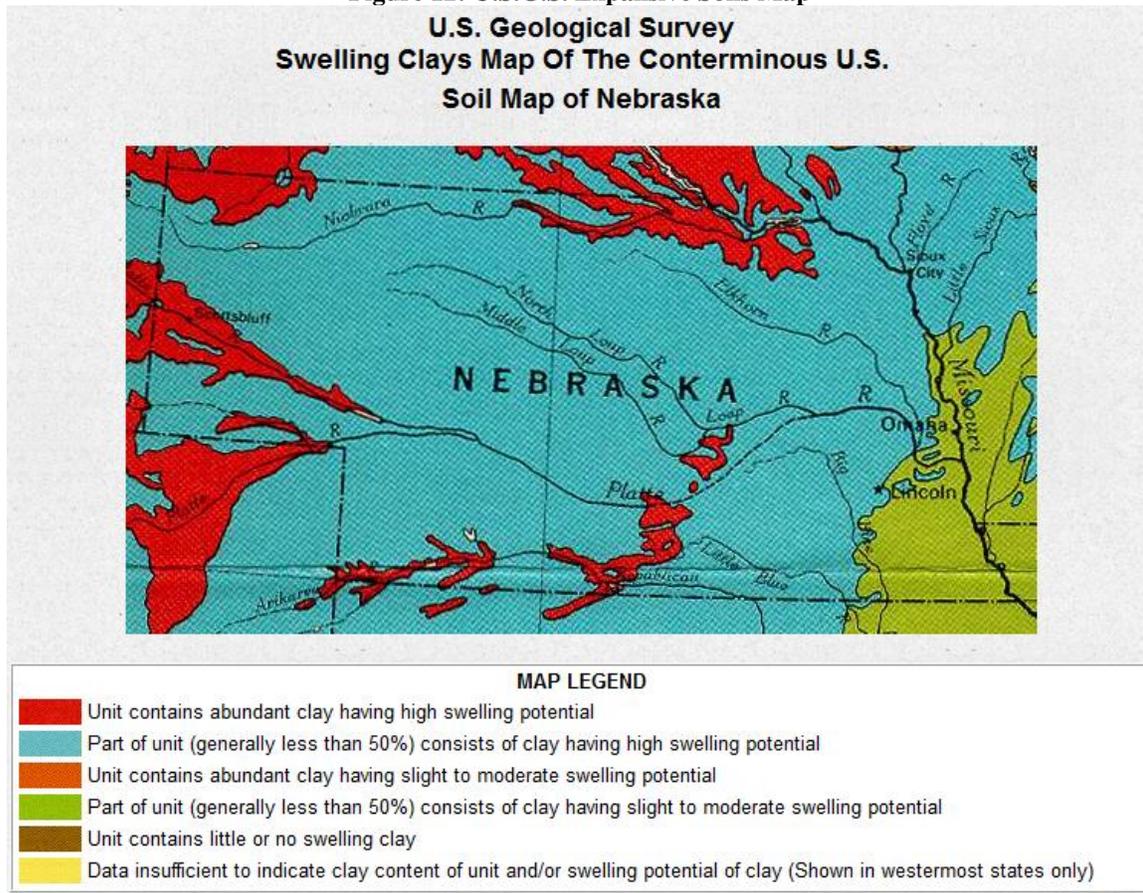
### **Expansive Soils**

The soil types common in Gage County are not characteristic of expansive soils and there has been no evidence of expansive soil events within Beatrice. Because of this and no reported events by participants, the planning team determined that the threat was not significant enough for detailed discussion.

### Sink Holes

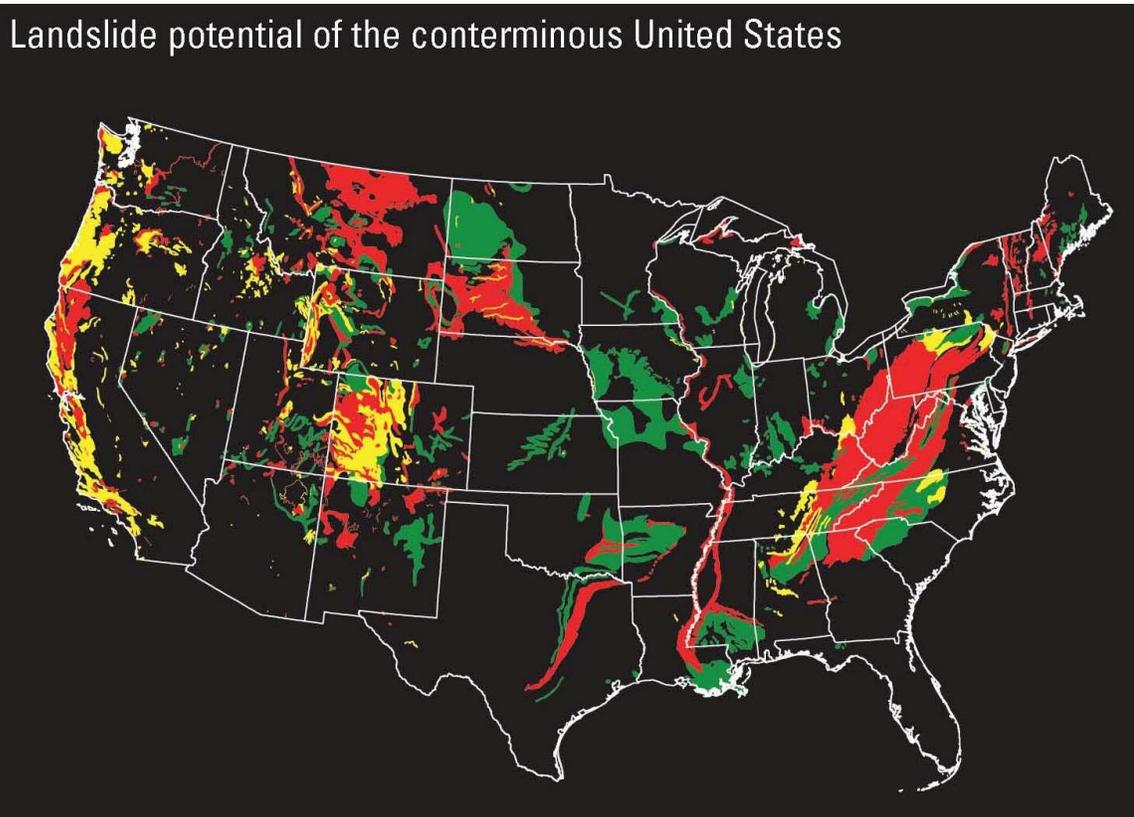
According to the 2011 Nebraska State Hazard Mitigation Plan, Nebraska has no true karst topography and is therefore not prone to sinkholes. There has been no evidence of sinkhole events within Beatrice. Because of this and no reported events by participants the planning team determined that the threat was not significant enough for detailed discussion.

**Figure 12: U.S.G.S. Expansive Soils Map**  
**U.S. Geological Survey**  
**Swelling Clays Map Of The Conterminous U.S.**  
**Soil Map of Nebraska**



### Landslides

The USGS, in Fact Sheet 2005-3156 “Landslide Hazards-A National Threat,” published a map showing the landslide potential of the conterminous United States. Red is very high potential, yellow is high potential, green is moderate, and the risk is low in the unmarked areas. The source of this data comes from the National Atlas and USGS. Furthermore the University Of Nebraska School Of Natural Resources maintains a database of Landslides in Nebraska. Based upon these two data sources, there has not been a landslide in or around Beatrice. The planning team determined that landslides do not pose a significant enough threat to warrant detailed discussion in this plan.

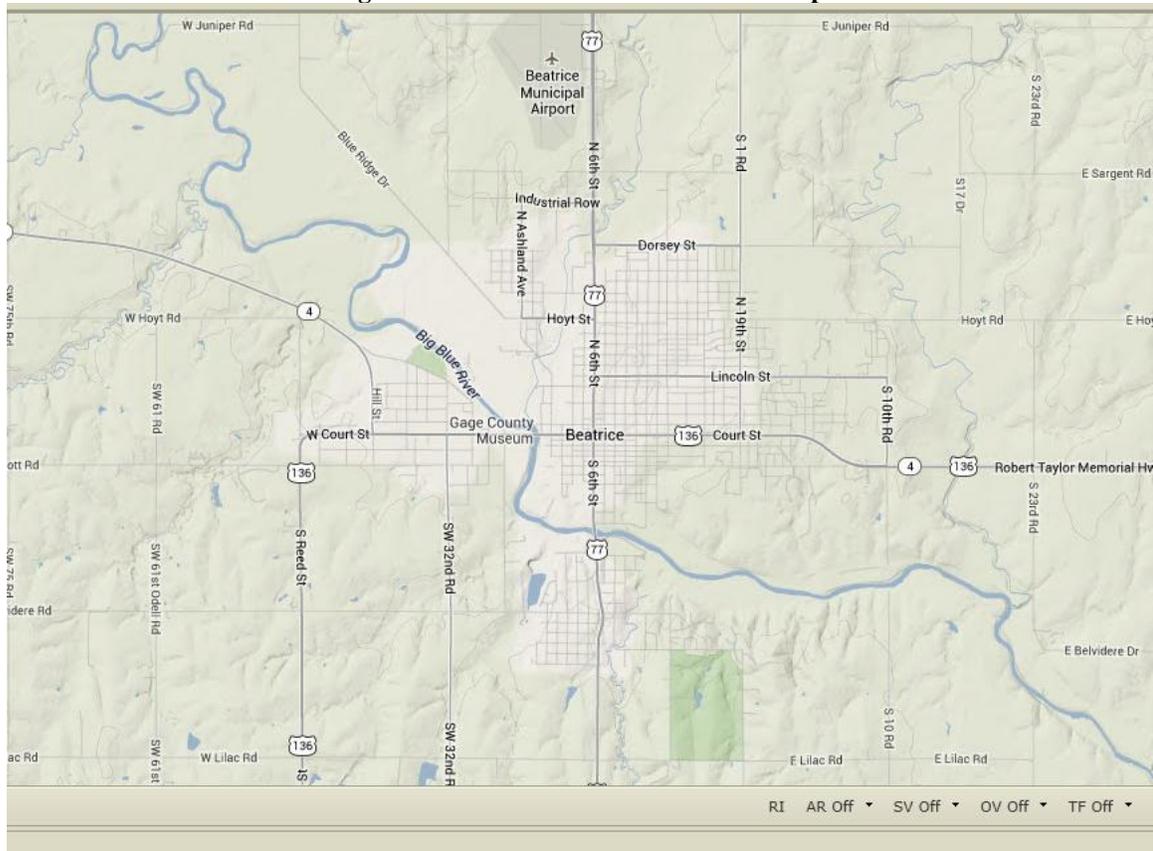
**Figure 13: USGS Map of Landslide Potential in Contiguous U.S.**

Source: USGS Fact Sheet 2005-3156; [http://walrus.wr.usgs.gov/infobank/programs/html/factsheets/pdfs/2005\\_3156.pdf](http://walrus.wr.usgs.gov/infobank/programs/html/factsheets/pdfs/2005_3156.pdf)

### **Levee Failure**

The planning team's research revealed no record of levees found in the planning area. The National Levee Database, maintained by the U.S.A.C.E., shows no federal levees impacting the City. While there is a possibility that levees may exist, such as low-head agricultural levees, no records indicated that the breach or overtopping of these levees would impact and property other than that of the levee owner. Damage to residential structures is unlikely.

Figure 14: U.S.A.C.E. Levee Database Map



## *Hazards within the City of Beatrice*

### *Severe Winter Storms (Severe Winter Storms and Extreme Cold)*

#### *Hazard Profile*

Severe winter storms are an annual occurrence in Nebraska. Winter storms can bring extreme cold, freezing rain and heavy or drifting snow creating blizzards. Blizzards are particularly dangerous due to drifting snow and the potential for rapidly occurring whiteout conditions which greatly inhibit vehicular traffic. Generally, winter storms occur between the months of November and March, but can occur as early as October and as late as April. Heavy snow is usually the most defining element of a winter storm. Large snow events can cripple an entire jurisdiction by hindering transportation, knocking down tree limbs and utility lines, and causing structural damage to buildings.

Along with snow events, winter storms also have the potential to deposit significant amounts of ice. Ice buildup on tree limbs and power lines can cause them to collapse. This is most likely to occur when ice falls in the form of rain that freezes upon contact, especially in the presence of wind. Freezing rain begins as snow falling from high altitudes. The snow completely melts as it passes through a high layer of warm air, and then is super-cooled when it passes through the layer of cold air just before it impacts the surface, causing the precipitation to freeze on impact. Ice can also lead to many problems on the roads as it makes them slick, causing automobile accidents, and making vehicle travel difficult.

Along with snow and ice storm events, extreme cold can be dangerous to the well-being of people and animals. Extreme cold can lead to hypothermia and frostbite, and when exposure lasts long enough, it can cause death. Hypothermia is a medical condition where the body temperature drops significantly below normal. This begins to occur when core body temperatures fall below 95 degrees Fahrenheit. This condition can lead to death if temperatures continue to fall. Frostbite is also a medical condition, which occurs when extreme cold causes surface damage to the skin and other tissue.

### ***Historical Occurrences***

The NCDC reported 58 total regional severe winter storm events in and around the City of Beatrice from January 1950 to July 31, 2012. Of the reported events, four events recorded damages, with \$56,500,000 in total property damages and \$4,820,000 in crop damages.

It should be noted that the National Climatic Data Center is not an all-inclusive, or exhaustive, source for historical weather data. Often data records for short-term local hazard events are more detailed and readily accessible than that for long-term regional events. The events below were significant in loss of life, injuries, or the amount of damages.

- **January 26, 1994:** *Property Damage: \$50,000.* Freezing rain and sleet caused icing of trees and power lines. Some electrical outages also occurred.
- **October 22, 1996:** *Crop Damage: \$3.2 million.* Five to eleven inches of heavy, wet snow blanketed the area. This combined with northerly winds which gusted as high as 46 mph caused widespread power and telephone outages and major tree damage. Fifteen percent of the sorghum was lost in Richardson, Pawnee, Nemaha, Johnson, and Otoe Counties.
- **October 25, 1997:** *Property Damage: \$56,500,000. Crop Damage: \$1,600,000.* A major early season snowstorm struck the area. A heavy wet snowfall of 6 to 14 inches fell on trees, many of which were still fully or partially leafed, and caused extensive damage and/or total destruction. At least 205,000 residents in the affected area were without power just after the storm, many of the outages lasted for several days. Omaha Public Power District estimated that it was the worst outage in 50 years. Nearly 85% of the trees in the Omaha area and 25% of the trees in the Lincoln area sustained damage or were totally destroyed. Many emergency shelters in and around the Omaha and Lincoln areas were opened for use by those who suffered a hardship from the storm.
- **March 7, 1998:** *Property Damage: \$26,000.* A major winter storm moved through the central plains and created near blizzard conditions over portions of eastern Nebraska. Heavy snow combined with strong northerly winds of 40-45 mph created considerable blowing snow with 6-15 foot snow drifts common. The heaviest snow fell in an area from Gage County northeast through the south and southeast portion of the Omaha metropolitan area where 11-16 inches of snow fell. Lesser amounts occurred further to the north with 4-6 inches at Norfolk. Schools and businesses were closed for a few days as the strong winds continued to cause blowing snow making the task of cleaning up very difficult.

- **January 4, 2005:** 2 Deaths reported. Monetary damages not known. This storm dropped 8 to 14 inches of snow over most of eastern Nebraska and southwest Iowa, with over a foot reported across the Omaha metro area. In fact, 14.1 inches was recorded at Omaha Eppley from this storm, tying it for the 3rd heaviest snowstorm on record. The storm came through in two main bursts, the first started late Tuesday afternoon 1/4/05 and continued to around dawn Wednesday. The second bout of heavy snow fell from late Wednesday afternoon until around midnight that night. Toward the end of the snow Wednesday evening wind chill values fell to 10 below to 25 below zero as brisk north winds combined with temperatures that eventually fell to zero or colder. These bitterly cold wind chill values continued into early Thursday morning. The storm claimed 2 lives Tuesday night as a young couple became disoriented after leaving their stuck vehicle in a rural area southwest of Omaha. Despite calls for help on their cell phone, they were unable to provide enough detail to be located before they collapsed and froze to death. The storm closed many schools across the region both Wednesday and Thursday. Besides the 14.1 inches recorded at Omaha Eppley, other heavier storm totals in eastern Nebraska included; 14.2 inches at the NWS in Valley, 12 inches in Fremont and Gretna, 11 inches at Uehling and 10 inches in David City, Raymond, Springfield, Weston, Plattsmouth, Bennington and Friend. Heavier amounts in southwest Iowa included; 12 inches at Little Sioux and Underwood, 11 inches in Harlan and Logan and 10 inches at Oakland.

### ***Vulnerability Assessment***

Based on the hazard identification, public input, and research of historical occurrences, severe winter storms have previously occurred in the City of Beatrice and the probability of severe winter storms occurring again is ‘highly likely’. The potential impacts of damage from severe winter storms can be ‘negligible’, causing less than ten percent damage throughout the City, especially with ice events. Severe winter storms have the capability to affect an entire jurisdiction during and after an event, and will most likely affect the entire City with one single event.

Severe winter storms occur on a regional scale, and can equally affect the entire City. All building stock and infrastructure, including critical facilities, are at risk of being damaged or affected by a severe winter storm. Some facilities and infrastructure may be at greater risk than others. Those facilities without backup generators are at greater risk of power disruption.

The collection of snow and ice on power lines and electrical equipment, or trees within close proximity, can cause equipment damage, downed power lines, and a loss of electricity. Snow and ice accumulations on transportation routes can lead to obstruction of traffic flow and hinder emergency response. Severe winter storms can also cause significant damage to trees, with branches downing electrical lines, blocking roadways, or causing building and property damage.

### ***Extent***

The Sperry-Piltz Ice Accumulation Index (SPIA) was developed by the National Weather Service to predict the accumulation of ice and resulting damages. The SPIA looks at total precipitation, wind, and temperatures to predict the intensity of ice storms. Figure 15, shows the SPIA index.

Figure 15 SPIA Index

**The Sperry-Piltz Ice Accumulation Index, or “SPIA Index” – Copyright, February, 2009**

ICE DAMAGE INDEX	* AVERAGE NWS ICE AMOUNT (in inches) <small>*Revised-October, 2011</small>	WIND (mph)	DAMAGE AND IMPACT DESCRIPTIONS
<b>0</b>	< 0.25	< 15	Minimal risk of damage to exposed utility systems; no alerts or advisories needed for crews, few outages.
<b>1</b>	0.10 – 0.25	15 - 25	Some isolated or localized utility interruptions are possible, typically lasting only a few hours. Roads and bridges may become slick and hazardous.
	0.25 – 0.50	> 15	
<b>2</b>	0.10 – 0.25	25 - 35	Scattered utility interruptions expected, typically lasting 12 to 24 hours. Roads and travel conditions may be extremely hazardous due to ice accumulation.
	0.25 – 0.50	15 - 25	
	0.50 – 0.75	< 15	
<b>3</b>	0.10 – 0.25	> = 35	Numerous utility interruptions with some damage to main feeder lines and equipment expected. Tree limb damage is excessive. Outages lasting 1 – 5 days.
	0.25 – 0.50	25 - 35	
	0.50 – 0.75	15 - 25	
	0.75 – 1.00	< 15	
<b>4</b>	0.25 – 0.50	> = 35	Prolonged & widespread utility interruptions with extensive damage to main distribution feeder lines & some high voltage transmission lines/structures. Outages lasting 5 – 10 days.
	0.50 – 0.75	25 - 35	
	0.75 – 1.00	15 - 25	
	1.00 – 1.50	< 15	
<b>5</b>	0.50 – 0.75	> = 35	Catastrophic damage to entire exposed utility systems, including both distribution and transmission networks. Outages could last several weeks in some areas. Shelters needed.
	0.75 – 1.00	> = 25	
	1.00 – 1.50	> = 15	
	> 1.50	Any	

(Categories of damage are based upon combinations of precipitation totals, temperatures and wind speeds/directions.)

Based on historic events in Beatrice and Gage County it is possible that extreme severe winter storms can occur within the planning area. Based on the reported events from 1996 to 2013 it is not likely that Beatrice will suffer a level 5 (SPIA Index) event. It is more realistic that Beatrice will experience severe winter storms that result in accumulations of snow and ice comparable to a level 2 (SPIA Index) event. The likely impacts of these events will be minor destruction and temporary closure and interruptions to critical facilities and transportation routes. It should be noted that typical severe winter storms in Nebraska are often accompanied by high winds which can, and have, resulted in events more in line with a level 3 (SPIA Index) event. The severe winter storm reported in 1997 is similar to a level 5 (SPIA Index); for Beatrice and the region it is likely that this scale of event will occur approximately once every 25 years.

**Potential Losses**

Based on statewide information from the NCDC, 543 incorporated jurisdictions have recorded property damage from severe winter storm events over the last 57 years. The average amount of damage per event in Nebraska was \$1.82 million. Throughout the Midwest, the average damage per event was \$2.27 million.

The ‘event damage estimate formula’ estimates potential loss estimates for the City of Beatrice per event based upon historical data:

$$\begin{aligned} & \text{Total Damages Recorded } (\$4,820,000) / \text{Total Years of Record } (62) = \\ & \qquad \qquad \qquad \text{Average Annual Damage } (\$77,741) \\ & \text{Average Annual Damage } (\$77,741) / \text{Structural Valuation } (\$528,546,456) = \\ & \qquad \qquad \qquad \text{Annual Structural Valuation Impacted } (0.015\%) \\ & \text{Total Damages Recorded } (\$4,820,000) / \text{Total Events Recorded } (58) = \\ & \qquad \qquad \qquad \text{Average Damage per Event Estimate } (\$83,103) \end{aligned}$$

Throughout the City, based on this average annual impacts Beatrice could expect to sustain damages to 0.015 percent of the total assessed value. Further the City could experience damages in excess of \$83,103 annually based upon historical occurrences.

The average annual impacts were based upon the average damages per year since 1950 and historical occurrences. The primary risks for severe winter storms are exposure, driving, and post-event behaviors and not to direct damages. Not looking at public losses to electric infrastructure, the most common types of private damage are from downed trees falling on private property and from power outages causing frozen food to thaw. This does not include loss of displacement, functional downtime, economic loss, injury, or loss of life. It should be noted that the total crop damages were included in the event details to express the magnitude of the event, but were not calculated into the average damage per event estimate as crop damages would likely not affect the City.

Power outages, which occur almost on an annual basis with severe winter storms in Nebraska, in combination with cold temperatures and below zero wind-chill, can pose a significant threat to human life. Highly vulnerable populations such as those living in nursing homes, young children, and those living in less than adequate environments are most at risk. Critical facilities and infrastructure necessary for basic survival such as emergency response and recovery operations, warning and communication systems, wells and water treatment, and many other services vital for returning the jurisdiction's functions to normal are at risk with power outages and severe winter storms.

Based upon the FEMA publication "What is a Benefit: Guidance on Benefit-Cost Analysis of Hazard Mitigation Project (June 2009)", if a severe winter storm occurred within the City of Beatrice, it is assumed the event could potentially cause a loss of electricity for ten percent of the population (12,459) at a cost of \$126 per person per day, or \$1,569,834. The assumed damages do not take into account physical damages to utility equipment and infrastructure.

### ***Future Vulnerability and Losses***

Severe winter storms regularly result in damages to power lines, telephone lines, as well as other infrastructure related to threat communication (i.e. radio and television antennas). This potential for decreased message dissemination combined with potential power outages results in higher levels of vulnerability for a number of groups within the community including: the elderly, individuals and families living below the poverty line, those isolated from social interactions, groups with limited mobility, and residents that are new to the area/region.

Communities can incorporate "living snow fences" in to community designs. "Living snow fences" are strategically placed trees and shrubs that act as a wind and snow block, reducing snow drifts and decreasing snow blowing across flat areas. Communities can also bury power lines to reduce the chance of power outages resulting from severe winter storms and ice storms. New public buildings can be designed with redundant power supply to ensure continuity of government services. Building codes can be enhanced to prohibit flat roofs and to increase facility strengths to withstand greater snow loads. Stakeholder groups in the area play a significant role in assisting and protecting vulnerable populations during and following severe winter storms.

Efforts can be made to protect any future construction as well as to retrofit existing construction. The following bullet points identify some general mitigation strategies that can be used to reduce a community's vulnerability to the threat of severe winter storms. Many of these strategies are identified and discussed in greater detail in the FEMA document Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards.

- Improve buildings codes to eliminate flat roofs in areas that expect heavy snow loads
- Retrofit buildings and infrastructure to withstand snow loads
- Increase weather monitoring procedures
- Incorporate text messaging into severe weather messaging programs
- Incorporate cable TV interruption warning systems
- Establish road closure policies and procedures necessary to protect the public
- Develop continuity plans for critical community services (public and private)
- Establish a Tree Board to assist in the development of a tree management program
- Participate in Tree City USA; establish a tree maintenance ordinance
- Establish redundancies for necessary municipal services (i.e. water, gas, electric, transportation)
- Develop a database of “vulnerable populations”
- Work with community groups serving “vulnerable populations” such as Meals on Wheels programs to help monitor vulnerable groups
- Establish public education programs to increase awareness of the dangers posed by severe winter storms and ways the public can mitigation the potential impacts

### **Tornados and High Winds (Tornados and Windstorms)**

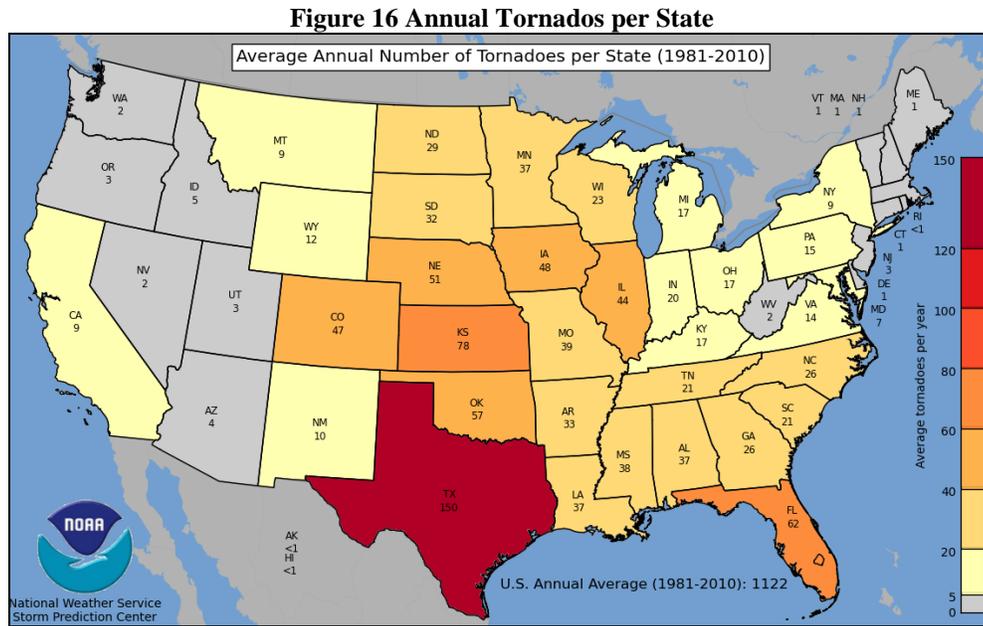
A tornado is typically associated with a supercell thunderstorm. Exactly how a tornado forms is a complex process and is not fully understood. Tornados are believed to be formed when cold air overrides a layer of warm air, which forces the warm air to rise quickly. As a thunderstorm develops, a large change in the direction of air flow with height, or wind shear, or an increase in wind speed, produces a horizontal spinning area of air. The updrafts of warm air cause the rotation to move from horizontal to vertical. Then, as the rotation increases, a funnel is produced and the water vapor in this funnel cloud is drawn towards the ground. This is commonly referred to as “touching down.” In order for rotations to be classified as tornados, three characteristics must be met:

- There must be a microscale rotating area of wind, ranging in size from a few feet to a few miles wide;
- The rotating wind, or vortex, must be attached to a convective cloud base and must be in contact with the ground; and
- The spinning vortex of air must have caused enough damage to be classified by the Fujita Scale as a tornado.

High winds not associated with tornados are discussed later in this section. After research on the NCDC and discussion with the City of Beatrice, planning team, and residents, historical occurrences or records of damages from high winds alone were limited; however high winds are almost always associated with tornados, severe thunderstorms, or severe winter storms. For the purpose of this plan, high winds were grouped with tornados.

Once tornados are formed, they can be extremely violent and destructive. They have been recorded all over the world, but are most prevalent in the American Midwest and South, in an area known as “Tornado Alley.” Approximately 1,000 tornados are reported annually in the contiguous United States. Tornados can travel distances over 100 miles, reach over 11 miles above ground, and usually stay on the ground no more than 20 minutes. The tornado season typically occurs in March and April, when 80 percent of tornados occur between noon and midnight.

According to FEMA, Nebraska is ranked 5th in the nation for the average number of tornados each year, but 23rd in number of tornado fatalities and 24th in injuries. Nebraska averages 39 tornados per year, with 102 being the highest recorded number of tornados in a single year, in 1999. All 93 counties in Nebraska have experienced tornados. The peak month for tornados is June, with 78 percent of all tornados having occurred in May through July. Historically, 71 percent of all tornados have occurred between 3:00 and 9:00 pm, with 53 percent having occurred between the time-frame of 4:00 to 8:00 pm. The figure below shows the average tornado activity in the United States annually between 1981 and 2010. On average, there are 1,122 tornados each year within the contiguous 48 states.



Source: United States Department of Commerce, National Oceanic Atmospheric Administration, Storm Prediction Center Statistics

After a tornado has passed through an area, an official rating category is determined, which provides a common benchmark that allows comparisons to be made between different tornados. The magnitude of tornados has, until recently, been measured by intensity on the Fujita-Pearson Tornado Scale, or simply the Fujita Scale, or F-Scale. The Fujita Scale does not measure tornados by their size or width, but rather the amount of damage it causes on human-built structures and trees. The scale ranges from F0 for the weakest, to F6 for the most powerful, although an F6 has never been recorded. The Fujita Scale was updated in 2007 with the Enhanced F-Scale. The enhanced scale classifies F0-F5 damage as determined by engineers and meteorologists across 28 different types of damage indicators, including different types of building and tree damage. In order to establish a rating, engineers and meteorologists examine the damage, analyze the ground-swirl patterns, review damage imagery, collect media reports, and sometimes utilize photogrammetry and videogrammetry. Based on the most severe damage to any well-built frame house, or any comparable damage as determined by engineer, an EF-Scale number is assigned to the tornado. The tables below summarize the Enhanced Fujita Scale and damage indicators.

**Table 18: Enhanced Fujita Scale**

Storm Category	3 Second Gust (mph)	Damage Level	Damage Description
----------------	---------------------	--------------	--------------------

EF0	65-85 mph	Gale	Some damages to chimneys; breaks branches off trees; pushes over shallow-rooted trees; damages to sign boards.
EF1	86-110 mph	Weak	The lower limit is the beginning of hurricane wind speed; peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off the roads; attached garages might be destroyed.
EF2	111-135 mph	Strong	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light object missiles generated.
EF3	136-165 mph	Severe	Roof and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted.
EF4	166-200 mph	Devastating	Well-constructed houses leveled; structures with weak foundations blown off some distance; cars thrown and large missiles generated.
EF5	200+ mph	Incredible	Strong frame houses lifted off foundations and carried considerable distances to disintegrate; automobile sized missiles fly through the air in excess of 100 meters; trees debarked; steel reinforced concrete structures badly damaged.
EF No rating	--	Inconceivable	Should a tornado with the maximum wind speed in excess of F5 occur, the extent and types of damage may not be conceived. A number of missiles such as iceboxes, water heaters, storage tanks, automobiles, etc. will create serious secondary damage on structures.

Source: National Oceanic and Atmospheric Administration; Federal Emergency Management Agency

**Table 19: Enhanced F Scale Damage Indicators**

Number	Damage Indicator
1	Small barns, farm outbuildings
2	One- or two-family residences
3	Single-wide mobile home (MHSW)
4	Double-wide mobile home
5	Apt, condo, townhouse (3 stories or less)
6	Motel
7	Masonry apt. or motel
8	Small retail bldg. (fast food)
9	Small professional (doctor office, branch bank)
10	Strip mall
11	Large shopping mall
12	Large, isolated ("big box") retail bldg.
13	Automobile showroom
14	Automotive service building
15	School - 1-story elementary (interior or exterior halls)
16	School - jr. or sr. high school
17	Low-rise (1-4 story) bldg.
18	Mid-rise (5-20 story) bldg.
19	High-rise (over 20 stories)
20	Institutional bldg. (hospital, govt. or university)
21	Metal building system
22	Service station canopy
23	Warehouse (tilt-up walls or heavy timber)
24	Transmission line tower
25	Free-standing tower
26	Free standing pole (light, flag, luminary)

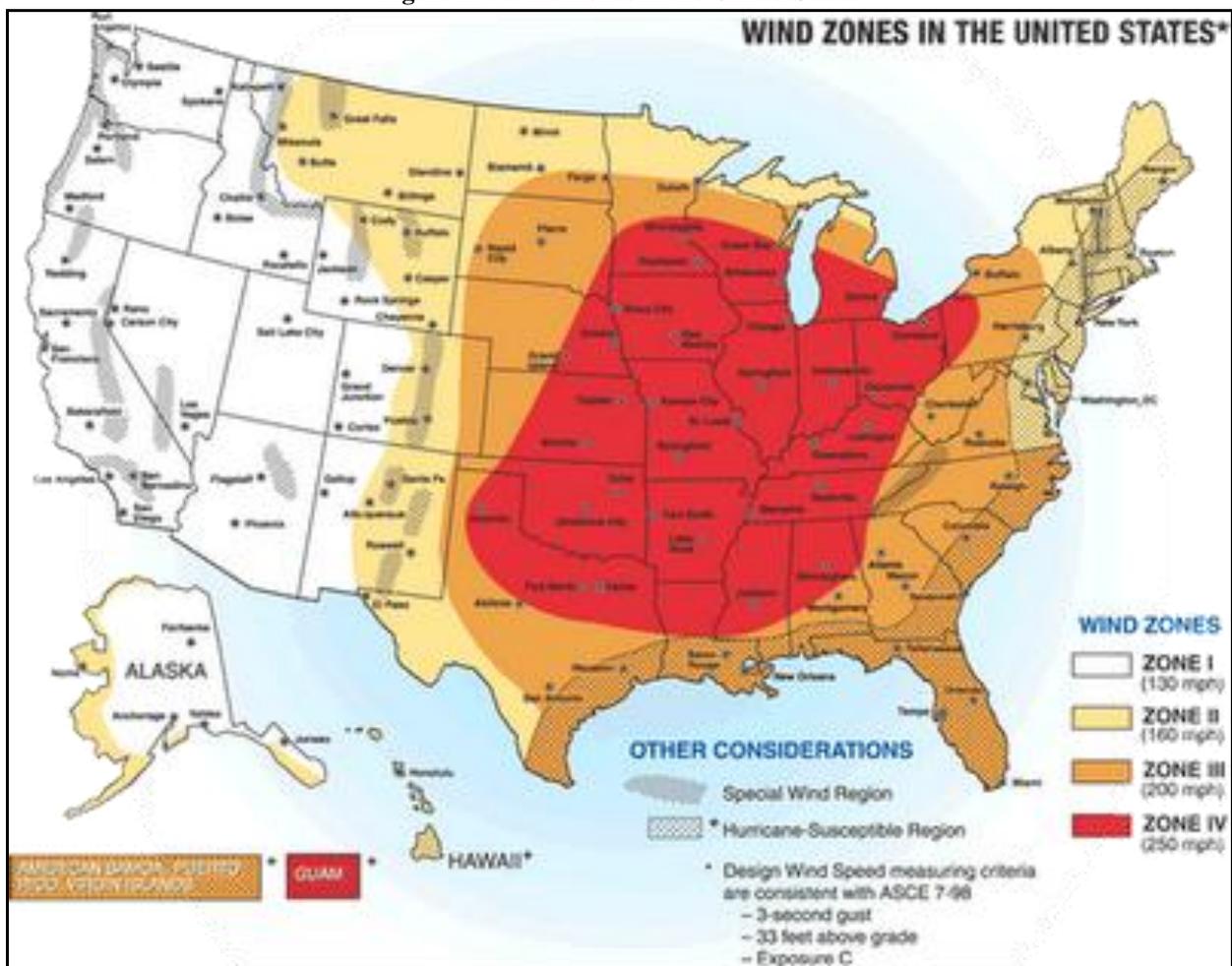
27	Tree - hardwood
28	Tree - softwood

Source: National Oceanic and Atmospheric Administration; Federal Emergency Management Agency

**High Winds**

High winds, which typically accompany severe thunderstorms and severe winter storms, can cause significant property and crop damage; downed power lines; loss of electricity; obstruction to traffic flow; and significant damage to trees and center-pivot irrigation systems. All building stock and above ground infrastructure, including critical facilities, are at risk of being damaged or affected by high winds. High wind speeds and flying debris can pose a significant threat to human life. The figure below shows the wind zones in the United States.

**Figure 17: Wind Zones in the United States**



Source: Federal Emergency Management Agency

Straight-line winds, also known as convective wind gusts, outflow, or downbursts, are produced by the downward momentum in the downdraft region of a storm. A storm with strong updrafts and downdrafts as well as a fast forward motion will be conducive to strong straight-line winds.

A storm is classified as severe by the National Weather Service once winds meet or exceed 58 miles per hour. Straight-line winds will cause damage and push debris in the same direction as the wind is blowing, whereas the violently rotating winds of a tornado will scatter debris in different directions.

### ***Historical Occurrences***

The NCDC reported 58 tornado and high wind events for the entire jurisdiction of the City of Beatrice from January 1950 to July 31, 2012. Of the reported events, 35 events recorded damages, with \$50,021,250 in total property damages. It should be noted that the National Climatic Data Center is not an all-inclusive or exhaustive source for historical weather data. Often data records for short-term local hazard events are more detailed and readily accessible than that for long-term regional events. The events below were significant in loss of life, injuries, or the amount of damages.

The following tornado was reported by participants at the public meetings.

- May 8, 1996: *Property Damage: \$12,000,000.* The beginning of the tornado started 4 1/2 miles west northwest of downtown Beatrice, just north of the Homestead National Monument. The storm damaged trees just north of state highway 4 when it struck several homes, primarily lifting the roofs off of them. The tornado was rated F1 at that point. Around 1/2 mile to the east, the tornado struck a subdivision. The damage was more severe, with collapsed outer walls and roofs off homes. The tornado damage was rated as a strong F2 in this area. The tornado, continuing to move in an east southeast direction, nearly paralleling highway 4, struck a church. Part of the roof was lost off the church. After striking the church, the tornado hit several more homes and barns before entering the heart of the city. The damage path width of the tornado was 1/4 to 1/2 mile wide, with damaging thunderstorm winds out to 1 1/2 mile. The main tornado path remained 1/4 to 1/2 mile wide north of U.S. highway 136, with much of the damage south of highway 136 due to thunderstorm downburst winds. The tornado strength weakened when entering the city, with an F-scale strength between F0-F1. Although much of the damage in the central city area was due to falling trees and large tree limbs, other damage noted was roofing torn off of several buildings and a collapsed 200 foot communication tower. After the storm exited the city, it regained strength. The tornado also began curving to the northeast. The storm maintained about F1 strength from about 1 mile east of downtown Beatrice to the storm's dissipation, approximately 3 miles northeast of the city. The strong F2 tornado's path was 9.5 miles long.

### ***Vulnerability Assessment***

Based on the hazard identification, public input, and research of historical occurrences, tornados and high winds have previously occurred in the City of Beatrice and the probability of tornados and high winds occurring again is 'highly likely'. The potential damages from tornados and high winds can be 'negligible', causing less than ten percent damage throughout the City. While it is possible that an EF 5 tornadic event could impact the City, based on historic events, a more realist extent for tornados would be an EF 2 or EF 3 tornado. There have been no direct impacts on the City reported but there have been multiple EF 2 and two EF 3 in the area surrounding the City. Probable extent for High Winds events include wins in excess of 50

mph throughout the City and region. High Winds can be expected to reach greater strengths especially during the winter, spring, and fall.

Tornados and high winds occur on an irregular basis, and can equally affect the entire City. High winds occur at a greater rate than tornados. Most tornados accompany severe thunder or wind storms. All building stock and above ground infrastructure, including critical facilities, are at risk of being damaged or affected by tornados and high winds. Tornados and high winds can cause structure loss, downed power lines, loss of electricity, obstruction to traffic flow, and significant damage to trees and center-pivot irrigation systems. A catastrophic event could lead to major economic loss for the jurisdiction. High wind speeds and flying debris can pose a significant threat to human life.

**Extent - Tornado**

Based on NCDC reported events from 1996 through 2013, the mostly likely tornadic event to occur in or around Beatrice will be an EF 2 tornado or less. In the 17 year record there have been two reported tornados in the City, an F2 in 1996 and an EF 0 in 2013. Given the history for the entire county it is likely that most tornadic events will be either an EF 0 or an EF 1. Of course it is possible that an EF 4 or EF 5 could occur but there are not historical records to indicate that this is likely.

**Extent – High Winds**

The National Weather Service (NWS) defines High Winds as sustained wind speeds of 40 mph or greater lasting for 1 hour or longer, or winds of 58 mph or greater for any duration. The NWS issues High Wind Advisories when there are sustained winds of 25 – 39 miles per hour and/or gusts to 57 mph. The Beaufort Wind Scale can be used to classify wind strength. Table 20 outlines the scale, providing wind speed ranking, range of wind speeds per ranking, and a brief description of conditions for each ranking.

**Table 20: Beaufort Wind Force Rankings**

Beaufort Wind Force Ranking	Range of Wind Speeds	Conditions
0	<1 mph	Smoke rises vertically
1	1 – 3 mph	Direction shown by smoke but not wind vanes
2	4 – 7 mph	Wind felt on face; leaves rustle; wind vanes move
3	8 – 12 mph	Leaves and small twigs in constant motion
4	13 – 18 mph	Raises dust and loose paper; small branches move
5	19 – 24 mph	Small trees in leaf begin to move
6	25 – 31 mph	Large branches in motion; umbrellas used with difficulty
7	32 – 38 mph	Whole trees in motion; inconvenience felt when walking against the wind
8	39 – 46 mph	Breaks twigs off tree; generally impedes progress
9	47 – 54 mph	Slight structural damage; chimneypots and slates removed
10	55 – 63 mph	Trees uprooted; considerable structural damages; improperly or mobiles homes with no anchors turned over
11	64 – 72 mph	Widespread damages; very rarely experienced
12 – 17	72 - >200 mph	Hurricane; devastation

Source: National Weather Service

Past high winds events reported for the City indicate the most likely extent for high winds will correlate to a Beaufort Wind Force Ranking of either a 10 or 11. There were 25 reported high wind events specific to the City of Beatrice, for those events winds ranged from 57.5 mph to 80.5 mph; the mean was just over 63 mph.

**Potential Losses**

The ‘event damage estimate formula’ estimates potential loss estimates for the City of Beatrice per event based upon historical data:

$$\begin{aligned} & \text{Total Damages Recorded } (\$50,021,250) / \text{ Total Years of Record } (62) = \\ & \quad \text{Average Damage per Event } (\$806,794) \\ & \text{Average Damage per Event } (\$862,435) / \text{ Structural Valuation } (\$528,546,456) = \\ & \quad \text{Annual Structural Valuation Impacted } (0.15\%) \\ & \text{Total Damages Recorded } (\$50,021,250) / \text{ Total Events Recorded } (58) = \\ & \quad \text{Average Damage per Event Estimate } (\$862,435) \end{aligned}$$

Throughout the City, based on the average annual impacts, a tornado or highwinds could potentially result in damages to 0.15 percent damage to the total assessed value with the City based upon historical occurrences.

The average annual impacts were based upon the average damages per year since 1950 and historical occurrences. This does not include loss of displacement, functional downtime, economic loss, injury, or loss of life. It should be noted that the total crop damages were included in the event details to express the magnitude of the event, but were not calculated into the average damage per event estimate as crop damages would likely not affect the City.

### ***Future Vulnerability and Losses***

Tornados can impact a wide range of people and properties. People living in mobile homes are specifically susceptible to the effects of tornados. Mobile homes that are not anchored or are not anchored properly can be blown over by winds as small as 60 – 70 mph. A 2007 study conducted by Dr. W. Ashley at Northern Illinois University found that between 1985 and 2005, 44% of all tornado related fatalities occurred in mobile homes while between 20 and 30% occurred in permanent homes. Tornado related deaths in mobile homes have increased over the timeframe investigated from 37% of all fatalities from 1986 to 1990 to nearly 57% of all fatalities from 2001 to 2005. Beatrice has an estimated 55 mobile homes that will need to be considered. The timing of tornados also impacts the vulnerability of people living in mobile homes. The 2007 study found that while only 25.8% of tornados occur between sunset and sunrise they account for 42.5% of tornado fatalities. This is a result of a number of factors including: decreased ability to identify tornados in the dark, decreased ability to communicate tornado threats to individuals at night, and a higher number of people in the housing units (i.e. mobile home) during the nighttime.

Other factors that may increase vulnerability to the threat posed by tornados include age, poverty levels, and home rentals. The 2007 study found that middle age (those over 40 year) and elderly are more vulnerable to tornados. This may be a result of decreased mobility, higher rate of auditory complications, or lack of resources need to mitigate potential tornado related impacts.

Considerations for future developments should include developing tornado safe rooms in/near mobile home parks as well as the events held at city parks. The 2003 Tornado Shelters Act authorizes communities to use Community Development Block Grant (CDBG) funds for construction of tornado-safe shelters in manufactured home parks with 20 or more housing units consisting predominately of low- and moderate-income residents.

There are some changes that communities can make to partially mitigate against tornados and strong winds. Building codes for new structures can be strengthened, requiring increased rebar in foundations, enhanced nailing patterns for wall sheathing, and the use of Simpson Strong Ties and Straps. Building codes can also be strengthened to require the use of anchors and tie-downs of mobile homes. Saferooms can be installed in new

structures as well as made to adapt to existing structures. In-ground saferooms can be installed in existing structures for as little as \$4,000. The installation of public saferooms in areas around vulnerable populations, such as mobile home parks, can increase safety of residents in those areas.

The planning area is experiencing moderate growth at this time; efforts can be made to protect future construction as well as to retrofit existing construction. The following bullet points identify some general mitigation strategies that can be used to reduce a community's vulnerability to the threat of tornado and strong winds. Many of these strategies are identified and discussed in greater detail in the FEMA document *Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards*.

- Enhance building codes to incorporate wind –resistant building techniques
- Bury overhead power lines
- Establish redundancies for necessary municipal services (i.e. water, gas, electric, transportation)
- Establish data recovery program and backup program for municipal employees
- Establish a Tree Board to assist in the development of a tree management program
- Participate in Tree City USA; establish a tree maintenance ordinance
- Encourage the construction of safe rooms
- Require tornado saferooms in newly constructed municipal buildings
- Work with trailer and mobile home parks to develop tornado safe rooms
- Ensure schools are equipped with sufficient safe space for their maximum student capacity
- Develop maps of “vulnerable populations” and saferooms located near those groups
- Ensure outdoor warning sirens are functional and located adequately to warn the public of potential tornadic events
- Incorporate text messaging into severe weather messaging programs
- Incorporate cable TV interruption warning systems
- Establish mutual aide agreements with neighboring communities and privately owned businesses
- Develop business continuity plans for critical community services (public and private)
- Establish public education programs to increase awareness of the dangers posed by severe tornados and strong winds and ways the public can mitigation the potential impacts

### **Severe Thunderstorms (Hailstorm, Thunderstorm, and Lightning)**

#### ***Hazard Profile***

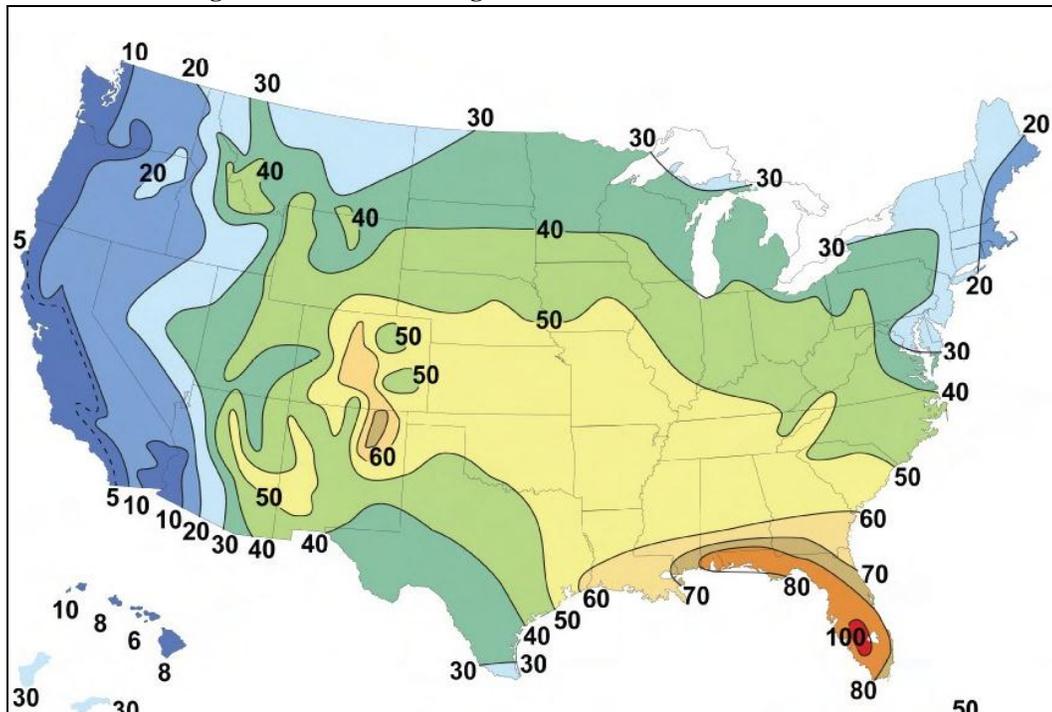
Severe thunderstorms are a common and unpredictable annual event throughout the Midwest, especially in Nebraska. Thunderstorms differ from many other hazards in that they are generally large in magnitude, have a long duration, and travel across large areas and through multiple jurisdictions within a single region. Additionally, thunderstorms often occur in series, with one area having the potential to be hit multiple times in one day.

A severe thunderstorm is defined by winds measuring 56 miles per hour or higher, hail three-quarters inch or larger, or the presence of tornadic activity.

Severe thunderstorms usually occur in the evening during the spring and summer months. These often massive storms can include heavy rain, hail, lightning, high wind, and tornados. Furthermore, heavy rains can cause flooding; lightning can cause wildfires and damages to property; and high winds can down trees, cause power outages, and destroy property with their shear force.

Economically, thunderstorms are generally beneficial in that they provide moisture necessary to support Nebraska's largest industry, agriculture. The majority of thunderstorms do not cause damage, but when they escalate to the point of becoming severe, the potential damages include crop losses from wind and hail, property losses due to buildings and automobiles damaged by hail, wind, or flash flooding, and death or injury to humans and animals from lightning, drowning, or being struck by falling or flying debris. The figure below displays the average number of days with thunder across the country each year, with Nebraska experiencing between 30.5 to 50.4 days from west to east across the state.

**Figure 18: Annual Average Number of Thunderstorm Events**



Source: <http://www.nws.noaa.gov/om/severeweather/index.shtml>

Thunderstorms can develop in less than 30 minutes, and can grow to an elevation of eight miles into the atmosphere. In the United States, approximately 100,000 thunderstorms occur annually. Lightning, by definition, is present in all thunderstorms and can be harmful to humans and animals, cause fires to buildings and agricultural lands, and cause electrical outages in municipal electrical systems. Lightning can strike up to 10 miles from the portion of the storm depositing precipitation. Damaging hailstones are also common in severe thunderstorms. Hail measuring just three-quarters of an inch can approach speeds of 100 mph. Hail causes nearly \$1 billion in damage to property and crops annually.

### ***Historical Occurrences***

The NCDC reported 356 total severe thunderstorm events for the entire jurisdiction of the City of Beatrice from January 1950 to July 31, 2012. Of the reported events, 19 events recorded damages, with \$1,721,500 in total property damages and \$94,000 in total crop damages.

It should be noted that the National Climatic Data Center is not an all-inclusive, or exhaustive, source for historical weather data. Often data records for short-term local hazard events are more detailed and readily

accessible than that for long-term regional events. No additional historical occurrences or records of damages from severe thunderstorms were discovered after discussion with the City of Beatrice, planning team, and residents. The events below were significant in loss of life, injuries, or the amount of damages.

- **July 6, 1994:** *Property Damage: \$500,000.* Lightning started a fire which destroyed much of the Beatrice Greenhouse. Lightning also struck a home, which started a fire that caused severe damage to the structure.
- **July 23, 1995:** *Property Damage: \$10,000. Crop Damage: \$3,000.* Heavy rain caused \$3,000 in damages and lightning caused \$10,000 in damages. No further information was available.
- **May 16, 1995:** *Damages: No information available on damage cost.* Two inches of heavy rain fell in 15 minutes. Hail size reported: 1.75 inches.
- **May 7, 1996:** *Property Damage: \$1,000.* Lightning strikes northwest of Beatrice caused the City's water wells to shut down and took out power. Lightning also struck a home in Beatrice doing damage to the house.
- **April 8, 2001:** *Property Damage: \$20,000.* Hail up to 1 inch in diameter damaged some windows in Beatrice including the marquee at the Cinema Centre on Court St. in Beatrice.
- **April 11, 2001:** *Damages: No information available on damage cost.* Thunderstorm wind gusts estimated at over 60 mph caused extensive tree damage near Beatrice. The wind damage was with the same thunderstorm complex that caused the wind damage near Endicott and the tornados in Wymore and Virginia.
- **September 12, 2001:** *Damages: No information available on damage cost.* A downburst with winds estimated at over 70 mph downed trees, twisted street signs and flattened and stripped crops north of Beatrice.
- **April 11, 2006:** *Damages: None.* A lightning strike killed one and injured three others during a recreational activity.
- **July 13, 2006:** *Damages: No information available on damage cost.* Hail that eventually reached tennis ball size fell for a little over 10 minutes in Beatrice. The largest stones in town were fairly isolated; apparently most of the larger stones that caused the most damage fell southeast of town in the Holmesville area. Hail size: 2.5 inches.
- **May 29, 2008:** *Damages: \$250,000.* Thunderstorm winds estimated at over 70 mph caused widespread tree damage from south through east of Beatrice. A tornado caused more significant damage north through northeast of Beatrice.

### ***Vulnerability Assessment***

Based on the hazard identification, public input, and research of historical occurrences, severe thunderstorms have previously occurred in the City of Beatrice and the probability of severe thunderstorms occurring again

is ‘highly likely’. The potential damages from severe thunderstorms can be ‘negligible’, causing less than ten percent damage throughout the City. Likely extent for Severe Thunderstorm Events include: strong winds (50 mph or greater), hail (up to two and one half inches), and heavy rains. Severe thunderstorms can be either short live events, moving quickly through the planning area, or at time slow moving events which deposit large amounts of rain across the City. There has been a history of lightning strikes which have impacted the City resulting in power loss to residents and critical facilities as well.

Severe thunderstorms occur on a regular basis from March to July, and can equally affect the entire City. Severe thunderstorms can produce heavy rain, flooding, damaging hail, lightning, and high winds during and after the event. All building stock and infrastructure including critical facilities, vehicles, power lines, trees, and utilities are at risk of being damaged or affected by severe thunderstorms.

Severe thunderstorms can cause property damage or loss, downed power lines, loss of electricity, obstruction to traffic flow, significant damage to trees, and pose a threat to human life. The electrical infrastructure is highly vulnerable to damages from lightning strikes and downed tree branches, roadways are vulnerable to wash outs and surface damages from flash floods, and building stock and personal property are vulnerable to damages from large hail stones.

**Extent**

Typically there are two elements of a severe thunderstorm that result in damages to property. First are high winds, for the extent related to high winds refer to the discussion related to table 20. The second element that frequently results in property damage is hail.

The TORRO scale is used throughout the United Kingdom to classify hailstones and provides some detail related to the potential impacts from hail. Table 21 outlines the TORRO Hailstone Scale.

**Table 21: TORRO Hailstone Scale**

<b>TORRO Classification / Intensity</b>	<b>Typical Hail Diameter</b>	<b>Typical Damage Impacts</b>
H0: Hard Hail	5 mm; Pea size	No damage
H1: Potentially Damaging	5 -15 mm (marble)	Slight general damage to plants and crops
H2: Significant	10 -20 mm (grape)	Significant damage to fruit, crops, and vegetation
H3: Severe	20 -30 mm (Walnut)	Severe damage to fruit and crops, damage to glass and plastic structures
H4: Severe	30 -40 mm (Squash Ball)	Widespread damage to glass, vehicle bodywork damaged
H5: Destructive	40 – 50 mm (Golf ball)	Wholesale destruction of glass, damage to tiled roofs; significant risk or injury
H6: Destructive	50 – 60 mm (chicken egg)	Grounded aircrafts damaged, brick walls pitted; significant risk of injury
H7: Destructive	60 – 75 mm (Tennis ball)	Severe roof damage; risk of serious injuries
H8: Destructive	75 – 90 mm (Large orange)	Severe damage to structures, vehicles, airplanes; risk of serious injuries
H9: Super Hail	90 – 100 mm (Grapefruit)	Extensive structural damage; risk of severe or even fatal injuries to persons outdoors
H10: Super Hail	>100 mm (Melon)	Extensive structural damage; risk or severe or even fatal injuries to persons outdoors

Using the reported events from 1996 to 2013 and the TORRO hailstone scale the most likely event to occur correlates with an H3 classification. There were 37 hail events reported specific to the City with an average hailstone size of just greater than one inch (26.4 mm). The event with the greatest extent was a 2005 hailstorm which produced 2.75 inch hailstones.

**Potential Losses**

Severe thunderstorms have varying magnitudes and can cause a wide degree of damage. The damage can range from a few downed tree limbs to wide spread tree loss, hail damage, and significant property damage.

The ‘event damage estimate formula’ estimates potential loss estimates for the City of Beatrice per event based upon historical data:

$$\begin{aligned} & \text{Total Damages Recorded } (\$1,721,500) / \text{Total Years of Record } (62) = \\ & \quad \text{Average Annual Damages } (\$27,766) \\ & \text{Average Annual Damages } (\$27,766) / \text{Structural Valuation } (\$528,546,456) = \\ & \quad \text{Annual Structural Valuation Impacted } (0.0053\%) \\ & \text{Total Damages Recorded } (\$1,721,500) / \text{Total Events Recorded } (356) = \\ & \quad \text{Average Damage per Event } (\$4,836) \end{aligned}$$

Throughout the City, based on this averaged annual impacts, severe thunderstorms could potentially result in 0.0053 percent damage to the total assessed value with the City based upon historical occurrences.

The average annual impacts were based upon the average damages per year since 1950 and historical occurrences. This does not include loss of displacement, functional downtime, economic loss, injury, or loss of life. It should be noted that the total crop damages were included in the event details to express the magnitude of the event, but were not calculated into the average damage per event estimate as crop damages would likely not affect the City.

**Future Vulnerability and Losses**

Vulnerable populations related to severe thunderstorms include the elderly, those living in mobile homes, and those caught outside during the storm event. During severe thunderstorms it is not uncommon for residents/towns to lose power for a period of time potentially a prolonged period of time. These power outages may prove deadly for elderly citizens that are reliant upon machines to remain alive. In addition the elderly, generally, are less mobile than many other members of the community making them more vulnerable to a wide range of threats. Mobile homes that are not anchored or are improperly anchored can be turned over by a wind of 60 to 70 mph. Severe thunderstorms are defined by winds in excess of 58 mph.

Hail is another component of severe thunderstorms that can seriously impact residents of mobile homes. Hail can damage vehicles, roofs, and landscaping as well as causing injury and occasionally death.

Lightning is commonly considered the most dangerous and most frequently encountered weather hazard. Annually, there is an average of 62 people killed by lightning in the United States. The most vulnerable groups related to lightning strikes are people located outside during storm events. Vulnerable areas to consider include public parks, campgrounds, swimming pools, and schools with play grounds.

Building codes can be enhanced so that they require or recommend the use of hail resistant material, tie-downs and ground anchors for mobile homes, and architectural designs that reduce or limit potential for wind-born debris. Existing structures can also incorporate hail resistant products such as concrete roof tiles and siding. Critical facilities should install and utilize surge protectors to ensure continuity of vital services. Power lines can be buried to decrease the chance of prolonged power outage and saferooms can be constructed near vulnerable populations (schools, daycares, mobile home parks, etc.) to increase safety for

residents in those areas. Communities can also establish Tree Boards and tree ordinances to ensure urban canopies are safe and healthy, reducing the potential impacts of severe thunderstorms.

The planning area is experiencing moderate growth at this time; efforts can be made to protect future construction as well as to retrofit existing construction. The following bullet points identify some general mitigation strategies that can be used to reduce a community's vulnerability to the threat of severe thunderstorms. Many of these strategies are identified and discussed in greater detail in the FEMA document *Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards*.

- Install and maintain surge protection for critical facilities
- Incentive programs to encourage the use of hail resistant roofing materials for new and existing structures
- Bury overhead power lines
- Establish a Tree Board to assist in the development of a tree management program
- Participate in Tree City USA; establish a tree maintenance ordinance
- Establish redundancies for necessary municipal services (i.e. water, gas, electric, transportation)
- Establish data recovery program and backup program for municipal employees
- Establish community severe weather warning protocols
- Incorporate text messaging into severe weather messaging programs
- Incorporate cable TV interruption warning systems
- Purchase and issue weather radios to critical facilities and vulnerable populations
- Establish mutual aid agreements with neighboring communities and privately owned businesses
- Develop business continuity plans for critical community services (public and private)
- Establish public education programs to increase awareness of the dangers posed by severe thunderstorms and ways the public can mitigate the potential impacts

## **Flooding (Riverine and Flash)**

### ***Hazard Profile***

Flood events are the most damaging and costly hazard in the United States, and account for 90 percent of all presidential declarations of disaster. Flooding can occur on a local level, sometimes affecting only a few streets, but is also able to extend throughout an entire region, affecting whole drainage basins and impacting property in multiple states. The principal type of flood most common to Nebraska, due to geographic location and topography, is riverine floods. There have been occurrences of urban flooding within Beatrice, due to the rivers throughout town.

Riverine floods, slower in nature, occur when water from sustained rainfall or rapid snow melt overflows a waterway once the volume of water exceeds the capacity of the waterway. Riverine floods, faster in nature including flash floods, result from convective precipitation usually due to intense thunderstorms or sudden release from an upstream impoundment created behind a dam, landslide, or levee. Flash floods are distinguished from a regular flood by a timescale of less than six hours. Flooding from excessive rainfall in Nebraska usually occurs between late spring and early fall.

Flooding is most commonly caused by excessive rainfall or snowmelt, but unexpected drainage obstructions such as landslides, ice, or debris can cause slow flooding upstream of the obstruction. Ice jams can cause flooding when a warm snap breaks up river ice, which flows downstream, and piles up against bridges or other waterway obstructions, causing a temporary dam in the waterway with water backing up behind it. When an ice jam breaks, all of the backed-up water is suddenly released, causing a rush of water downstream which can rapidly exceed the capacity of waterways and cause severe flash flooding. Ice jams are common throughout Nebraska during the transition between winter and spring.

Flash floods are rapid flooding of geomorphic low-lying areas, when the ground becomes saturated with water that has fallen too quickly to be absorbed. They are usually caused by heavy rains associated with a severe thunderstorm. Flash floods can also occur after the collapse of an ice jam, or a man-made structure, such as a dam or levee. Flash floods most often occur in normally dry areas that have recently received precipitation.

In the United States, the National Weather Service (part of the National Oceanic and Atmospheric Administration) reported in 2011 that, using a national 30-year average, more people die yearly in floods (93 on average) than by lightning (58), tornados (57), or hurricanes (48).

### ***Historical Occurrences***

The NCDC reported 24 flooding events for the entire jurisdiction of the City of Beatrice from January 1950 to July 31, 2012. Of the reported events, six events recorded damages, with \$988,000 in total property damages.

It should be noted that the National Climatic Data Center is not an all-inclusive, or exhaustive, source for historical weather data. Often data records for short-term local hazard events are more detailed and readily accessible than that for long-term regional events. No additional historical occurrences or records of damages from flooding were discovered after discussion with the City of Beatrice, planning team, and residents. The events below were significant in loss of life, injuries, or the amount of damages.

- **May 8, 1996:** Heavy rains of 1 to 3 inches fell over already saturated ground.
- **May 23, 1996:** Heavy rains of 2 to 4 inches fell over the Little and Big Blue River basins.
- **July 10, 1997:** *Property Damages: \$8,000.* Heavy rains enveloped a grain elevator and washed out a section of railroad tracks next to it.
- **May 20, 1999:** Flooding of many county roads and 100 feet of dirt was washed out under rail road tracks near Beatrice.
- **May 30, 1999:** Street flooding in Beatrice plus county roads around town closed as well due to flooding. County road east of Beatrice closed due to flooding.
- **July 28, 2001:** Heavy rains caused significant street flooding in Beatrice.
- **May 28, 2002:** Numerous county roads were covered by water around Beatrice.
- **May 6, 2007:** *Property damages of \$650,000.* Much of eastern Nebraska received 4 to 8 inches of rain over a three day period (4.26 inches in Beatrice) resulting in road closures, flooding of a park in Beatrice, sandbagging near the museum, and the evacuation of two Beatrice businesses.
- **July 17, 2008:** Between 2.5 and 5 inches of rain was reported over much of Gage County centered on Beatrice. The heavy rain caused flash flooding across numerous county roads prompting their closure. Hail and strong winds were also reported.

### ***Vulnerability Assessment***

Based on the hazard identification, public input, and research of historical occurrences, flooding has previously occurred in the City of Beatrice and the probability of another flood event is ‘highly likely’. The potential damages from flooding can be ‘negligible’, causing less than ten percent damage throughout the City. The extent of flooding in the City would be mostly confined to special flood hazard areas. Based on historic occurrences storm events depositing as little as two inches can result in some minor levels of flooding. Large storm events depositing five or more inches of rain will impact roadways, causing road closures as well as causing damages to other community properties. In total less than seven percent of community structures are located within floodplain which limits potential damages and impacts.

According to the FEMA Map Service Center website ([www.msc.fema.gov](http://www.msc.fema.gov)), the City of Beatrice has a FEMA approved Flood Insurance Rate Map (FIRM). They are effective 06/18/2010.

Jurisdictions with a delineated 100-year floodplain, generally due to the presence and close proximity of a significant floodway, are more vulnerable to riverine and flash flooding, although flooding can occur outside of these boundaries. The potential for localized low-land flooding, especially flash floods with heavy rains, for properties in or near low-lying areas as well as areas where drainage is inadequate is present. Potential losses could include water damage, disruption in transportation, or health issues due to insects and stagnant water. A more detailed description of the areas impacted by flooding, specifically location and extent of flash

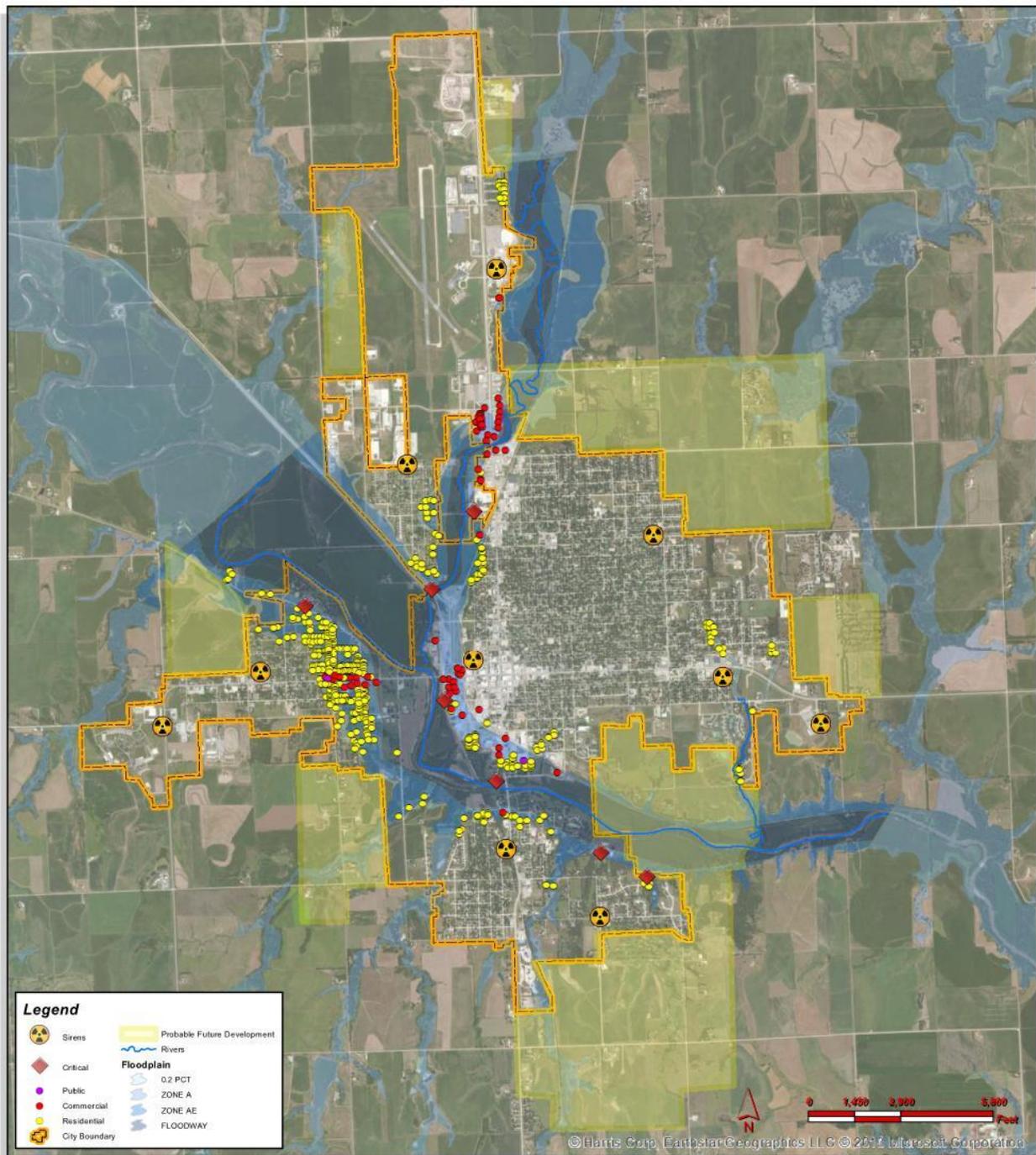
flooding may be considered for the five year plan update. 19 displays the City of Beatrice 1% annual chance floodplain map.

Table 22 shows a summary of the structures in the 100-year floodplain. These structures and their contents could be damage or destroyed in the event of a flood. Critical facilities within the floodplain include major community employers and government buildings. In the event of a flood impacts to these buildings, in addition to damages and loss of content, could result in work interruptions and potentially lay-off due to closure of major community employers.

**Table 22: Structures in the Estimated floodplain**

Type	Number of Structures
Critical Facilities	6
Commercial Structures	57
Public Structures	43
Residential Structures	287
Public Schools	0
<b>Total</b>	<b>393</b>

Figure 19: Beatrice Floodplain Map with Structures in Floodplain Identified



	<h2 style="color: red;">Beatrice, Nebraska</h2> <p><b>--Hazard Mitigation Plan--</b>  <b>Structures in Floodplain &amp;</b>  <b>Future Development</b></p>	<p>Created By: SMS                  Date: 6/2013                  Revised: 6/24/2013                  Software: ArcGIS 10.1                  File: 110018</p>  <p><small>This map was prepared using information from record drawings supplied by JEO and/or other applicable city, county, federal, or public or private entities. JEO does not guarantee the accuracy of this map or the information used to prepare this map. This is not a scaled plot.</small></p>
--	--	--

### ***National Flood Insurance Program***

The National Flood Insurance Program (NFIP) was established in 1968 to reduce flood losses and disaster relief costs by guiding future development away from flood hazard areas where practicable; by requiring flood resistant design and construction practices; and by transferring the costs of flood losses to the residents of floodplains through flood insurance premiums.

In return for availability of federally backed flood insurance, jurisdictions applying to join the NFIP must agree to adopt and enforce minimum flood loss reduction standards to regulate proposed development in special flood hazard areas as defined by the Federal Emergency Management Agency's (FEMA) flood maps. One of the strengths of the program has been keeping people away from flooding rather than keeping the flooding away from people - through historically expensive flood control projects.

The NFIP has approximately 4.4 million policies in force, representing over \$370 billion worth of coverage, in 19,884 participating jurisdictions nationwide. Ninety-five percent of flood insurance policies are written by private companies and sold by more than 110,000 insurance agents and brokers participating in the NFIP's Write Your Own (WYO) program. Since 1969, over \$12.1 billion in claims have been paid.

Currently, Nebraska has 13,057 policies in force representing \$2.16 billion worth of coverage. The City of Beatrice is in Good Standing under the National Flood Insurance Program (Eligible/ Date of Current Map – 06/18/2010) with 105 active policies in-force, \$20,419,900 insurance in-force whole, and \$80,281 written premium in-force.

This plan highly recommends and strongly encourages the City of Beatrice to remain in good standing and continue involvement with the NFIP. Compliance with the NFIP should remain a top priority for the City. Jurisdictions are encouraged to initiate activities above the minimum participation requirements, which are described in the Community Rating System Coordinator's Manual (FIA-15/2013).

Another innovative program is FEMA's Cooperating Technical Partners Programs (CTP). The main objective of the CTP is to increase local involvement in the flood mapping process. With over 20,000 jurisdictions in the NFIP, the CTP encourages collaboration with NFIP jurisdictions and regional and state agencies who wish to become more active participants in the FEMA flood hazard mapping program.

In order to qualify for Hazard Mitigation Assistance jurisdictions must be in good standing with the NFIP, if the project is located in a Flood Hazard Risk Area. Contact the Nebraska Department of Natural Resources with any questions regarding NFIP.

### ***NFIP Repetitive Loss Structures***

The NDNR was contacted to determine if any existing buildings, infrastructure, or critical facilities are classified as NFIP Repetitive Loss Structures, or those receiving two or more claim payments of more than \$1,000 within any rolling 10-year period. According to the NDNR, all eight of the repetitive loss structures in the City of Beatrice have been acquired and demolished. Despite these properties having been purchased the AW-501 forms have not been completed and submitted to remove the properties from the list of repetitive loss structures. The structures NDNR report as having been acquired by the City include 13 residential properties and three non-residential properties.

**Extent**

Based on data provided by the NCDC related to flooding events it is difficult to project a likely extent for this hazard. There are numerous reports of floods/flash floods resulting in closure of roadways in and around the City. It is likely that major flood events will occur in the future and will impact the City. Based on historic reports flood events with waters between two and eight feet over flood stage are possible. Other reported events are less specific regarding the quantity of water or depth of floods. Based on data from the NWS as little as six inches of water can result in roadway closures; flooding events of this magnitude are highly likely to occur in Beatrice within the next decade.

**Potential Losses**

For the purposes of estimating potential losses, it was estimated that all the structures in the flood zone area sustain a 20 percent building damage with a flood depth of 2 feet. This is from the Flood Building Loss Estimation Table provided by the FEMA Benefit-Cost Analysis Full Data Module. Evaluation was based on the average of one or two story buildings with basements. Using this estimated flood event, the potential building damage losses to the City would be \$31,147,895. Table 23 summarizes the damage to structures in the corporate limits within the City's estimated 100-year flood boundary.

**Table 23: Potential losses to structures in the floodplain**

Structures in 100-year Flood Boundary		Structure Valuation	
Structure Type	Number of Structures	Total Value	Approximate Damage Value
Commercial/Industrial	57	\$15,071,820	\$3,014,364
Residential	287	\$16,076,075	\$3,215,215
<b>TOTAL</b>	344	\$31,147,895	\$6,229,579

**Future Vulnerability and Losses**

A 2008 study examining social vulnerability as it relates to flood events found that low-income and minority populations are disproportionately vulnerable to flood events. These groups may lack resources that are needed to mitigate potential flood events as well as resources that are necessary for evacuation and response. In addition, low income residents are more likely to live in areas vulnerable to the threat of flooding but lack the resources necessary to purchase flood insurance. The study did find that flash floods are more often responsible for injuries and fatalities than prolonged flood events. Other groups that may be more vulnerable to floods, and specifically flash floods, include the elderly, those outdoors during rain events, and those in low-lying areas. Elderly residents may suffer from a decreased or complete lack of mobility and as a result be caught in flood-prone areas. Residents in campgrounds or public parks may be more vulnerable to flooding events as many of these areas exist in natural floodplains and can experience rapid rise in water levels resulting in injury or death.

Land-use regulations should be used to limit development in floodplains and other flood prone areas as well as protecting natural flood mitigation features. Buyout programs can be used to eliminate properties located in floodplains, especially properties that have experienced repetitive losses. Communities may also consider incorporating "Green Infrastructure" to address flooding concerns, examples of this would include using permeable surfaces for parking areas, using rainwater retention swales, developing rain gardens, developing green roofs, and establishing greenways. Building codes can be enhanced to require tie-down straps for propane tanks while existing structures can be retrofitted to withstand potential flood events elevating structures and utilities.

The following bullet points identify some general mitigation strategies that can be used to reduce a community's vulnerability to the threat of flooding. Many of these strategies are identified and discussed in greater detail in the FEMA document *Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards*.

- Limit or restrict development in flood-prone areas
- Preserve natural open spaces in floodplains
- Incorporate permeable surfaces and other “green infrastructure” components into municipal designs; Establish a “green infrastructure” program
- Enhanced building codes (i.e. require tie-downs for propane tanks and other gas and chemical storage containers; require water detention swales and retention ponds for new construction)
- Revise and update floodplain maps
- Manage the Floodplain Beyond Minimum Requirements (i.e. adopting a “no-rise” in base elevation clause for the flood damage prevention ordinance)
- Participate in the National Flood Insurance Program (NFIP)
- Participate in the NFIP’s Community Rating System
- Remove existing structures from flood-prone areas
- Elevate or retrofit structures and utilities
- Incorporate ice jam prevention techniques into mitigation strategies and projects
- Develop incentives for structural floodproofing
- Consider erosion control and bank stabilization programs for critical facilities
- Retain natural vegetative beds in stormwater channels
- Incorporate flood mitigation programs into comprehensive plans
- Construct flood control measures
- Evaluate and update municipal storm water systems
- Develop flood response plans for the community (incorporating information about pet and agricultural animal considerations)
- Establish education programs to educate the public about the risks of flooding and ways to protect their families and property

## **Extreme Heat**

### ***Hazard Profile***

Extreme heat is often associated with periods of drought and can be characterized by long periods of high temperatures in combination with high humidity. During these conditions, the human body has difficulty cooling through the normal method of the evaporation of perspiration. Health risks rise when a person is over exposed to heat. Extreme heat can also cause people to over use air conditioners, which can lead to power failures. Over the last 30 years, more people in the United States have died from extreme heat than from earthquakes, hurricanes, floods, lightning, and tornados combined.

### ***Historical Occurrences***

The NCDC reported 7 extreme heat events in or around the City of Beatrice from January 1950 to July 31, 2012. Of the reported events, three events recorded damages, with \$6,460,000 in total property damages and \$150,000 in total crop damages.

The extreme heat and drought event from the summer of 2012 was substantial, but did not warrant a presidential disaster declaration within Nebraska. The full effects of this event are still being assessed, and any future update should include details about its true extent.

No additional historical occurrences or records of damages from periods of extreme heat were discovered after discussion with the City of Beatrice, Planning Team, or public meeting participants.

It should be noted that the National Climatic Data Center or Farm Service Agency Small Business Administration are not all-inclusive, or exhaustive, sources for historical weather data. Often data records for short-term local hazard events are more detailed and readily accessible than that for long-term regional events. No additional historical occurrences or records of damages from periods of extreme heat were discovered after discussion with the City of Beatrice, planning team, and residents. The events below were significant in loss of life, injuries, or the amount of damages.

- **July 10, 1995:** *Property Damages: \$160,000. Crop Damages: \$150,000.* One hundred degree heat over a five day period resulted in three deaths, numerous livestock losses, and damage to roads.
- **July 19, 1999:** *Property Damages: \$3,300,000.* Over an 11 day period, temperatures reached 90 degrees or better all but a day or two. The high temperatures were accompanied by high humidity's which caused afternoon heat indices to reach between 105 and 120 degrees.
- **July 22, 2005:** *Property Damages: \$3,000,000.* High temperatures in the upper 90s to around 105 and lows of 75-80 prevailed over much of eastern Nebraska and southwest Iowa over a three day period. Afternoon heat index values reached 105 to 115 degrees across much of the area.

### ***Vulnerability Assessment***

Based on the hazard identification, public input, and research of historical occurrences, periods of extreme heat have previously occurred in the City of Beatrice and the probability of extreme heat occurring again is 'highly likely'. The potential damages from extreme heat can be 'negligible', causing less than ten percent

damage throughout the City. The extent or magnitude for extreme heat will vary from year to year. It is realistic to expect summer temperatures to exceed 100° F potential for prolonged periods of time. In addition to high temperatures, the humidity levels in Nebraska can exacerbate temperatures resulting in a ‘Heat Index’ that is great than the actual temperature. The yearly humidity average for the region is approximately 69 percent, during the summer months the humidity regularly exceeds the norm.

Periods of high temperatures can make people vulnerable to heatstroke, heat cramps, heat exhaustion, and pose a threat to human life. Most at risk are young children, elderly, and those working and living in non-air-conditioned environments. Building stock, such as critical facilities, are not at risk however periods of extreme heat place a significant demand on utilities, such as water and electricity, which can cause a failure in the system. Power loss could occur with the high demand on energy, making an extreme heat event even more dangerous.

The agricultural economy, especially livestock, is highly vulnerable and at great risk during periods of extreme heat. Heat stress in feedlot cattle can cause reduced performance, and in the most severe cases, lead to the death of the animals, resulting in millions of dollars in losses to the cattle industry.

### ***Extent***

High temperatures are a regular part of the climate in Beatrice, Gage County, Nebraska, and much of the mid-west. For the planning area there were extreme heat events reported in 2009 and 2001 with temperatures ranging (including humidity) between 105°F and 120°F. It is likely that this type of event will occur again. Annually it is realistic that temperatures will reach 100°F to 105°F.

### ***Potential Losses***

The direct and indirect effects of extreme heat are difficult to quantify. There is no way to place a value on the loss of human life. Potential losses such as power outages could affect businesses, homes, and critical facilities. High demand and intense use of air conditioning can overload the electrical systems and cause damages to infrastructure.

Due to the limited reports of historical occurrences with recorded damages it is not feasible to utilize the ‘event damage estimate formula’ to estimate potential losses for the planning area.

According to the FEMA publication “What is a Benefit: Guidance on Benefit-Cost Analysis of Hazard Mitigation Project (June 2009)”, if a hazard event occurred within the City, it is assumed the event could potentially cause a loss of electricity for ten percent of the population at a cost of \$126 per person per day. Specific loss estimates were not calculated due to the multiple variables and complexity associated with the event. In rural areas, the percent of the population affected and duration may increase during extreme events. The assumed damages do not take into account physical damages to utility equipment and infrastructure.

$$\begin{aligned} &12,459 \text{ (Population 2010)} * 10\% \text{ (Assumed Population Affected)} * \$126 \text{ (Per Person Per Day)} \\ &= \$156,983 \text{ (Assumed Electric Loss of Use Damage)} \end{aligned}$$

### ***Future Vulnerability and Losses***

Communities will always have some level of vulnerability related to extreme heat events. Any future development and future residents in the City will be vulnerable to the affects and losses sustained from

extreme heat, especially the agricultural economy. The total losses that could occur in the future would increase as the population of the City increases. The education of the population is the best way to mitigate for extreme heat. There are few large scale “hard” projects that can be undertaken, but explaining policies and best practices can go a long way in dealing with this hazard. It is especially advisable to educate vulnerable populations. Elderly residents are often in the greatest danger when it comes to extreme heat. Children are also more vulnerable to extreme temperatures.

Communities can incorporate some strategies to reduce these impacts including: cool roofing materials, planting trees and vegetation, incorporating green roofs into urban design, and using cool pavements. Cool roof products are made of highly reflective and emissive materials that can remain approximately 50 - 60°f cooler than traditional roofing materials during peak summer heat. Trees, shrubs, grass, and ground covers help cool urban environments by providing shade as well as increasing evapotranspiration resulting in cooler temperatures. A green roof is a vegetative layer grown on a rooftop which helps to remove heat from the air through evapotranspiration. Cool pavements are designed to reduce solar energy absorption as well as reducing thermal emittance.

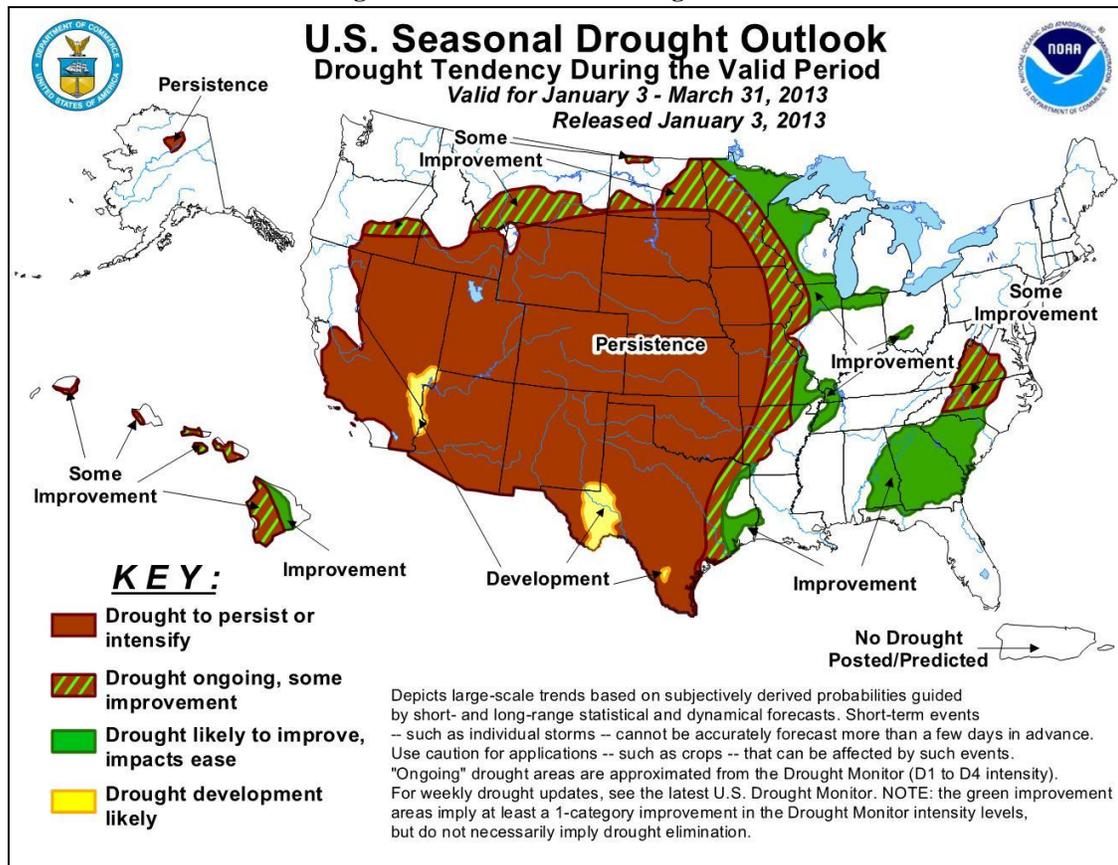
**Drought**

***Hazard Profile***

The State of Nebraska first adopted a drought plan in 1986, Nebraska’s Drought Assessment and Response System (DARS). In 1988, as a result of the severe drought that affected more than 40 percent of the nation and much of eastern Nebraska, DARS was revised to become the Drought Assessment and Response Team (DART). The plan was activated in 1988 to respond to drought conditions in the eastern portion of the state and again in 1989 in response to a statewide drought. Nebraska’s drought mitigation and response are now under the responsibility of the Climate Assessment Response Committee (CARC), which replaced the functions of DART in 1991. CARC is under the direction of the Nebraska Department of Agriculture. The Emergency Response Committee (ERC), which was originally considered a part of CARC, was officially folded into NEMA to avoid overlap of responsibilities. The latest revision to the state’s drought plan took place in 1998 in order to place greater emphasis on mitigation measures.

According to the National Drought Mitigation Center at the University of Nebraska-Lincoln, “Drought is a normal, recurrent feature of climate, although many erroneously consider it a rare and random event. It occurs in virtually all climatic zones, but its characteristics vary significantly from one region to another.” A drought is an extremely dry period in a region where the water availability drops below the region’s requirements, often coexisting with periods of extreme heat. The figure below displays the U.S. seasonal drought outlook for January 3, 2013 through March 31, 2013.

**Figure 20: U.S. Seasonal Drought Outlook**



Source: National Drought Mitigation Center – Drought Monitor

Drought is a slow-onset, creeping phenomenon and its impacts are largely non-structural. Drought normally affects more people than other natural hazards, and its impacts are spread over a larger geographical area. This makes the detection or early warning of drought conditions, and assessment of impacts, more difficult than that of quick-onset natural hazards that result in more visible impacts.

Periods of drought can often result in significant economic, environmental, and social impacts. Agriculture is the primary sector affected by periods of drought; however impacts on rural and municipal water supplies, fish and wildlife, tourism, recreation, water quality, soil erosion, the incidence of wildland fires, electricity demand, and other sectors are also important. The indirect impacts of drought on personal and business incomes, tax revenues, unemployment, and other areas are also significant.

Droughts are affected by natural processes, natural water availability, and also human demands on water supply. Demands on water supply caused by droughts have significant political, social, economic, and environmental impacts. According to the National Weather Service, droughts can be brought on by four different conditions:

- ***Metrological Drought*** – occurs when there is a prolonged period with below average precipitation.
- ***Agricultural Drought*** – occurs when there is not enough moisture to produce average crop or range production. This situation can arise even when the area of interest receives average precipitation. This is due to soil conditions and agricultural techniques.
- ***Hydrologic Drought*** – occurs when water available in aquifers, lakes, and reservoirs falls below the statistical average. This situation can arise even where the area of interest receives average precipitation. This is due to the reserves diminishing from increased water usage usually from agricultural use.
- ***Socioeconomic*** – occurs when the demand for water is greater than the supply. This can be caused by an increase in demand and/or reduction in supply.

### ***Historical Occurrences***

The NCDC reported 1 total regional drought event in and around the City of Beatrice from January 1950 to July 31, 2012. Of the reported events, zero recorded damages. It is worth noting that data from the 2012 drought was not yet available at the time data was gathered. According to FEMA, this drought event has not received a Presidential Disaster Declaration for counties within Nebraska.

The extreme heat and drought event from the summer of 2012 was substantial, but did not warrant a presidential disaster declaration within Nebraska. The full effects of this event are still being assessed, and any future update should include details about its true extent.

Planning participants did report local impacts related to the prolonged drought event in 2012. Participants reported impacts that include ruptured water lines and street damages due to dry shifting soils.

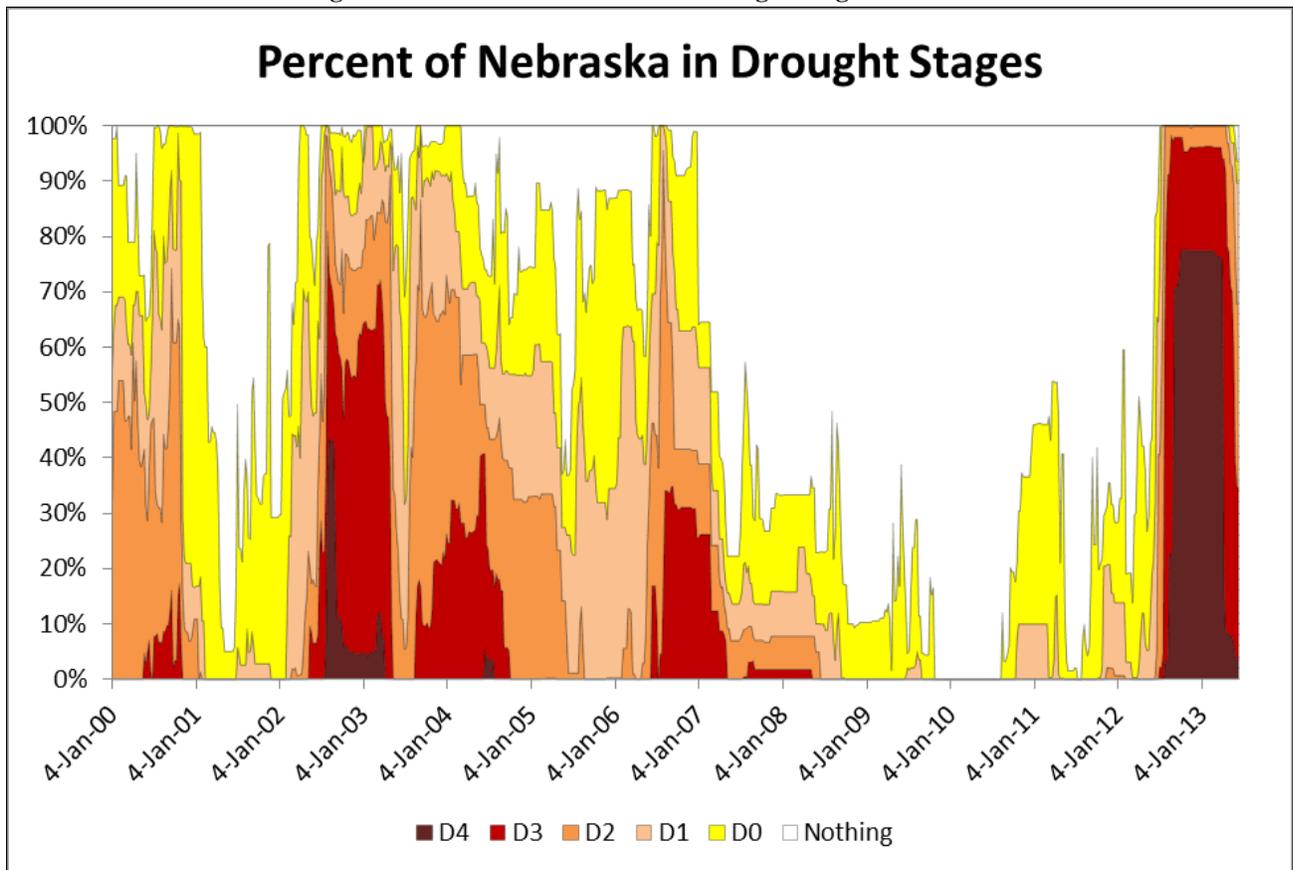
It should be noted that the National Climatic Data Center or Farm Service Agency Small Business Administration are not all-inclusive, or exhaustive, sources for historical weather data. Often data records for short-term local hazard events are more detailed and readily accessible than that for long-term regional

events. No additional historical occurrences or records of damages from periods of drought were discovered after discussion with the City of Beatrice, planning team, and residents.

- November 1, 1999: This drought event began in early September and ended for much of the area on November 22<sup>nd</sup> when .5 to 1.5 inches of precipitation fell. For many locations, this was the first significant rain of over a quarter of an inch since September 4<sup>th</sup>.

The figure below summarizes the historical drought conditions for Nebraska by intensity and percent area from 2000 through 2010.

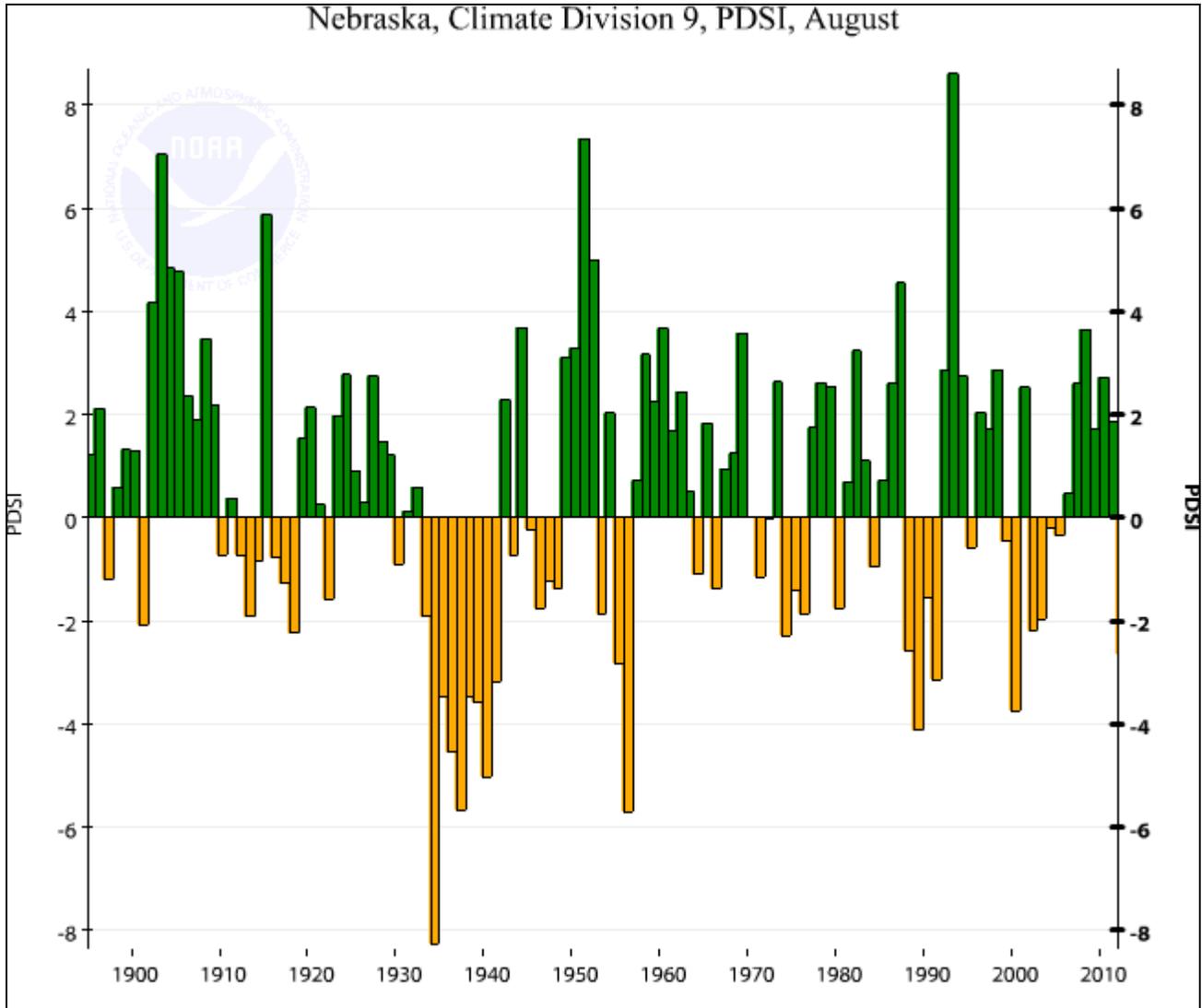
Figure 21: Percent of Nebraska in Drought Stages 2000-2013



Source: National Drought Mitigation Center – Drought Monitor

The following figure is the Palmer Drought Severity Index (PDSI) with data from the National Climatic Data Center (NCDC) using the Climate Visualization System (CLIMVIS) on the NOAA website. The graph illustrates drought history for Division 9 – Southeast Nebraska, which includes the City of Beatrice, between the years of 1895 and 2012. The negative Y axis represents a drought, for which ‘-2’ indicates a moderate drought, ‘-3’ a severe drought, and ‘-4’ an extreme drought. Table 24 details the Palmer classifications.

**Figure 22: Palmer Drought Severity Index**  
Nebraska, Climate Division 9, PDSI, August



Source: National Oceanic Atmospheric Administration, High Plains Regional Climate Center

**Table 24: Palmer Classifications**

Numerical Value	Description	Numerical Value	Description
4.0 or more	Extremely wet	-0.5 to -0.99	Incipient dry spell
3.0 to 3.99	Very wet	-1.0 to -1.99	Mild drought
2.0 to 2.99	Moderately wet	-2.0 to -2.99	Moderate drought
1.0 to 1.99	Slightly wet	-3.0 to -3.99	Severe drought
0.5 to 0.99	Incipient wet spell	-4.0 or less	Extreme drought
0.49 to -0.49	Near normal	--	--

Source: National Oceanic Atmospheric Administration National Weather Service, Climate Prediction Center

**Vulnerability Assessment**

Based on the hazard identification, public inputs, and research of historical occurrences, periods of drought have previously occurred in the City of Beatrice and the probability of another drought is ‘possible’, with between a one and nine percent chance in the next year. The potential damages from drought can be ‘negligible’, causing less than ten percent damage throughout the City. Drought has the capability to affect not only a single community or county, but an entire region during an extended event.

Drought can cause a severe drop in the availability of both surface and groundwater for domestic, municipal, and agricultural uses. Extended periods of drought typically occur in combination with periods of extreme heat, placing a larger demand on electricity and water supplies. The agricultural industry would be highly vulnerable to the affects from an extend drought, with the sources of irrigation water becoming limited or unavailable. Drought can negatively impact the economy, social structure, and environment in and around each participant of the plan. The State of Nebraska has begun implementing Integrated Water Management strategies to alleviate some of the challenges associated with drought.

**Extent**

Based on the 100 year plus history of drought events provided by the PDSI it is likely that Beatrice will experience a “moderate drought” in the next decade. Moderate drought would be expected to result in some crop damages, increased fire risk, lower water levels, and the enacting of local voluntary water restrictions.

The U.S. Drought Monitor (USDM) can also be utilized to quantify the extent of drought using the USDM it is realistic to expect D1 – D2 drought events in Beatrice over the next decade.

**Figure 23 U.S Drought Monitor Scale**

Category	Description	Possible Impacts	Palmer Drought Index	CPC Soil Moisture Model (Percentiles)	USGS Weekly Streamflow (Percentiles)	Standardized Precipitation Index (SPI)	Objective Short and Long-term Drought Indicator Blends (Percentiles)
D0	Abnormally Dry	Going into drought: short-term dryness slowing planting, growth of crops or pastures. Coming out of drought: some lingering water deficits: pastures or crops not fully recovered	-1.0 to -1.9	21-30	21-30	-0.5 to -0.7	21-30
D1	Moderate Drought	Some damage to crops, pastures, streams, reservoirs, or wells low, some water shortages developing or imminent; voluntary water-use restrictions requested	-2.0 to -2.9	11-20	11-20	-0.8 to -1.2	11-20
D2	Severe Drought	Crop or pasture losses likely; water shortages common; water restrictions imposed	-3.0 to -3.9	6-10	6-10	-1.3 to -1.5	6-10
D3	Extreme Drought	Major crop/pasture losses; widespread water shortages or restrictions	-4.0 to -4.9	3-5	3-5	-1.6 to -1.9	3-5
D4	Exceptional Drought	Exceptional and widespread crop/pasture losses; shortages of water in reservoirs, streams, and wells creating water emergencies	-5.0 or less	0-2	0-2	-2.0 or less	0-2

Short-term drought indicator blends focus on 1-3 month precipitation. Long-term blends focus on 6-60 months. Additional indices used, mainly during the growing season, include the USDA/NASS Topsoil Moisture, Keetch-Byram Drought Index (KBDI), and NOAA/NESDIS satellite Vegetation Health Indices. Indices used primarily during the snow season and in the West include snow water content, river basin precipitation, and the Surface Water Supply Index (SWSI). Other indicators include groundwater levels, reservoir storage, and pasture/range conditions.

**Potential Losses**

Due to the variable nature of the event, regional implications, duration, potential number of sectors affected, their ability to endure the drought, and limited reports of historical occurrences with recorded damages it is not feasible to utilize the ‘event damage estimate formula’ to estimate potential losses for the planning area. However, the following impacts may be expected during a period of drought:

- Reduced range and pasture forage and livestock water results in poor animal health, soil erosion, and possible economic loss to ranchers
- Reduced soil moisture on dry cropland poses economic loss to farmers and possible increased soil erosion and blowing dust
- Decreased irrigation water from surface water sources prevents achievement of crop harvest potential
- Water storage may not be adequate in long-term drought
- Increased irrigation pumping from underground water sources may lower water levels and decreases pumping rates resulting in less capacity to meet crop needs and decreasing the profitability of an irrigated cropping system
- Loss of farmers and ranchers due to drought-induced bankruptcy
- Drought induced mental anguish of farms and ranchers resulting in increased suicides, social and family problems
- Increased health problems for residents of areas experiencing problems from blowing dust
- Damage to cropland and rangeland due to intrusion of wildlife species
- Decreased income from local dairy and feedlot operations due to drought-induced high cost of feedstock
- Decline in stability of local economy and tax base due to decreased sales of agricultural support equipment
- Reduced tourism due to misperceptions about the effects of drought
- Due to drought, many public water supply systems experience potable water demand problems
- Many rural water districts and small public water systems develop operational problems when operating for extended periods of drought
- Due to drought, private wells experience water quality and quantity problems
- Increased irrigation may overdraft available aquifer and affect municipal and rural water supplies during drought
- Increased presence of large, industrial, independent water users may overdraft available aquifers during drought
- Drought-induced temperature extremes produce extreme living conditions for both rural and urban residents. Increased electrical usage may create overloads on available electrical grid network

Periods of drought are characterized by intensity, duration, and frequency of occurrence, which make potential losses extremely hard to determine. It can be assumed that a drought significant in nature, lasting at least five years, would have a devastating financial impact on the area. The majority of losses associated with drought are crop and livestock related, which can cause significant damage and harm to the local agricultural industry and economy, with loss in profits and resulting economic downfall. Periods of drought can cause monetary loss of crops and livestock, environmental losses, economic losses, as well as losses associated with disruption of the social structure. Drought can pose a significant threat to human life.

#### ***Future Vulnerability and Losses***

According to the Climate Prediction Center at the National Weather Service, drought in the near future is going to persist or intensify in the Central and West of Nebraska but for the East of Nebraska where our planning area locates will not expect drought conditions in the next three months. Besides climate variability that results in drought conditions, communities can be vulnerable

and increase their drought risks with unwise land use decisions, urban development, and population growth etc.

Population groups with high vulnerability to drought include elderly, immigrants, children, and low-income families. Often drought is accompanied by extreme temperatures which can result in severe impacts among elderly populations. Often time's elderly residents are less willing to relocate from drought impacted areas resulting in decreased water supply and increased physical stressors and a poorer quality of life or even death. Immigrants, especially migrant workers, are also vulnerable to the threats posed by drought. Immigrants may lack community social networks and as a result be essentially isolated increasing their vulnerability. In addition immigrants may lack effective communication methods in their new environment which would increase their level of isolation; this combined with a lack of familiarity with natural systems of the area may significantly increase their vulnerability. Immigrants may also lack resources necessary to prepare for potential droughts and may also rely on agricultural based employments for income they do have. Agricultural sectors are among the most heavily impacted by drought and may as a result have to lay-off seasonal or migrant employees. Finally children are susceptible to water-borne diseases that may become more prevalent during times of drought. Low-income families, like children, may be impacted by higher food prices that result from drought. This is especially true as it relates to fresh fruits and vegetables that may or may not be available.

Communities will always have some level of vulnerability related to the phenomenon of drought. There are actions that can be taken to reduce this vulnerability in future development areas as well as potentially retrofitting existing developments and structures. Land-use regulations should consider the water supply and quality when considering areas to be developed in the future and ensure that future developments will not stress the existing water supply system or ultimately result in insufficient water supplies for the community. Communities can audit water systems as well to reduce water waste and loss through leaks and small breaks to the distribution system. It is estimated that communities lose between 10 – 20 percent of available water to inefficiencies in the distribution system. Building codes can also be changed to either reduce landscaped and irrigated areas or to require high efficiency irrigation systems as well as encouraging the use of low-flow fixtures in new construction areas. Xeriscaping can also be used to reduce water consumption and increase the resiliency of communities within the plan area.

The following bullet points identify some general mitigation strategies that can be used to reduce a community's vulnerability to the threat of drought. Many of these strategies are identified and discussed in greater detail in the FEMA document *Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards*. Additional information regarding drought mitigation and drought planning can be found in the National Drought Mitigation Center's *Drought-Ready Communities: A Guide to Community Drought Preparedness*.

Once the full extent of the damages of the Drought of 2012 is known, this information should be incorporated into the update to this plan in 5 years.

- Assess Drought Vulnerability (identify factors that affect drought severity for local jurisdictions)
- Establish a Drought Monitoring Board and drought reporting procedures
- Establish monitoring procedures for municipal water supply and distribution systems

- Develop drought specific plans (this may include water conservation plans, drought preparedness plans, and wellhead protection plans)
- Establish municipal water conservation programs
- Establish agricultural policies (agricultural irrigation standards, grazing policies, etc.)
- Enhanced residential landscape standards (xeriscaping, irrigation systems requirements, etc.)
- Enhanced building codes to require low-flow fixtures in new construction
- Incentives to retrofit structures with low-flow fixtures
- Incorporate permeable surfaces into municipal designs
- Investigate alternative water supply options
- Participate in the Tree City USA program
- Encourage agricultural businesses to purchase crop insurance as appropriate
- Drought education programs (residential and agricultural)

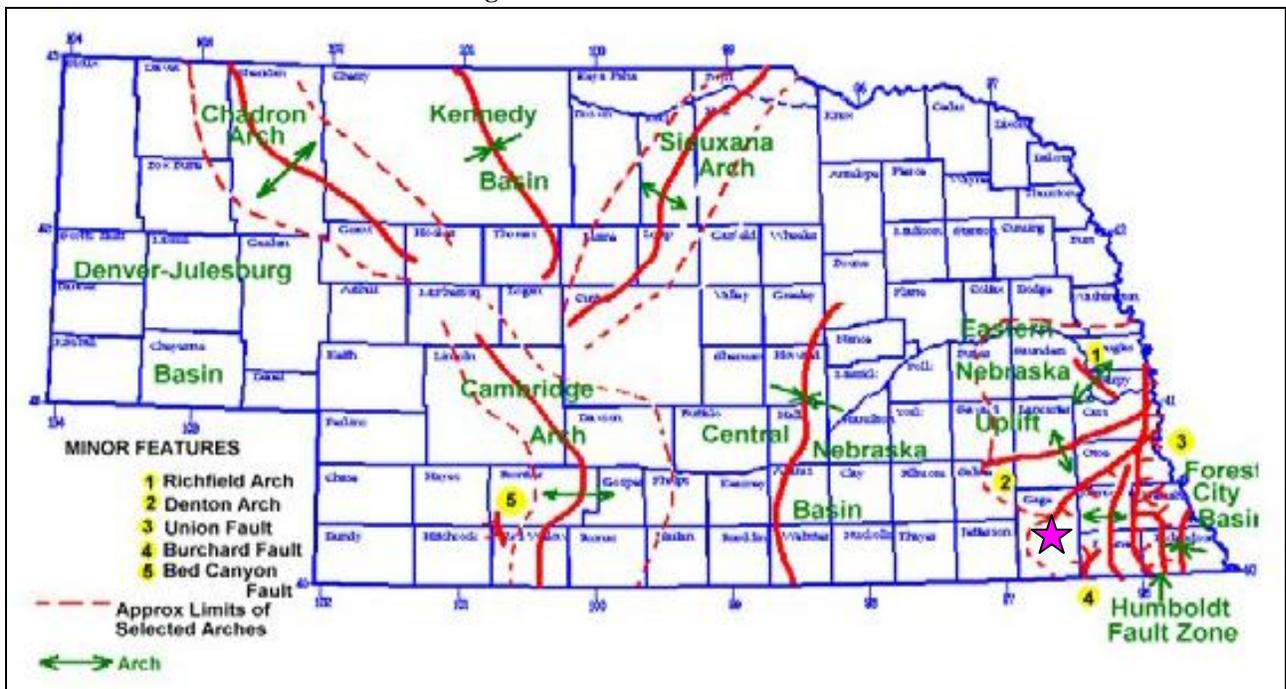
**Earthquakes**

**Hazard Profile**

An earthquake is the result of a sudden release of energy in the Earth’s tectonic plates that creates seismic waves. The seismic activity of an area refers to the frequency, type, and size of earthquakes experienced over a period of time. Earthquakes do occur in Nebraska, however they are uncommon and when they do occur, are small, generally not felt, and cause little to no damage. Earthquakes are measured by magnitude and intensity. Magnitude is measured by the Richter Scale, a base-10 logarithmic scale, which uses seismographs around the world to measure the amount of energy released by an earthquake. Intensity is measured by the Modified Mercalli Intensity Scale, which determines the intensity of an earthquake by comparing actual damage against damage patterns of earthquakes with known intensities. The figure below illustrates the fault lines in Nebraska and the tables summarize the Richter Scale and Modified Mercalli Scale.

Beatrice is located near a system of faults including the Humboldt Fault to the southeast and the Union Fault to the north. The Union Fault is the nearest to the City but is not very active. The fault lines in Nebraska, including those near Beatrice, are relatively deep and do not pose a significant threat to the planning area or the state in general.

**Figure 24: Nebraska Fault Lines**



Source: Nebraska Department of Natural Resources

**Table 25: Richter Scale Descriptions**

Richter Magnitudes	Earthquake Effects
Less than 3.5	Generally not felt, but recorded.
3.5 – 5.4	Often felt, but rarely causes damage.

Under 6.0	At most slight damage to well-designed buildings. Can cause major damage to poorly constructed buildings over small regions.
6.1 – 6.9	Can be destructive in areas up to about 100 kilometers across where people live.
7.0 – 7.9	Major earthquake. Can cause serious damage over larger areas.
8 or greater	Great earthquake. Can cause serious damage in areas several hundred kilometers across.

Source: Federal Emergency Management Agency

**Table 26: Modified Mercalli Intensity Scale**

Scale	Intensity	Description of Effects	Corresponding Richter Scale Magnitude
I	Instrumental	Detected only on seismographs	
II	Feeble	Some people feel it	< 4.2
III	Slight	Felt by people resting, like a truck rumbling by	
IV	Moderate	Felt by people walking	
V	Slightly Strong	Sleepers awake; church bells ring	< 4.8
VI	Strong	Trees sway; suspended objects swing, objects fall off shelves	< 5.4
VII	Very Strong	Mild Alarm; walls crack; plaster falls	< 6.1
VIII	Destructive	Moving cars uncontrollable; masonry fractures, poorly constructed buildings damaged	
IX	Ruinous	Some houses collapse; ground cracks; pipes break open	< 6.9
X	Disastrous	Ground cracks profusely; many buildings destroyed; liquefaction and landslides widespread	< 7.3
XI	Very Disastrous	Most buildings and bridges collapse; roads, railways, pipes and cables destroyed; general triggering of other hazards	< 8.1
XII	Catastrophic	Total destruction; trees fall; ground rises and falls in waves	> 8.1

Source: Federal Emergency Management Agency

### ***Historical Occurrences***

No historical occurrences or records of damages from earthquakes were discovered after discussion with the City of Beatrice, Planning Team, or public meeting participants.

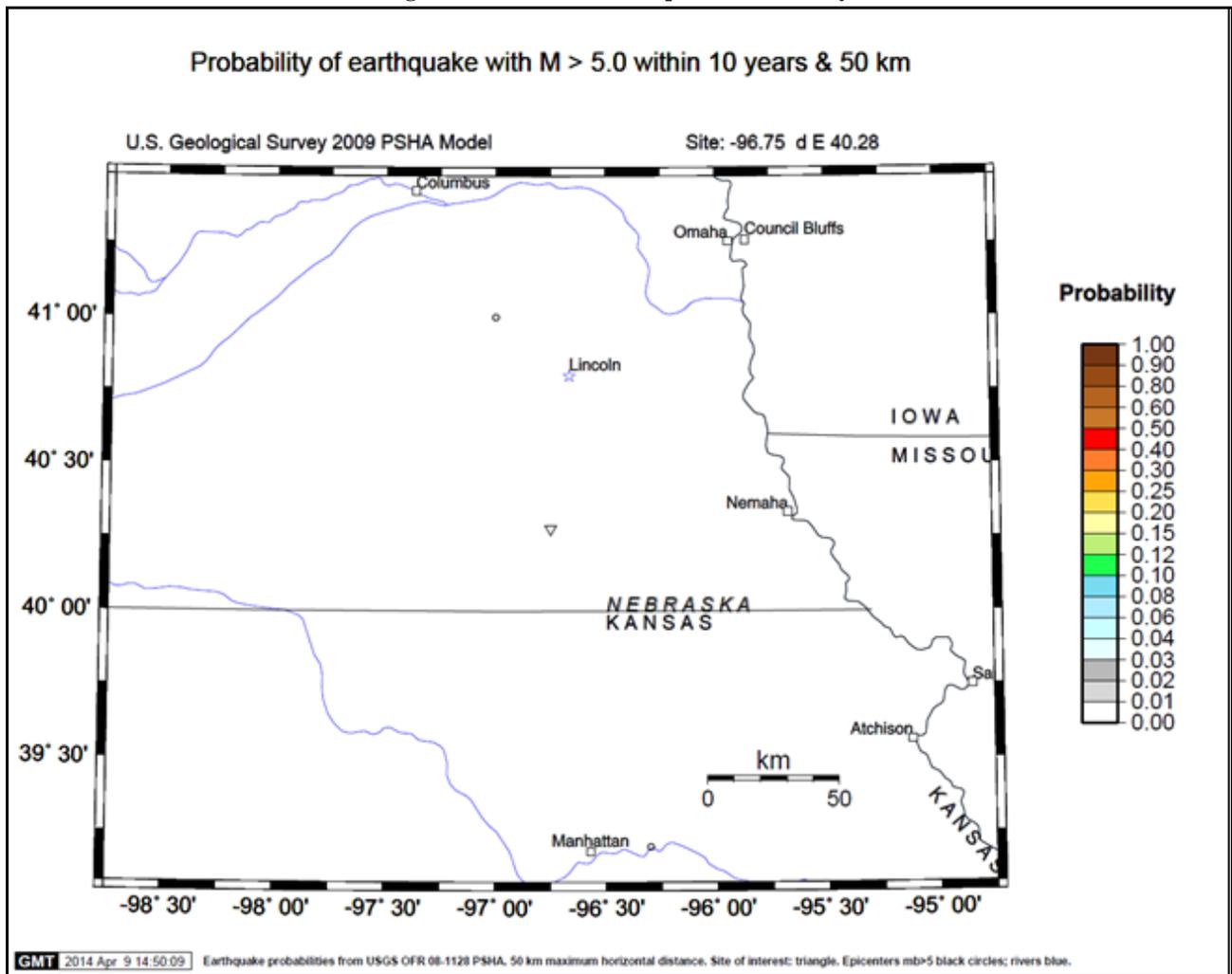
### ***Vulnerability Assessment***

Based on the hazard identification, public input, and research of historical occurrences, earthquakes have not previously occurred in or around the City of Beatrice and the probability of an earthquake occurring is ‘unlikely’, with less than one percent chance in the next year. The potential damages from an earthquake would be ‘negligible’, causing less than ten percent damage throughout the City.

**Extent**

Based on the historical occurrences, earthquakes do not occur on a regular basis in the area and are isolated events. Figure 25 displays the probability of a 5.0 earthquake occurring within a 50 km area surrounding Beatrice. According to this map, developed using the USGS 2009 Earthquake Probability Mapping program, there is a near zero percent chance for this type of event to occur despite the location of a fault north of the City. It is expected that earthquakes will not occur in the planning area and if they do it would be a minor event (less than 3.5).

**Figure 25: Beatrice Earthquake Probability**



Source: United States Geological Survey

**Potential Losses**

Due to the lack of sufficient earthquake data, limited resources, extremely low earthquake risk for the area, and limited reports of historical occurrences with recorded damages it is not feasible to utilize the 'event damage estimate formula' to estimate potential losses for the planning area.

***Future Vulnerability and Losses***

Any future development will be as vulnerable to losses from earthquakes as is existing development. Losses for future development will remain negligible due to the rarity of earthquakes in the area.

## **Dam Failure**

### ***Hazard Profile***

Dam failure is described as a structural failure of a water impounding structure. Structural failure can occur during extreme conditions, which include but are not limited to:

- Reservoir inflows in excess of design flows
- Flood pools higher than previously attained
- Unexpected drop in pool level
- Pool near maximum level and rising
- Excessive rainfall or snowmelt
- Large discharge through spillway
- Erosion, landslide, seepage, settlement, and cracks in the dam or area
- Earthquakes

NDNR regulates dam safety and has classified dams by the potential hazard each poses to human life and economic loss, based upon assets and population located downstream of the dam. The following are classifications and descriptions for each hazard class:

- **High hazard** potential means a hazard potential classification such that failure or misoperation of the dam resulting in loss of human life is probable.
- **Significant hazard** potential means a hazard potential classification such that failure or misoperation of the dam would result in no probable loss of human life but could result in major economic loss, environmental damage, or disruption of lifeline facilities.
- **Low hazard** potential means a hazard potential classification such that failure or misoperation of the dam would result in no probable loss of human life and in low economic loss.
- **Minimal hazard** potential means a hazard potential classification such that failure or misoperation of the dam would likely result in no economic loss beyond the cost of the structure itself and losses principally limited to the owner's property.

Dams that are classified with high hazard potential require the creation of an Emergency Action Plan (EAP). The EAP defines responsibilities and provides procedures designed to identify unusual and unlikely conditions which may endanger the structural integrity of the dam within sufficient time to take mitigating actions and to notify the appropriate emergency management officials of possible, impending, or actual failure of the dam. The EAP may also be used to provide notification when flood releases will create major flooding. An emergency situation can occur at any time; however, emergencies are more likely to happen when extreme conditions are present. The EAP includes information regarding the efficiency of emergency response entities so that proper action can be taken to prevent the loss of life and property. Local emergency response entities generally included in an EAP include but are not limited to 911 Dispatch, County Sheriffs, Local Fire Departments, Emergency Management Agency Director, County Highway Department, and the National Weather Service.

### ***Historical Occurrences***

Data from the DNR indicates there have been no Dam Failures upstream of Beatrice. The key personnel and citizens of Beatrice concur. There are no other sources indicating any dam failures above Beatrice. No additional historical occurrences or records of damages from dam failure were discovered after discussion with Beatrice, the Planning Team, or public meeting participants.

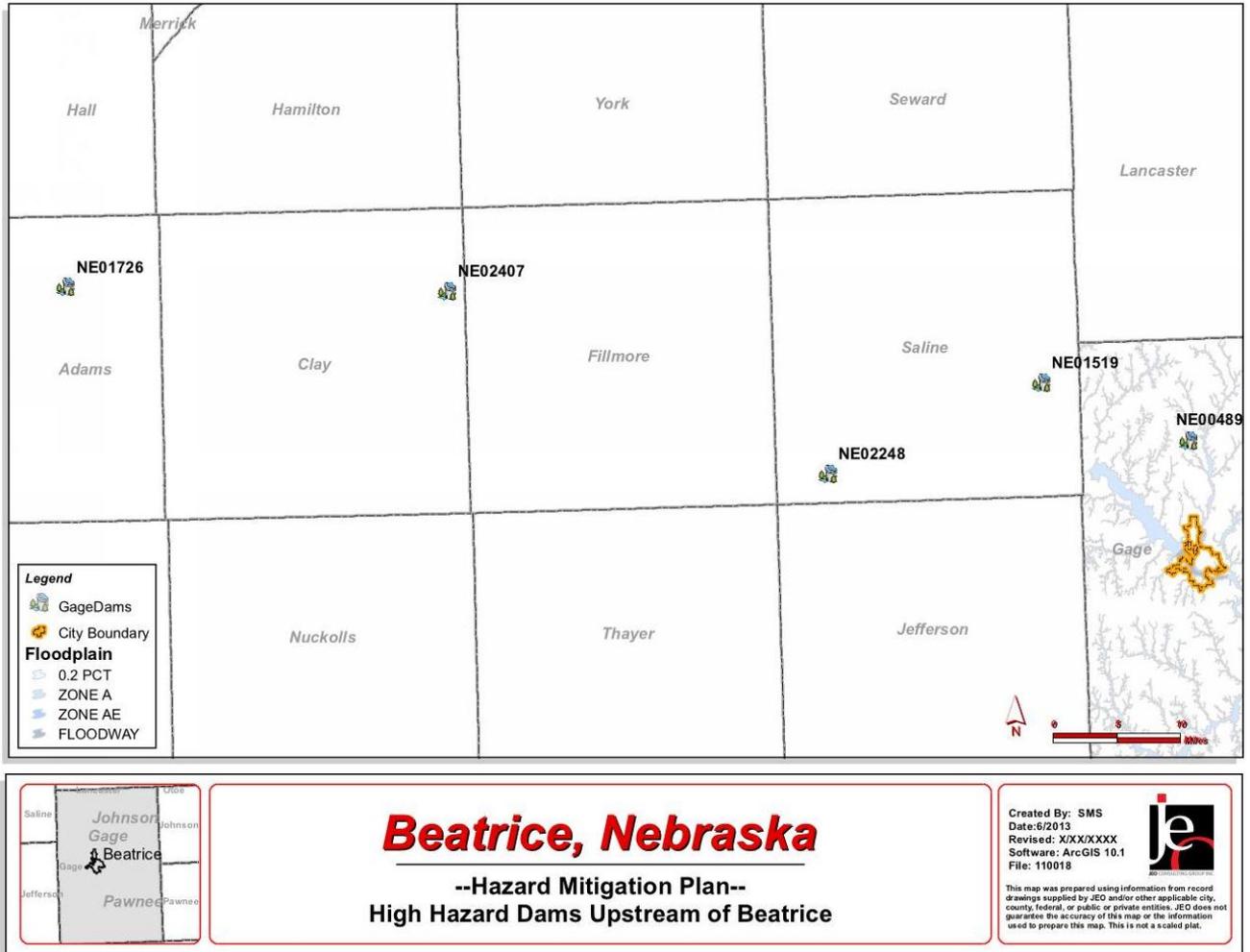
***Vulnerability Assessment***

Based on research of historical occurrences, public input, and information received, dam failure has not previously occurred in the City of Beatrice and the probability of dam failure occurring is ‘unlikely’, with less than 1% chance in the next year. The potential damages from dam failure would be ‘Limited’, causing 1 to 4 percent damage throughout the City of Beatrice. Table 277 below summarizes the total number of High Hazard dams located upstream of the City of Beatrice. It is expected that dam failure will not occur in the planning area. Therefore there would be no magnitude or extent for the hazard expected for the City.

After reviewing a NDNR dam database, five (5) high hazard dams were discovered to be upstream of the City of Beatrice. Discussions with NDNR revealed the areas that would be inundated, due to a failure of one of the high hazard dams, would remain significantly upstream of Beatrice and have a negligible effect on the City. Negligible effects include an inundation area that is contained within the 100-yr floodplain; therefore, if any effects due to a dam failure are observed, said effects would be similar to a flood. The effects and damages of flooding are covered under the “Flooding” Section of this report. Therefore, the vulnerability of Beatrice to Dam Failure is negligible and potential losses are none. More detailed information regarding inundation areas is available through the Nebraska Department of Natural Resources.

All dams are inspected on a regular basis and after flash flood events. If issues are found during an inspection, the proper course of action is taken to ensure the structural integrity of the dam is preserved. In the event that dam failure is imminent, the Emergency Action Plan (EAP) for the dam governs the course of action.

Figure 26: High Hazard Dams Upstream of Beatrice



Source: Nebraska Department of Natural Resources

Table 27: High Hazard Dams

NIDID	Name	County	Year Completed	Last Inspected	Normal Ac.-Ft.	Max Ac.-Ft.	Surface Area Ac.	Drain Area Ac.	Volume C.Y.
NE01726	Hastings NW Dam	Adams	1980	4/19/2012	145	1,155	42	2,304	161,153
NE02407	Structure 2-7-5W	Clay	1994	4/19/2012	4	57	3	128	7,174
NE02248	Swan Creek 20	Saline	1987	3/15/2012	341	3,978	54	4,928	224,017
NE01519	Wilber Dam No 1	Saline	1975	3/15/2012	14	127	5	256	16,600
NE00489	Indian Creek 15-A	Gage	1955	8/5/2012	17.8	703	7.3	958	35,000

Source: Nebraska Department of Natural Resources

**Extent**

This event is not likely to occur.

**Potential Losses**

Due to lack of data and the sensitive nature of this hazard potential losses are not being calculated for this threat. Community members in the planning area that wish to quantify the threat of dam failure should contact Gage County Department of Emergency Management or Nebraska Department of Natural Resources to view EAPs and breach inundation area maps.

**Table 28: Number of Structures within the Inundation Area**

<b>Structures in Inundation Area</b>	
<b>Structure Type</b>	<b>Number of Structures</b>
<b>Residential</b>	393
<b>Commercial / Industrial</b>	526
<b>Public</b>	9
<b>Other</b>	59
<b>Total</b>	5,834

#### ***Future Vulnerability and Losses***

Structures built in the inundation area of a high hazard dam would be vulnerable to dam failure and the losses could be equivalent to the valuation of the structure. More information on inundation areas is available through the NDNR. Mitigation projects described in the “Flooding” section would be equally useful for this hazard type.

#### ***New HIRA Based Hazards Considered***

The State of Nebraska looks at additional hazards than those considered by this plan. At this time, those hazards will not be explored in depth, but may be considered for future plans. Below is some basic information on the historic occurrences of these hazards. Each of these hazards is addressed in the Gage County Local Emergency Operations Plan.

#### **Chemical Fixed Sites**

According to the State of Nebraska HMP, the whole of Gage County has 47 Tier 2 fixed chemical sites. The text below is from the State Plan:

- Nebraska has approx. 3,624 facilities that report under the Emergency Planning and Community Right to know Act (EPCRA) §311 & 312 and the Clean Air Act §112(r) (7) identifies the development of a Risk Management Program (RMP). Facilities that fall under this act report hazardous and extremely hazardous chemicals that are stored in their facility at any given time. Facilities are expected to submit reports to the local emergency planning committee, the local fire jurisdiction and the State Emergency Response Commission (SERC).

It was determined that other planning mechanisms are currently in place and sufficient to address this threat within the city of Beatrice. Future updates may consider a more inclusive discussion related this threat.

#### **Civil Disorder**

There were four instances of civil disorder identified in the State Plan. These events all occurred between 1966 and 1969 and were related to the race relations of the civil rights movement. This was not considered a significant threat for the planning area due to lack of historical occurrences and a low probability of future occurrences.

### **Radiological Fixed Sites**

There are no radiological fixed sites within Gage County.

### **Radiological Transportation**

The transportation of radiological materials occurs across Nebraska. It is unknown if materials are transported across Gage County specifically. There are no known incidences of hazard events related to radiological transportation. Future updates should more thoroughly examine this threat.

### **Urban Fires**

Fires have occurred within the City of Beatrice. The State Plan identifies that fires do happen, but recognizes that there are state and local resources to accommodate such events. Through the planning process the planning team felt that this threat is currently addressed by plans a procedures currently in place for Beatrice, future updates may consider a closer examination of this threat.

### **Animal Disease**

Producers are required by state law to report any animal disease occurrence to the Nebraska Department of Agriculture (NDA). The NDA confirmed that no outbreaks or cases involving bovine spongiform encephalopathy, foot & mouth disease, or exotic new castle disease have been reported in Nebraska. Gage County was shown to be at “Minimal” risk from artificially induced agricultural animal diseases.

### **Plant Disease**

This hazard can seriously affect the economy of the state. Gage County falls below the “Top Ten” counties in dollar sales identified in the State Plan that would have the greatest economic loss should a plant disease occur. Regardless of this, the county received a “High” score on the HIRA analysis. For this update it was decided to focus on other hazards, future updates should consider a more thorough examination of plant disease and the impacts that they could have on the local economy. One significant consideration was the limits on potential mitigation activities outside of the standard treatments related to this threat.

### **Chemical Transportation**

Between 2004 and 2011, there were 357 total hazardous material releases within Nebraska. Only 19 of those were serious incidents which are defined by the Pipeline and Hazardous Safety Administration. Data in the State Plan indicates the majority of incidences occur on highways, as opposed to rail and air. The data also supports that the majority of occurrences are while loading or unloading the materials. Gage County received a “High” HIRA score because of the state highways within the county. It was determined that due to plans currently in place to address this threat more serious consideration would be given at the next update for this plan.

### **Power Failure**

A long term power outage would affect any electrical customer, no matter which part of the state. Power outages which last for over 8 hours are fortunately a rare event. Weather issues typically cause 20-25% of all

outages in a given year. Gage County received a “High” HIRA score. Prolonged power outage is most commonly associated with other natural hazards (high winds, tornados, severe winter storms, severe thunderstorms) and has been addressed through those sections.

### **Terrorism**

The impact of terrorism on a community can vary from minor to catastrophic. All areas of the state are at risk for some form of terrorism. Determining the probability of terrorism is an inexact science. Gage County received a “High” HIRA score because of its main population center, Beatrice. It was determined that there are currently plans in place to account for this threat within Gage County and the city of Beatrice. Future updates should consider a more thorough analysis of terrorism.

### **Transportation**

Gage County is served by multiple forms of transportation including air, rail, and road. The primary concern involving transportation involves issues with the inability to move people or goods to necessary destinations or markets. Accidents can occur to each of these modes of transportation. The probability of accidents occurring in the future is good, although mitigation projects can be undertaken to diminish the impact on the community. Gage County received a “High” HIRA score. It was determined that for this update transportation would not be evaluated as a threat. The planning team opted to focus primarily on natural hazards as they had done in previous plans. Future updates may consider a more detailed evaluation of transportation concerns for the city of Beatrice.

## **Section Five: Mitigation Strategy**

### ***Introduction***

The primary focus of the mitigation strategy is to establish goals and objectives, and identify action items to reduce the effects of hazards on existing infrastructure and property in a cost effective and technically feasible manner. The development of the goals and objectives began by reviewing the goals and objectives developed for the 2008 hazard mitigation plan. Participants in the planning process were asked to review the goals and offer suggestion and comments as a part of the ‘hazard identification’ public meeting.

The intent of each goal and set of objectives was to develop strategies to account for the risks associated with the hazards, and identify ways to reduce or eliminate those risks. Each goal and set of objectives is preceded by ‘mitigation alternatives’ or actions items.

### ***Development of Goals***

Below are the final goals and objectives as determined by the residents and planning team. These goals and objectives provide specific direction to the City of Beatrice for reducing future hazard related losses. The goals and objectives were numbered to assist in the development and organization of mitigation alternatives or ‘action items’, as discussed in this section.

#### ***Goal 1: Protect the Health and Safety of Residents***

Objective 1.1: Reduce or prevent damage to property or prevent loss of life or serious injury (overall intent of the plan).

#### ***Goal 2: Reduce Future Losses from Hazard Events***

Objective 2.1: Provide protection for existing structures, future development, critical facilities, services, utilities, and trees to the extent possible.

Objective 2.2: Develop hazard specific plans, conduct

studies or assessments, and retrofit jurisdiction to mitigate for hazards and minimize their impact.

Objective 2.3: Minimize and control the impact of hazard events through enacting or updating ordinances, permits, laws, or regulations.

#### ***Goal 3: Increase Public Awareness and Educate on the Vulnerability to Hazards***

**Requirement §201.6(c)(3)(i):** [The hazard mitigation strategy shall include a] description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.

**Requirement §201.6(c)(3)(ii):** [The mitigation strategy shall include a] section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure.

**Requirement: §201.6(c)(3)(ii):** [The mitigation strategy] must also address the jurisdiction’s participation in the National Flood Insurance Program (NFIP), and continued compliance with NFIP requirements, as appropriate.

**Requirement: §201.6(c)(3)(iii):** [The mitigation strategy section shall include] an action plan describing how the actions identified in section (c)(3)(ii) will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.

**Requirement §201.6(c)(3)(iv):** For multi-jurisdictional plans, there must be identifiable action items specific to the jurisdiction requesting FEMA approval or credit of the plan.

Objective 3.1: Develop and provide information to residents and businesses about the types of hazards they are exposed to, what the effects may be, where they occur, and what they can do to be better prepared.

**Goal 4: Improve Emergency Management Capabilities**

Objective 4.1: Develop or improve Emergency Response Plan and procedures and abilities.

Objective 4.2: Develop or improve Evacuation Plan and procedures.

Objective 4.3: Improve warning systems and ability to communicate to residents and businesses during and following a disaster or emergency.

**Goal 5: Pursue Multi-Objective Opportunities (whenever possible)**

Objective 5.1: When possible, use existing resources, agencies, and programs to implement the projects.

Objective 5.2: When possible implement projects that achieve several goals.

**Mitigation Alternatives (Action Items)**

JEO worked with the City of Beatrice and planning team to review and evaluate the current listing of mitigation alternative action items, document those which have been implemented, and identify, evaluate, and prioritize new potential alternatives. Several of the action items identified in the original Beatrice Hazard Mitigation Plan were implemented. Those one time projects that were not completed have been included on the Projects List for this plan. Several items were removed at the request of the City of Beatrice, due to completion or lack of relevance. Through the process of prioritization the focus of the planning team and priority projects are largely consistent with the 2008 hazard mitigation plan.

At the ‘mitigation alternative’ public meeting the City of Beatrice was asked to prioritize the list of alternatives (see worksheets in *Appendix C*) using FEMA’s recommended STAPLEE process. This process addressed all the major factors when weighing the relative costs and benefits of implementing one action over another. These factors included the prohibitive costs, the jurisdiction’s resource capabilities, the jurisdiction’s desires and concerns, and the overall feasibility of the alternative. The STAPLEE process, taken from FEMA’s Multi-Hazard Mitigation Planning Guidance (July 2008), considered the social, technical, administrative, political, legal, economic, and environmental benefits of each action. The criteria are summarized below.

- **S – Social:** Mitigation actions are acceptable to the jurisdiction if they do not adversely affect a particular segment of the population, do not cause relocation of lower income people, and if they are compatible with the jurisdictions social and cultural values.
- **T – Technical:** Mitigation actions are technically most effective if they provide long-term reduction of losses and have minimal secondary adverse impacts.
- **A – Administrative:** Mitigation actions are easier to implement if the jurisdiction has the necessary staffing and funding.
- **P – Political:** Mitigation actions can truly be successful if all stakeholders have been offered an opportunity to participate in the planning process and if there is public support of the action.

- **L – Legal:** It is critical that the jurisdiction or implementing agency have the legal authority to implement and enforce a mitigation action.
- **E – Economical:** Budget constraints can significantly deter the implementation of mitigation actions. Hence, it is important to evaluate whether an action is cost-effective, as determined by a cost-benefit review, and possible to fund.
- **E – Environmental:** Sustainable mitigation actions that do not have an adverse effect on the environment, that comply with Federal, State, and local environmental regulations, and that are consistent with the jurisdiction’s environmental goals, have mitigation benefits while being environmentally sound.

The ‘mitigation alternative’ meeting worksheets asked the City to mark ‘yes’ if they felt the alternative was feasible under the STAPLEE criteria, or ‘no’ if it was not. The actions with greater benefits and lower relative costs, as evaluated by the STAPLEE, were to have a “high” priority, while alternatives with lower benefits and higher relative costs were to have a “low” priority. In addition, the City had the opportunity to directly indicate if they felt the action was high, medium, or low priority. The ‘priority’ listed does not necessarily indicate which alternatives will be implemented first, but rather serves as a guide in determining what action may be appropriate and when it should be implemented. The prioritized list will help the City determine which alternatives may best alleviate damages in the event of a disaster.

The final list of mitigation alternatives was established with information on the description, analysis, hazard(s) addressed, estimated cost, benefits, potential funding, timeline, priority, and lead agency for each action through input from the residents, planning team, and consultant. Below are the specific mitigation alternatives or ‘action items’ identified by the City of Beatrice. The following information is provided for each action item:

- **Description** – general outline of the action
- **Analysis** – brief summary of what the action intends to achieve
- **Goal/Objective** – which goal and objective the action falls under
- **Hazard(s) Addressed** – which natural hazard(s) the action intends to address
- **Status** – indicates if the action was carried over from the previous plan, is ongoing, or new to this plan
- **Estimated Cost** – general cost range
- **Benefits** – how the action will benefit the local planning participants
- **Potential Funding** – any potential funding mechanisms for the action
- **Timeline** – general completion timeframe for the action established by the planning team and participants
- **Priority** – general level of importance (high/medium/low) in which the action may be implemented
- **Lead Agency** – agencies which may lead implementation of the action
- **City** – Unless otherwise defined “City” as a responsible department or agency refers to the City Council and Mayor.

The implementation process will vary based on the availability of existing information, funding opportunities or limitations, and administrative capabilities of the City. In future plan updates, a more detailed and formal assessment of the costs and benefits for each alternative could be evaluated to better prioritize action items.

It is important to note that not all alternatives identified were ultimately included in this plan due to limited capabilities, prohibitive costs, low benefit/cost ratio, or other concerns expressed by the City. Also, the City will do its best to implement these projects, but ultimately cannot commit to them due to funding limitations. This information will serve as a guide for the City with hazard mitigation in the future.

### **Completed Mitigation Alternative Action Items**

According to the planning team the following actions identified in the 2008 hazard mitigation plan as completed or nearing completion.

**Action:** Construct Saferooms

**Hazard Addressed:** Severe Thunderstorms, Tornadoes and High Winds

**Description:** Beatrice, in coordination with the Lower Blue NRD and the Nebraska Emergency Management Agency, developed and offered a Residential Saferoom Program. 47 home and small business owners opted to participate in the program.

**Status:** In progress

**Action:** Develop evacuation plan for the City.

**Hazards addressed:** Tornado and High winds, chemical release, flooding

**Description:** The City developed an evacuation plan as part of the Local Emergency Operations Plan.

**Status:** Completed

**Action:** Threat Communication

**Hazards Addressed:** All

**Description:** The City's 911 Center has developed a system that allows warning to be sent all landlines and registrared cellular phones. This system is called the Emergency Notification System and is part of the 911 mapping process at the 911 Center.

**Status:** Completed

**Action:** Threat Communication

**Hazards Addressed:** All

**Description:** The regional Emergency Management Group has upgraded the local NOAA transmitter located on the Gage / Jefferson County line. These upgrades will improve radio coverage for the City and surrounding area.

**Action:** NOAA Radio

**Hazards Addressed:** All

**Description:** In cooperation with the NWS in Omaha, the City has insured that all schools in Gage County have a NOAA weather radio. The NWS and Beatrice promote the use of the NOAA radios as a form of communication for severe weather events and other man-made hazards.

**Status:** Completed

**Action:** Warning System Improvement

**Hazards Addressed:** Tornado and High Winds, Severe Thunderstorms

**Description:** Tornado sirens are controlled by Gage County EMA. The Beatrice sirens (and other throughout the county) are DC powered and radio controlled and can be activated at the 911 Center, the County EOC, or from the EMA mobile command vehicles.

**Status:** Completed

#### **All Terrain or 4-wheel drive vehicles for transportation**

**Hazards addressed:** Severe Thunderstorms, Tornados/High Winds, Severe Winter Storms, Flooding

**Description:** Provide a limited number of all-terrain or 4-wheel drive vehicles to be used during disaster situations.

**Status:** Completed

#### **Removed Mitigation Alternative Action Items**

According to the planning team the following actions identified in the 2008 hazard mitigation plan have been removed from this plan.

**Action:** Drainage Assessment

**Hazards Addressed:** Flooding

**Description:** Property owner alleged flooding resulting from broken storm water pipe or a deficient drainage system. Perform drainage assessment, design, and construct project to reduce flooding at 718 S 9<sup>th</sup> Street.

**Reason For Removal:** This action was determined to not be a current need for the City.

**Action:** Drainage Assessment

**Hazards Addressed:** Flooding

**Description:** Property owner alleged flooding resulting from broken storm water pipe or a deficient drainage system. Perform drainage assessment, design, and construct project to reduce flooding at 1226 S 7<sup>th</sup> Street.

**Reason For Removal:** This action was determined to not be a current need for the City

**Action:** Implement Disclosure Requirements

**Hazards Addressed:** Severe Thunderstorms, Tornados and Highwinds, Flooding, Drought

**Description:** Require sellers of property to disclose any exposure to known hazards.

**Reason For Removal:** It was determined that home sellers must disclose floodplain information prior to sale. It is not possible to determine hazard boundaries for most other natural hazards.

#### **Mitigation Alternative Action Items**

The City of Beatrice was instructed that each alternative must relate directly to the goals and objectives established for this plan. Below, each action item is outlined by the corresponding goal and objective. Many of these projects and strategies are carried over from the 2008 hazard mitigation plan. The planning team reprioritized actions based on the current needs of the City. The reprioritization process included projects identified in the 2008 plan as well as projects new to this planning process.

#### **Goal 1: Protect the Health and Safety of Residents**

**Objective 1.1: Reduce or prevent damage to property or prevent loss of life or serious injury (overall intent of the plan).**

**Goal 2: Reduce Future Losses from Hazard Events**

**Objective 2.1:** Provide protection for existing structures, future development, critical facilities, services, utilities and trees to the extent possible.

**Action 2.1.1: Bury Main Power Lines**

**Hazards addressed:** Severe Thunderstorms, Tornados/High Winds, Severe Winter Storms

**Description:** Implement a plan for burying a percentage of overhead power lines each year to reduce the loss of power incurred from downed lines. Electrical utilities shall be required to use underground construction methods where possible for future installation of power lines.

**Status:** Continued from previous plan

**Cost:** \$10,000,000

**Potential Funding:** Pre-Disaster Mitigation Program, Nebraska Emergency Management Agency, City of Beatrice, Gage County

**Timeline:** 10 years

**Priority:** Medium

**Lead Agency:** City, Beatrice Board of Public Works

**Action 2.1.2: Bury Power Service Lines**

**Hazards addressed:** Severe Thunderstorms, Tornados/High Winds, Severe Winter Storms

**Description:** Service lines shall be buried in conjunction with the relocation of the main power lines.

**Status:** Continued from previous plan

**Cost:** \$5,000,000

**Potential Funding:** Pre-Disaster Mitigation Program, Nebraska Emergency Management Agency, City of Beatrice, Gage County

**Timeline:** 10 years

**Priority:** Medium

**Lead Agency:** City, Beatrice Board of Public Works

**Action 2.1.3: Provide Backup Power System**

**Hazards addressed:** Severe Thunderstorms, Tornados/High Winds, Severe Winter Storms

**Description:** Develop a backup plan and construct a backup power system to provide redundant power supply to the City. This provides the City with the ability to provide the power to the community in the event of a hazard event destroys the primary system or it fails.

**Status:** Continued from previous plan

**Cost:** unknown

**Potential Funding:** Pre-Disaster Mitigation Program, Nebraska Emergency Management Agency, City of Beatrice, Gage County

**Timeline:** 3 years

**Priority:** High

**Lead Agency:** City, Nebraska Public Power District, Beatrice Board of Public Works

**Action 2.1.4: Review and upgrade, if necessary, infrastructure, security procedures and equipment at critical facilities in the community**

**Hazards addressed:** Severe Thunderstorms, Tornados/High Winds, Severe Winter Storms, Flooding

**Description:** Install flood protection barriers where appropriate. Renovate buildings for strength and safety, or take other measures to provide protection for critical facilities.

**Status:** Continued from previous plan

**Cost:** varies, as needed

**Potential Funding:** National Flood Insurance Program, Flood Mitigation Assistance Program, Pre-Disaster Mitigation Program, Nebraska Emergency Management Agency, City of Beatrice, Gage County

**Timeline:** 5 years

**Priority:** High

**Lead Agency:** City, Beatrice Public Schools, Beatrice Police and Fire Departments, Beatrice Airport Authority, Individual home owners or business owners. Lead agency is dependent on what structure is being protected.

**Action 2.1.5: Flood Control Projects In and Upstream of Beatrice**

**Hazards addressed:** Flooding

**Description:** Often events have caused the Big Blue River to go above flood stage, flooding much of Beatrice. This mitigation alternative is to do a full assessment of watershed draining to Beatrice and design flood control projects to reduce flooding. Potential candidates for flood control projects could be: detention cells to store storm water; levees in and around Beatrice; dams along the tributaries of the Big Blue River; dams along Indian Creek; and a flood control / recreational dam on the Big Blue River.

Dams built along the tributaries that empty into the Big Blue River and also along Indian Creek would help reduce flood damages in and around Beatrice. These small dams would help alleviate flooding to the city during a storm event. Furthermore, having a large flood control structure on the Big Blue River could dramatically reduce flooding in Beatrice. A large permanent pool area could also provide great recreational, social and economic benefits. Levees, possibly along the entire stretch of the Big Blue River, would help alleviate flooding in the City during a storm event. (See next mitigation alternative). It's recommended that any levee be constructed in accordance to the FEMA Levee Certification Standards.

**Status:** Continued from previous plan

**Cost:** Assessment and design about \$250,000, construction cost dependent on assessment findings.

**Potential Funding:** National Flood Insurance Program, Flood Mitigation Assistance Program, Pre-Disaster Mitigation Program, Nebraska Emergency Management Agency, City of Beatrice, Gage County, U.S. Army Corps of Engineers, LBBNRD, DNR, NDOR

**Timeline:** unknown

**Priority:** High

**Lead Agency:** Lower Big Blue Natural Resources District, Nebraska Department of Natural Resources, NDOR, City of Beatrice, Gage County

**Action 2.1.6: Modify or replace existing bridges and/or approaches over Big Blue River at Hwy 136 and Hwy 77**

**Hazards addressed:** Flooding

**Description:** This project proposes to replace or modify the bridges going across Big Blue River at Hwy 136 and/or Hwy 77. Based on observation of City Staff and residents, as well as a general understanding of known storm drainage deficiencies in and around the City of Beatrice, the Bridges at Hwy 136 and Hwy 77 experience flooding and may not provide adequate flow during a storm event. Furthermore, the approaches to these structures may not have adequate elevation to provide access across the river during a storm event. The approach at Hwy 136 especially experiences flooding. Conduct a preliminary drainage assessment of this area and design and construct bridge improvements to reduce and/or alleviate flooding.

**Status:** Continued from previous plan

**Cost:** unknown

**Potential Funding:** National Flood Insurance Program, Flood Mitigation Assistance Program, Pre-Disaster Mitigation Program, Nebraska Emergency Management Agency, City of Beatrice, Gage County

**Timeline:** unknown

**Priority:** High

**Lead Agency:** Lower Big Blue Natural Resources District, Nebraska Department of Natural Resources, City of Beatrice, Beatrice Board of Public Works, Gage County

#### **Action 2.1.7: Preserve Natural Open Spaces**

**Hazards addressed:** Flooding

**Description:** Minimize development of natural drainage ways to allow for drainage of storm water through the City. This can be accomplished through zoning regulations or property acquisition at the City's schedule

**Status:** Ongoing

**Cost:** \$0

**Potential Funding:** None

**Timeline:** On-going

**Priority:** High

**Lead Agency:** Lower Big Blue Natural Resources District, Nebraska Department of Natural Resources, City, Beatrice Board of Public Works

#### **Action 2.1.8: Improve drainage patterns in and around the community**

**Hazards addressed:** Flooding

**Description:** Improve drainage issues later identified by the City or identified in the Drainage Study and the Master Plan. Assessment, Design and Construct improvements as need be.

**Status:** Continued from previous plan

**Cost:** varies depending on size and type of project

**Potential Funding:** National Flood Insurance Program, Flood Mitigation Assistance Program, Pre-Disaster Mitigation Program, Nebraska Emergency Management Agency, City of Beatrice, Gage County

**Timeline:** On-going identification, Design and Construction: 2 years

**Priority:** Medium

**Lead Agency:** City, Beatrice Board of Public Works

**Action 2.1.9: Build additional Snow Fences**

**Hazards addressed:** Severe Winter Storms

**Description:** Build additional snow fences to protect the main roads and critical facilities from excessive snow drifting and road closure.

**Status:** Continued from previous plan

**Cost:** \$25,000

**Potential Funding:** Pre-Disaster Mitigation Program, Nebraska Emergency Management Agency, City of Beatrice, Gage County

**Timeline:** 2 years

**Priority:** Medium

**Lead Agency:** City, Street Department

**Action 2.1.10: Continue to improve the Maintenance of Roadway Snow Routes**

**Hazards addressed:** Severe Winter Storms

**Description:** As needed, continue to revise and improved the snow and ice removal program for City streets. This plan should address situations such as plowing snow, removal of ice, parking during snow and ice removal, and removal of associated storm debris.

**Status:** Continued from previous plan

**Cost:** As-Needed

**Potential Funding:** Pre-Disaster Mitigation Program, Nebraska Emergency Management Agency, City of Beatrice, Gage County

**Timeline:** On-going

**Priority:** High

**Lead Agency:** City, Street Department

**Objective 2.2:** Develop hazard specific plans, conduct studies or assessments, and retrofit city to mitigate for hazards and minimize their impact.

**Action 2.2.1: Capital Improvements Program (CIP)**

**Hazards addressed:** Severe Thunderstorms, Tornados/High Winds, Severe Winter Storms, Flooding

**Description:** Capital improvement programs serve as a guide to community funding for physical improvements over a given time period. How funding is allocated can affect what is at risk. For example, the CIP can have funds allocated to replace or strengthen vulnerable or critical facilities such as hospitals, government buildings, and utilities. This is a proactive approach to addressing improvements.

**Status:** Continued from previous plan

**Cost:** \$0

**Potential Funding:** None

**Timeline:** Initially: 1 year, then On-going

**Priority:** Medium

**Lead Agency:** City

**Action 2.2.2: Determine downstream reduction in floodplain**

**Hazards addressed:** Flooding

**Description:** Conduct an evaluation of the reduction of the floodplain area as a result of future waterway improvement projects. Any changes to the floodplain will require a formal request be drafted to FEMA for changes to be made. This request will require substantial engineering calculations and evaluations of the change in river and creek flows along with future disaster damages to the City.

**Status:** Continued from previous plan

**Cost:** \$60,000

**Potential Funding:** National Flood Insurance Program, Flood Mitigation Assistance Program, Pre-Disaster Mitigation Program, Nebraska Emergency Management Agency, City of Beatrice, Gage County, DNR, NRD

**Timeline:** 2-3 years

**Priority:** Medium

**Lead Agency:** Nebraska Department of Natural Resources, City

**Action 2.2.3: Utilize the citywide Drainage Study, and/or perform additional assessment, to create a Citywide Master Plan to prioritize all flooding related projects**

**Hazards addressed:** Flooding

**Description:** As there are many known and possibly unknown drainage deficiencies in and around the city of Beatrice, prioritizing potential projects is essential to effective implementation of these projects. A Citywide Master Plan should be conducted to analyze the entire city, develop potential projects, and prioritize these projects. A Citywide Master Plan would compare benefits to costs and take into many factors to determine which projects should be completed before others.

**Status:** Continued from previous plan

**Cost:** \$100,000

**Potential Funding:** National Flood Insurance Program, Flood Mitigation Assistance Program, Pre-Disaster Mitigation Program, Nebraska Emergency Management Agency, City of Beatrice, Gage County

**Timeline:** Initial prioritization: 1 year, after this On-going

**Priority:** High

**Lead Agency:** City, Beatrice Board of Public Works

**Action 2.2.4: Improve or acquire property at high-risk to flooding**

**Hazards addressed:** Flooding

**Description:** Analyze each property that is subject to frequent flooding and identify feasible mitigation options. Offer incentives to encourage property owner to precede with flood mitigation projects. City representatives should contact repetitive flooding property owners to identify the critical weaknesses in the property and discuss mitigation alternatives. Additionally, the property owner's willingness to pursue an improvement project should funding opportunities or incentives arise should be dialoged. Repetitive loss structures should be high priority.

**Status:** Continued from previous plan

**Cost:** Cost for improvements or acquisition will vary. On-going labor costs for City personnel. Funding for incentives may be available through the Lower Big Blue NRD or FEMA's Hazard Mitigation Grant or Flood Mitigation Assistance Programs.

**Potential Funding:** National Flood Insurance Program, Flood Mitigation Assistance Program, Pre-Disaster Mitigation Program, Nebraska Emergency Management Agency, City of Beatrice, Gage County, Lower Big Blue NRD, Nebraska Department of Natural Resources, FEMA

**Timeline:** Analysis: 2 years, Acquisition: Immediately following

**Priority:** Medium

**Lead Agency:** City, City Attorney

#### **Action 2.2.5: Community Ratings System**

**Hazards addressed:** Flooding

**Description:** The City's participation in FEMA's Community Ratings System, a part of the National Flood Insurance Program, can provide an impetus for the community to undertake a number of projects and activities designed to increase the flooding mitigation efforts. In addition, CRS participation can help reduce flood insurance premiums.

According to the brochure **CRS Communities and Their Classes**, published by the Federal Emergency Management Agency, the Community Rating System (CRS) "is a voluntary program for NFIP-participating communities. The goals of the CRS are to reduce flood losses, to facilitate accurate insurance ratings, and to promote the awareness of flood insurance.

The CRS has been developed to provide incentives for communities to go beyond the minimum floodplain management requirements to develop extra measures to provide protection from flooding." The incentives are in the form of insurance premium discounts that can equal up to a 45% discount of the cost of flood insurance. At the present time, the City of Beatrice is not a participant in the CRS program.

For communities to be eligible, they must be in full compliance with the National Flood Insurance Program and be in its Regular phase of the program. Communities in the Emergency phase of the program are not eligible.

Activities that receive CRS credit can take a number of forms such as higher regulatory standards for buildings located in floodplains as well as other regulatory activities, and are generally grouped into four categories: Public Information, Mapping and Regulations, Flood Damage Reduction, and Flood Preparedness.

**Status:** Continued from previous plan

**Cost:** \$0

**Potential Funding:** None

**Timeline:** On-going

**Priority:** Medium

**Lead Agency:** City, Planning & Zoning Commission

#### **Action 2.2.6: Provide backup Wastewater System**

**Hazards addressed:** Tornadoes/High Winds, Severe Winter Storms, Flooding

**Description:** Develop a backup plan and construct a wastewater system to provide protection in the event that the main wastewater treatment facility fails, or when the infiltration is greater than capacity.

**Status:** Continued from previous plan

**Cost:** \$25 million

**Potential Funding:** Pre-Disaster Mitigation Program, Nebraska Emergency Management Agency, City of Beatrice, Gage County

**Timeline:** 3 years

**Priority:** Medium

**Lead Agency:** City, Beatrice Board of Public Works

**Action 2.2.7: Design and Construction of Storm Water Treatment Facility**

**Hazards addressed:** Severe Thunderstorms

**Description:** Conduct an assessment, Design and Construct a Storm Water Treatment Facility. As State regulations change, the City of Beatrice may be required to treat all storm water.

**Status:** Continued from previous plan

**Cost:** \$25 million

**Potential Funding:** Pre-Disaster Mitigation Program, Nebraska Emergency Management Agency, City of Beatrice, Gage County

**Timeline:** 5 years

**Priority:** High

**Lead Agency:** City, Beatrice Board of Public Works

**Objective 2.3:** Minimize and control the impact of hazard events through enacting or updating ordinances, permits, laws or regulations.

**Action 2.3.1: Improve and Maintain Subdivision Regulations**

**Hazards addressed:** Severe Thunderstorms, Tornados/High Winds, Severe Winter Storms, Flooding

**Description:** These regulations determine how a parcel of land can be divided into smaller parcels. It is wise to incorporate mitigation measures into subdivision regulations before a parcel of land is divided, as this allows for a wider variety of options. Furthermore make changes to the subdivision ordinance that could assist in the mitigation of flooding include having no adverse impact.

**Status:** Continued from previous plan

**Cost:** \$0

**Potential Funding:** None

**Timeline:** On-going

**Priority:** Medium

**Lead Agency:** City, Planning Commission, Zoning Administrator

**Action 2.3.2: Evaluate and Improve Building Standards**

**Hazards addressed:** Severe Thunderstorms, Tornados/High Winds, Severe Winter Storms, Flooding

**Description:** Evaluate the existing construction standards and building codes to determine the degree of protection from natural disaster damage that is required of structures in the City. Implement additional standards as deemed necessary. Additional standards may be considered for the construction of more weather resistant structures.

**Status:** Continued from previous plan

**Cost:** \$0

**Potential Funding:** None  
**Timeline:** 4 years  
**Priority:** Medium  
**Lead Agency:** City & Building Inspection Department

**Action 2.3.3: Continue Floodplain Regulations**

**Hazards addressed:** Flooding

**Description:** Continue to administer local floodplain development regulations for new and existing structures. Strict enforcement of the type of development and elevations of structures should be conducted through the issuance of building permits by the City. Research should be conducted to determine if stricter regulations should be implemented by the City of Beatrice for building construction. Also continue to provide proper education for city officials to properly implement the regulations.

**Status:** Ongoing

**Cost:** \$0

**Potential Funding:** None

**Timeline:** On-going

**Priority:** Medium

**Lead Agency:** City, Planning Commission, Zoning Administrator

**Action 2.3.4: Maintain Tree City USA Status**

**Hazards addressed:** Severe Thunderstorms, Tornados/High Winds, Severe Winter Storms

**Description:** Work with the National Arbor Day Foundation to continue the designation of the City of Beatrice as a 'Tree City USA'. Beatrice has been a Tree City USA for 20 years. This designation can be used to improve the image of and pride in the City and its tree program. Additionally, this designation can be beneficial in grant applications for tree projects. The four main requirements for achieving this designation are: 1) Establish a tree board; 2) Enact a tree care ordinance; 3) Establish a forestry care program with a \$2 per capita annual budget; 4) Enact an Arbor Day observance and proclamation. Maintain each of these. Note: This mitigation alternative also applies for Severe Thunderstorms and Winter Storms

**Status:** Ongoing

**Cost:** Required commitment of \$2 per capita per year (approximately \$8,000/year) for tree maintenance and plantings.

**Potential Funding:** Pre-Disaster Mitigation Program, Nebraska Emergency Management Agency, City of Beatrice, Gage County, National Arbor Day Foundation

**Timeline:** On-Going

**Priority:** Medium

**Lead Agency:** City, Public Properties Department, National Arbor Day Foundation

**Action 2.3.5: Improve and Implement drought water conservation regulations**

**Hazards addressed:** Drought

**Description:** Improve and/or develop a program to conserve water use by the citizens of Beatrice during elongated periods of drought. Potential restrictions on water could include limitations on lawn watering, car washing, or water sold to outside sources.

**Status:** Continued from previous plan

**Cost:** \$0

**Potential Funding:** None

**Timeline:** Initially: 1 year, then On-going

**Priority:** Medium

**Lead Agency:** City, Nebraska Department of Natural Resources

**Goal 3: Increase Public Awareness and Educate on the Vulnerability to Hazards**

**Objective 3.1:** Develop and provide information to residents and businesses about the types of hazards they are exposed to, what the effects of them may be, where they occur, and what they can do to be better prepared.

**Action 3.1.1: Increase Public Awareness of Vulnerability to Hazards**

**Hazards addressed:** Severe Thunderstorms, Tornados/High Winds, Severe Winter Storms, Flooding, Drought, Extreme Heat

**Description:** Form a committee to gather and provide businesses and the public with information regarding hazards, management and preparedness.

**Status:** Ongoing

**Cost:** \$4000

**Potential Funding:** None

**Timeline:** Immediate

**Priority:** Medium

**Lead Agency:** City, Gage County Emergency Management

**Action 3.1.2: Education on Tree Types and Planting**

**Hazards addressed:** Severe Thunderstorms, Tornados/High Winds, Severe Winter Storms

**Description:** Maintain a listing of trees desirable for planting in the City of Beatrice. The list can serve as a guide to citizens planting new trees on private grounds. New tree plantings should have a low susceptibility to insect damage or disease and be of a hardy variety that will stand up well to heavy snow and ice loading as well as the force of high winds. Education programs should be developed to distribute information to citizens on how to reduce the risk from tree failure to life, property and utility systems. Note: This mitigation alternative also applies for Severe Thunderstorms and Winter Storms

**Status:** Continued from previous plan

**Cost:** \$2,000

**Potential Funding:** Pre-Disaster Mitigation Program, Nebraska Emergency Management Agency, City of Beatrice, Gage County

**Timeline:** 1 year

**Priority:** Medium

**Lead Agency:** City, Parks & Recreation Commission, NE Forest Service

**Action 3.1.3: Education (Tornado Safety Week)**

**Hazards addressed:** Tornados/High Winds

**Description:** Review the current program as implemented during Severe Weather Awareness Week and modify or develop a week long program to educate the public on the hazards of tornados and potential safety precautions. The program shall also be distributed to the City schools.

**Status:** Ongoing

**Cost:** \$1,500

**Potential Funding:** Pre-Disaster Mitigation Program, Nebraska Emergency Management Agency, City of Beatrice, Gage County

**Timeline:** 2 years

**Priority:** High

**Lead Agency:** City, Beatrice Public Schools, Gage County Emergency Management

#### **Goal 4: Improve Emergency Management Capabilities**

**Objective 4.1: Develop or improve City and/or County Emergency Response Plan and procedures and abilities.**

##### **Action 4.1.1: Improve the Comprehensive City Disaster and Emergency Response Plan**

**Hazards addressed:** Severe Thunderstorms, Tornados/High Winds, Severe Winter Storms, Flooding, Extreme Heat

**Description:** Use the Hazard Mitigation Plan and its findings to revise and improve the Beatrice Comprehensive Disaster and Emergency Response Plan. Develop a schedule for updating the plan following updates to the Hazard Mitigation Plan.

**Status:** Continued from previous plan

**Cost:** \$10,000

**Potential Funding:** Hazard Mitigation Grant Program, Pre-Disaster Mitigation Program, Nebraska Emergency Management Agency, City of Beatrice, Gage County

**Timeline:** On-going

**Priority:** Medium

**Lead Agency:** City, Gage County Emergency Management

##### **Action 4.1.2: Additional Personnel for Emergency Response**

**Hazards addressed:** Severe Thunderstorms, Tornados/High Winds, Severe Winter Storms, Flooding, Extreme Heat

**Description:** Identify and train personnel and citizens for Emergency Response. Look at having not only a backup person for every position, but also a third backup for every position. Since the previous HMP Gage County has joined Citizen Corp and developed a Community Emergency Response Team (CERT).

**Status:** Ongoing

**Cost:** \$50,000

**Potential Funding:** Pre-Disaster Mitigation Program, Nebraska Emergency Management Agency, City of Beatrice, Gage County

**Timeline:** 5 Years

**Priority:** Medium

**Lead Agency:** City

**Action 4.1.3: Additional Equipment for Emergency Response**

**Hazards addressed:** Severe Thunderstorms, Tornados/High Winds, Severe Winter Storms, Flooding, Extreme Heat

**Description:** Provide additional equipment as needed to respond to severe storms, winter storms, flooding and tornados and other natural hazards. Since the previous plan Gage County EMA has procured vehicles and trailers to assist first responders. This equipment includes: four wheel drive vehicles, mobile command trailer, generator light trailer, a boat with side image sonar, and three ATVs.

**Status:** Ongoing

**Cost:** \$50,000 - \$400,000 per vehicle, varies depending on what equipment is needed

**Potential Funding:** Pre-Disaster Mitigation Program, Nebraska Emergency Management Agency, City of Beatrice, Gage County

**Timeline:** On-going

**Priority:** Medium

**Lead Agency:** City, Beatrice Police and Fire Departments

**Action 4.1.4: Develop strategies to provide necessary services in the event of flooding**

**Hazards addressed:** Flooding

**Status:** Ongoing

**Cost:** \$0

**Potential Funding:** None

**Timeline:** On-going

**Priority:** Medium

**Lead Agency:** City, Beatrice Board of Public Works, Nebraska Emergency Management Agency, Gage County Emergency Management

**Objective 4.2: Develop or improve Evacuation Plan and procedures.**

**Action 4.2.1: Identify, Design, and Develop Storm Shelters**

**Hazards addressed:** Severe Thunderstorms, Tornados/High Winds, Severe Winter Storms, Flooding

**Description:** Many existing public buildings are available for use as shelters in the event of a disaster. The City should develop plans to utilize these buildings in the event of a disaster. Additional buildings located in centralized population areas should be identified to increase the availability of shelter to the citizens of the City.

Furthermore, research and develop requirements for construction of storm shelters in new concentrated areas of mobile housing or other high-risk housing to provide shelter for residents. Design and construct shelters wherever vulnerable populations are to include; both public and private schools, city parks, and public and private senior living facilities. Also designate the hospital, library, jail, and other facilities, as storm shelters.

Furthermore, educate people who will utilize these shelters as to where the shelters are located and what service might be provided. Develop and distribute a brochure including this information to utility customers, landlords, home owners etc.

**Status:** Continued from previous plan

**Cost:** \$1,000/person

**Potential Funding:** Pre-Disaster Mitigation Program, Nebraska Emergency Management Agency, City of Beatrice, Gage County

**Timeline:** 10 years

**Priority:** Medium

**Lead Agency:** City, Gage County Emergency Management, Red Cross

**Objective 4.3:** Improve warning systems and ability to communicate to residents and businesses during and following a disaster or emergency.

**Action 4.3.1: Improve Communication to Residents and Businesses During and Following Emergencies**

**Hazards addressed:** Severe Thunderstorms, Tornados/High Winds, Severe Winter Storms, Flooding, Drought, Extreme Heat

**Description:** Create a formal contact point for emergency situations that is available around the clock for residents and businesses to contact. Examples are telephone hotlines, or public notice boards, cable system and specific radio frequency. This contact can provide information and assistance both during and following a disaster. Providing this contact can help increase public safety, speed recovery efforts and provide peace of mind to community.

**Status:** Continued from previous plan

**Cost:** \$1000, can vary depending on type of system implemented

**Potential Funding:** Pre-Disaster Mitigation Program, Nebraska Emergency Management Agency, City of Beatrice, Gage County

**Timeline:** Immediate

**Priority:** High

**Lead Agency:** City, Nebraska Emergency Management Agency, Gage County Emergency Management, Chamber of Commerce

**Action 4.3.2: Cable TV Interrupt Warning System**

**Hazards addressed:** Severe Thunderstorms, Tornados/High Winds, Severe Winter Storms, Flooding

**Description:** Improve and Implement a cable TV interrupt warning system that would notify cable TV viewers of disasters and supply pertinent information.

**Status:** Continued from previous plan

**Cost:** \$0

**Potential Funding:** None

**Timeline:** Immediate

**Priority:** Medium

**Lead Agency:** City, Police Department

**Action 4.3.3: Tornado Warning System for Future Development**

**Hazards addressed:** Tornados/High Winds

**Description:** Work with Gage County to conduct an evaluation of implementing outdoor warning siren requirements for future subdivisions requiring the developers to install sirens if out of range of existing sirens. These sirens will have to be connected to the City's existing warning system. (Note that Beatrice already has 10 sirens and Gage County has an additional 13 sirens. Gage County operates and maintains all 23 sirens.) Furthermore, Beatrice should work with Gage County to further ensure there is sufficient siren coverage for the county as it develops.

**Status:** Continued from previous plan

**Cost:** \$15,000 - 25,000 per siren

**Potential Funding:** Pre-Disaster Mitigation Program, Nebraska Emergency Management Agency, City of Beatrice, Gage County

**Timeline:** 2 years

**Priority:** High

**Lead Agency:** City, Gage County, Gage County Emergency Management

### **Goal 5: Pursue Multi-Objective Opportunities Whenever Possible**

**Objective 5.1:** When possible, use existing resources, agencies, and programs to implement the projects.

#### **Action 5.1.1: Coordination with Surrounding Communities**

**Hazards addressed:** Severe Thunderstorms, Tornados/High Winds, Severe Winter Storms, Flooding, Drought, Extreme Heat

**Description:** Build and maintain existing inter-local agreements with other communities to support each other in the event of a hazard event. This allows the City to share personnel and expertise with other municipalities to minimize the expense to each town for emergency personnel. This also assists the community in the participation of the National Incident Management System.

**Status:** Continued from previous plan

**Cost:** \$0

**Potential Funding:** None

**Timeline:** Initial: 2 years, then On-going

**Priority:** Medium

**Lead Agency:** City, Gage County

#### **Action 5.1.2: Continue to support Nebraska Dept. of Natural Resources water allocation regulations**

**Hazards addressed:** Drought

**Description:** Support NDNR regulations regarding water allocation in the area in and around the City of Beatrice. These regulations include well construction and location, closure of wells and the consumption of surface water for various uses. Where necessary, the City shall assist in the enforcement of regulations.

**Status:** Ongoing

**Cost:** \$0

**Potential Funding:** None

**Timeline:** On-going

**Priority:** Medium

**Lead Agency:** City, Nebraska Department of Natural Resources

**Objective 5.2:** When possible implement projects that achieve several goals.

(The Action meeting this Objective could include any single or combination of previous mentioned Actions to achieve several goals at the same time.)

**Mitigation Alternative Action Items Conclusion**

The projects identified in this hazard mitigation plan update represent a carryover from the 2008 hazard mitigation plan. Many of the 2008 projects were completed and were reviewed earlier in this section. Mitigation projects from the 2008 plan that have not been implemented were reviewed and reprioritized during this planning process. The priority ranking for these projects was consistent with the ranking process completed for the 2008 plan. The actions ranked as high priority focus on four main areas: facility hardening, flood control, public education, warnings and communications. This prioritization reflects the needs and vulnerabilities identified in previous sections of this plan.

## **Section Six: Plan Implementation and Maintenance**

### ***Monitoring, Evaluating, and Updating the Plan***

The City of Beatrice will be responsible for the annual monitoring, evaluating, and updating of the plan. Hazard mitigation projects will be prioritized by the City's governing body with support and suggestions from the public, as well as property and business owners. Unless otherwise specified, the City Council will be responsible for implementation of the recommended projects. The responsible party for the various implementation actions will report on the status of all projects and include which implementation processes worked well, any difficulties encountered, how coordination efforts are proceeding, and which strategies could be revised.

To assist with the monitoring of the plan, as each recommended project is completed, a detailed timeline of how that project was completed will be written and attached to the plan in a format selected by the governing body. Information that should be included will address project timelines, agencies involved, area(s) benefited, total funding (if complete), etc. At the discretion of the governing body, a local task force may be used to review the original draft of the mitigation plan and to recommend changes.

**Requirement §201.6(c)(4)(i):** *[The plan maintenance process shall include a] section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle.*

**Requirement §201.6(c)(4)(ii):** *[The plan shall include a] process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate.*

**Requirement §201.6(c)(4)(iii):** *[The plan maintenance process shall include a] discussion on how the community will continue public participation in the plan maintenance process.*

Review and updating of this plan will occur at least every five years. At the discretion of the governing body, updates may be incorporated more frequently, especially in the event of a major hazard. The governing body shall start meeting to discuss mitigation updates at least six months prior to the deadline for completing the plan review. The persons overseeing the evaluation process will review the goals and objectives of the previous plan and evaluate them to determine whether they are still pertinent and current. Among other questions, they may want to consider the following:

- Do the goals and objectives address current and expected conditions?
- If any of the recommended projects have been completed, did they have the desired impact on the goal for which they were identified? If not, what was the reason it was not successful (lack of funds/resources, lack of political/popular support, underestimation of the amount of time needed, etc.)?
- Have the nature, magnitude, and/or type of risks changed?
- Are there implementation problems?
- Are current resources appropriate to implement the plan?
- Were the outcomes as expected?
- Did the plan partners participate as originally planned?
- Are there other agencies which should be included in the revision process?

Worksheets in *Appendix D* may also be used to assist with plan updates.

If major new, innovative mitigation strategies arise that could impact the City of Beatrice or elements of this plan, which are determined to be of importance, a plan amendment may be proposed and considered separate from the annual review and other proposed plan amendments. The City will compile a list of proposed amendments received annually and prepare report providing applicable information for each proposal, and recommend action on the proposed amendments.

***Hazard Mitigation Assistance***

In 2009, FEMA put together the Hazard Mitigation Assistance Unified Guidance to further the unified program approach, improve the clarity and ease of use of the guidance by presenting information common to all programs in general order of the grant life cycle for the Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation (PDM), and Flood Mitigation Assistance (FMA). The table below outlines the eligible activities by HMA program.

**Table 29: Eligible Activities by HMA Program**

Eligible Activities	HMGP	PDM	FMA
1. Mitigation Projects	√	√	√
Property Acquisition and Structure Demolition	√	√	√
Property Acquisition and Structure Relocation	√	√	√
Structure Elevation	√	√	√
Dry Floodproofing of Historic Residential Structures	√	√	√
Dry Floodproofing of Non-residential Structures	√	√	√
Minor Localized Flood Reduction Projects	√	√	√
Structural Retrofitting of Existing Buildings and Facilities	√	√	
Safe Room Construction	√	√	
Infrastructure Retrofit	√	√	
Slope Stabilization	√	√	
Wildfire Mitigation	√	√	
Post-Disaster Code Enforcement	√		
5 Percent Initiative Projects	√		
2. Hazard Mitigation Planning	√	√	√
3. Management Costs	√	√	√

Source: FEMA Hazard Mitigation Unified Guidance 2011

**Eligible Mitigation Projects**

Below is information taken directly from the 2011 Hazard Mitigation Assistance Unified Guidance regarding typical project descriptions that are both eligible activities and a listing of common ineligible activities.

**Mitigation Projects**

This section briefly describes the mitigation projects eligible under one or more of the three HMA programs.

**Property Acquisition and Structure Demolition** – The voluntary acquisition of an existing at-risk structure and, typically, the underlying land, and conversion of the land to open space through the demolition of the structure. The property must be deed-restricted in perpetuity to open space uses to restore and/or conserve the natural floodplain functions. For property acquisition and structure demolition projects, see Part IX A.

- **Property Acquisition and Structure Relocation** – The voluntary physical relocation of an existing structure to an area outside of a hazard-prone area, such as the Special Flood Hazard Area (SFHA) or a regulatory erosion zone and, typically, the acquisition of the underlying land. Relocation must conform to all applicable State and local regulations. The property must be deed-restricted in perpetuity to open space uses to restore and/or conserve the natural floodplain functions. For property acquisition and structure relocation projects, see Part IX A.
- **Structure Elevation** – Physically raising an existing structure to the Base Flood Elevation (BFE) or higher if required by FEMA or local ordinance. Structure elevation may be achieved through a variety of methods, including elevating on continuous foundation walls; elevating on open foundations, such as piles, piers, posts, or columns; and elevating on fill. Foundations must be designed to properly address all loads and be appropriately connected to the floor structure above, and utilities must be properly elevated as well. FEMA encourages Applicants and subapplicants to design all structure elevation projects in accordance with the American Society of Civil Engineers/Structural Engineering Institute (ASCE/SEI) 24-05, *Flood Resistant Design and Construction*. For additional information about structure elevation projects, see Part IX E.
- **Mitigation Reconstruction** – The construction of an improved, elevated building on the same site where an existing building and/or foundation has been partially or completely demolished or destroyed. Mitigation reconstruction is only permitted for structures outside of the regulatory floodway or coastal high hazard area (Zone V) as identified by the existing best available flood hazard data. Activities that result in the construction of new living space at or above the BFE will only be considered when consistent with the Mitigation Reconstruction requirements. Such activities are only eligible under SRL.

Mitigation reconstruction projects cannot be combined with other activity types within the same project subapplication. To ensure the subapplication scope, schedule, and budget adhere to programmatic requirements, a mixture of activity types other than mitigation reconstruction within the subapplication is not permitted. Applicants must indicate within the mitigation activity section of their subapplication why they are electing to utilize mitigation reconstruction, and have not chosen the other available activity types. For additional information about mitigation reconstruction projects, see Part IX D.

- **Dry Floodproofing** – Techniques applied to keep structures dry by sealing the structure to keep floodwaters out. For all dry floodproofing activities, FEMA encourages Applicants and subapplicants to design all dry floodproofing projects in accordance with ASCE/SEI 24-05.
  - **Dry Floodproofing of Historic Residential Structures** is permissible only when other techniques that would mitigate to the BFE would cause the structure to lose its status as a Historic Structure, as defined in 44 CFR Section 59.1.
  - **Dry Floodproofing of Non-residential Structures** must be performed in accordance with NFIP Technical Bulletin (TB) 3-93, *Non-Residential Floodproofing — Requirements and Certification*, and the requirements pertaining to dry floodproofing of non-residential structures found in 44 CFR Sections 60.3(b)(5) and (c)(4).

- **Minor Localized Flood Reduction Projects** – Projects to lessen the frequency or severity of flooding and decrease predicted flood damages, such as the installation or modification of culverts and stormwater management activities such as creating retention and detention basins. These projects must not duplicate the flood prevention activities of other Federal agencies and may not constitute a section of a larger flood control system.
- **Structural Retrofitting of Existing Buildings** – Modifications to the structural elements of a building to reduce or eliminate the risk of future damage and to protect inhabitants. The structural elements of a building that are essential to protect in order to prevent damage include foundations, load-bearing walls, beams, columns, building envelope, structural floors and roofs, and the connections between these elements.
- **Non-structural Retrofitting of Existing Buildings and Facilities** – Modifications to the non-structural elements of a building or facility to reduce or eliminate the risk of future damage and to protect inhabitants. Non-structural retrofits may include bracing of building contents to prevent earthquake damage or the elevation of heating and ventilation systems.
- **Safe Room Construction** – Safe room construction projects are designed to provide immediate life-safety protection for people in public and private structures from tornado and severe wind events, including hurricanes. For HMA, the term “safe room” only applies to extreme wind (combined tornado and hurricane) residential, non-residential, and community safe rooms; tornado community safe rooms; and hurricane community safe rooms. This type of project includes retrofits of existing facilities or new safe room construction projects, and applies to both single and multi-use facilities. For additional information, see Part IX C.
- **Infrastructure Retrofit** – Measures to reduce risk to existing utility systems, roads, and bridges.
- **Soil Stabilization** – Projects to reduce risk to structures or infrastructure from erosion and landslides, including installing geo-textiles, stabilizing sod, installing vegetative buffer strips, preserving mature vegetation, decreasing slope angles, and stabilizing with rip rap and other means of slope anchoring. These projects must not duplicate the activities of other Federal agencies.
- **Wildfire Mitigation** – Projects to mitigate the risk to at-risk structures and associated loss of life from the threat of future wildfire through:
  - **Defensible Space for Wildfire** – Projects creating perimeters around homes, structures, and critical facilities through the removal or reduction of flammable vegetation. For additional information, see Part IX B.3.1.
  - **Application of Ignition-resistant Construction** – Projects that apply ignition resistant techniques and/or non-combustible materials on new and existing homes, structures, and critical facilities. For additional information, see Part IX B.3.2.
  - **Hazardous Fuels Reduction** – Projects that remove vegetative fuels proximate to the at-risk structure that, if ignited, pose significant threat to human life and property, especially critical facilities. For additional information, see Part IX B.3.3.
- **Post-Disaster Code Enforcement** – Projects designed to support the post-disaster rebuilding effort by ensuring that sufficient expertise is on hand to ensure appropriate codes and standards, including NFIP local ordinance requirements, are utilized and enforced. For additional information, see Part VIII A.8.
- **5 Percent Initiative Projects** – These projects provide an opportunity to fund mitigation actions that are consistent with the goals and objectives of the State or Tribal (Standard or Enhanced) and local mitigation plans and meet all HMGP program requirements, but for which it may be difficult to conduct a standard BCA to prove cost effectiveness. For additional information, see Part VIII A.10.

**Note:** The requirements of Part IX A of this guidance and of 44 CFR Part 80 governs only real property acquisition for open space purposes, and do not apply to real property acquisition associated with other mitigation projects. Unlike acquisition for open space purposes, acquisition associated with the construction of a mitigation project may involve the local jurisdiction's use of its power of eminent domain to take certain, limited property interests necessary to construct the project. Prior to applying for such projects Applicants and subapplicants must consult with FEMA for further direction because different requirements and procedures will apply.

### **Hazard Mitigation Planning**

Planning activities funded under HMA are designed to develop State, Tribal, and local mitigation plans that meet the planning requirements outlined in 44 CFR Part 201. A mitigation planning subgrant award must result in a mitigation plan adopted by the jurisdiction(s) and approved by FEMA prior to the end of the Period of Performance (POP). For **FMA**, funds shall only be used to support the flood hazard portion of State, Tribal, or local mitigation plans to meet the criteria specified in 44 CFR Part 201. Funds are only available to support these activities in communities participating in the NFIP. For links to mitigation planning and risk assessment resources, see Part X C.2.

### **Management Costs**

Management costs are any indirect costs and administrative expenses that are reasonably incurred by a Grantee or subgrantee in administering a grant or subgrant award.

Eligible Applicant or subapplicant management cost activities may include:

- Solicitation, review, and processing of subapplications and subgrant awards;
- Subapplication development and technical assistance to subapplicants regarding engineering feasibility, BCA, and EHP documentation;
- Geocoding mitigation projects identified for further review by FEMA;
- Delivery of technical assistance (e.g., plan reviews, planning workshops, training) to support the implementation of mitigation activities;
- Managing grants (e.g., quarterly reporting, closeout);
- Technical monitoring (e.g., site visits, technical meetings);
- Purchase of equipment, per diem and travel expenses, and professional development that is directly related to the implementation of HMA programs; and
- Staff salary costs directly related to performing the activities listed above.

Management costs are only awarded in conjunction with project or planning grants and subgrants. For a link to more geocoding information, see Part X C.3. For more information regarding management costs for **HMGP**, see Part VIII A.4. For **PDM** and **FMA**, FEMA may provide up to 25 percent of the Applicant's *anticipated management costs, upon the award and final approval of the first subgrant. The remaining management costs will be obligated as additional subgrants are awarded.*

### **Ineligible Mitigation Activities**

Below is information taken directly from the 2011 Hazard Mitigation Assistance unified Guidance regarding typical project descriptions that are ineligible under HMA funding, regardless of how worthwhile they are.

- Projects that do not reduce the risk to people, homes, neighborhoods, structures, or infrastructure
- Projects that are dependent on another phase of a project in order to be effective and/or feasible (i.e., not a stand-alone mitigation project that solves a problem independently or constitutes a functional portion of a solution.)
- Projects for which actual physical work such as groundbreaking, demolition, or construction of a raised foundation has occurred prior to award. Projects for which demolition and debris removal related to structures proposed for acquisition or mitigation reconstruction has already occurred may be eligible when such activities were initiated or completed under the FEMA Public Assistance program to alleviate a health or safety hazard as a result of a disaster
- Projects constructing new buildings or facilities with the exception of safe room construction and SRL mitigation reconstruction
- Projects that create revolving loan funds
- Activities required as a result of negligence or intentional actions, or the reimbursement of legal obligations such as those imposed by a legal settlement, court order, or State law
- Projects located in a Coastal Barrier Resource System (CRBS) Unit, or in an Otherwise Protected Area
- Activities on Federal lands or associated with facilities owned by another Federal entity
- Major flood control projects related to the construction, demolition or repair of dams, dikes, levees, floodwalls, seawalls, groins, jetties, breakwaters, and erosion projects related to beach nourishment or re-nourishment
- Projects for hazardous fuels reduction in excess of 2 miles from structures
- Projects that address unmet needs from a disaster that are not related to mitigation
- Retrofitting facilities primarily used for religious purposes, such as places of worship (or other projects that solely benefit religious organizations). A place of worship may, however, be included in a property acquisition and structure demolition or relocation project provided that the project benefits the entire community, such as when the whole neighborhood or community is being removed from the hazard area
- Projects that only address man-made hazards
- Projects that address operation, deferred or future maintenance, repairs, or replacement (without a change in the level of protection provided) of existing structures, facilities, or infrastructure (e.g., dredging, debris removal, replacement of obsolete utility systems, bridges, and facility repair/rehabilitation)
- Projects to do the following
  - Landscaping for ornamentation (trees, shrubs, etc.)
  - Site remediation of hazardous materials (with the exception of eligible activities such as the abatement of asbestos and/or lead-based paint and the removal of household hazardous wastes to an approved landfill)
  - Water quality infrastructure
  - Address ecological or agricultural issues
  - Protection of the environment and/or watersheds
  - Forest management
  - Prescribed burning or clear-cutting
  - Creation and maintenance of fire breaks, access roads, or staging areas

- Irrigation systems
- Mapping, flood studies, and planning activities, such as plan revisions/amendments or risk assessments, when they do not result in a FEMA-approved hazard mitigation plan
- Studies not directly related to the design and implementation of a proposed mitigation project
- Preparedness measures and response equipment (e.g., response training, electronic evacuation road signs, interoperable communications equipment)

### ***Continued Public Involvement***

To ensure continued plan support and input from the public as well as property and business owners, public involvement should remain a top priority for each participant. Notices for public meetings involving discussion of or action on mitigation updates should be published and posted in the following locations a minimum of two weeks in advance:

- Public spaces/buildings throughout each participating community
- Web sites, local newspapers, and regionally-distributed newspapers

### ***Incorporation into Existing Planning Mechanisms***

The governing body will be responsible for ensuring that the goals and objectives of this plan are incorporated into applicable revisions of the City of Beatrice's comprehensive development plan and any new planning projects undertaken by the City. This would ensure the mitigation component of the comprehensive development plan would be consistently revisited and reviewed. However, care must be taken so that this mitigation portion is reviewed and updated every five years, as the evaluation and updating of the comprehensive plan is typically done on a ten year basis. In addition, this plan should also take into account any changes in the comprehensive development plan, and incorporate the information accordingly into its next update.

In addition, this plan should be incorporated into existing planning mechanisms, as necessary, for the Emergency Management Agency and Natural Resources District, including procedures for implementing projects, updating the plan, continuing communication, and amending the plan as needed over the next five years.

Because integration of hazard mitigation principles into local planning mechanisms is so important, it is recommended that representatives of planning agencies and organizations be included on the plan development committee of future hazard mitigation plan updates.

At this time there are no plans to update the comprehensive development plan, the local zoning ordinance, or building codes to reflect the information contained in this hazard mitigation plan. The implementation of mitigation project will occur when they are aligned with other projects/needs within the community. Other local planning tools, such as the Local Emergency Operation Plan, reflect the goals and objectives of this hazard mitigation plan.

### ***Capabilities Assessment***

An important component in the development of any plan is examining the community's ability to implement projects that are identified. The assessment of these capabilities should address staffing, funding, and the

prioritization of needs. The City of Beatrice has some excellent tools and staff that can be very helpful in implement mitigation projects, but there are some limitations on what is realistic to expect.

## **BOARDS**

**Board of Public Works:** Five person board which is responsible for the electric, water, sewer and garbage service throughout the community. This board oversees the usage rates and billing for these services.

**Board of Adjustment:** This five member board hears and decides appeals to zoning ordinances, zoning interpretations, and variance requests.

**Board of Appeals:** This four member board hears and decides appeals of orders, decisions, or determinations made by the Building Official regarding the application or interpretation of building codes.

**Community Redevelopment Authority:** This five member board reviews request for Tax Increment Financing (TIF) projects and makes recommendations to the City Council.

**Housing Authority Board:** This six member board provides over sight, sets policies, and charts the direction of current and future program of the Beatrice Housing Authority.

**Planning and Zoning Commission:** The Planning and Zoning commission is a nine member body that is responsible for: making and adopting plans for the physical development of the City (including the two mile extra-jurisdictional area); making recommendations to the City Council regarding plats and zoning changes; and approves or denies special use permits.

**Plumbing Board:** This five member board is responsible for reviewing and making recommendations regarding the sanitary construction, alteration, and inspection of plumbing and sewer connection and drains within the City.

**Citizens Advisory Review Committee (CARC):** This five member body toe responsible for review and recommendations to the City Council regarding the LB840 Economic Development and CDBG Reuse Loan Funding projects.

**Civil Service Commission:** This three member body administers the Civil Service Act including establishing and holding employment tests, employment interviews, and conduction investigation for positions governed by the Civil Service Act.

The City of Beatrice has considerable community participation in the form of boards and board members. These groups will play an integral role in determining whether or not mitigation projects will be prioritized for the City. It will be important for the members of these boards to be aware of the projects identified in the plan and work to incorporate those projects into the work already being considered.

**Beatrice Plus Advisory Board:** Residents have the opportunity to “round-up” their utility payments to the nearest dollar creating a fund that is utilized to fund community betterment projects. The project applications are reviewed this seven person board which then makes recommendations to the City Council regarding project selection.

## DEPARTMENTS

**Building Inspection Department:** This department is responsible for ensuring that consistent quality of property and building construction is completed for the safety of tenants and long-term value to property owners. The staff reviews building plans and issues building permits, along with performing building inspections.

**Water Department:** This department monitors water usage and problems related to water treatment and distribution. The water department works with the City Administrator to prioritize projects and needed improvements.

**Water Pollution Control Department:** This department monitors the wastewater system for the City; the department administers sewer fees which help fund current operations as well as future upgrades and improvements. The WPC works closely with the City Administrator to prioritize projects and needs for the City.

**Street Department:** This department is responsible for: street sweeping, blading of gravel roads, sign installation and maintenance, painting of pavement markings, mowing, traffic control, street repairs and maintenance, tree removal on street right ways, culvert installation, storm sewer maintenance, snow and ice removal, and drainage structure repair. The department is funded as part of the City's budget and is working to pass an optional spending tax for increased funding in 2014. The superintendent for this department works closely with the City Administrator to prioritize projects.

**Public Properties Department:** This department oversees the maintenance of City parks, buildings, and the Big Blue Water Park. There are 13 parks located in and around the city, four miles of biking and walking trails, and one water park. This department is funded from the City's budget as well as developing grants to implement projects.

**Police Department:** The Beatrice Police Department is responsible to providing protection and enforcing laws within the community. The department has a number of ongoing programs to assist and educate members of the community including: Crime Stoppers, Safer Kids, Safer Seniors, and Animal Control.

**Fire and Rescue:** The Fire and Rescue Department provide services to approximately 13,000 citizens within an eight square mile area. The department has mutual aid agreement with Gage, Jefferson, and Saline Counties. The BFRD offers a number of public education activities including: Junior Fire Marshall program, Farm Safety, Fire Prevention puppet shows, and Employee In-Service Training. The sitting Fire Chief participated in the hazard mitigation planning process.

**City Engineer:** This department works with many of the other department within city government on project implementation. The service provided by this department range from the development of maps, relocating utilities, or project design and management. The City Engineer participated in the hazard mitigation planning process.

**Electric Department:** The electric department is responsible for overseeing and maintaining the more than 17 miles of transmission line and 11 substations throughout the city. The electric department implemented a Load Management System in the 1980s which has reduced the peak load during the hot summer months. This program has resulted in the significant cost saving and has been supported by member of the community. In addition, the department works with Nebraska Public Power District to offer incentives to community members willing to install and utilize energy efficient equipment and appliances.

**City Administrator:** Beatrice utilizes a City Administrator to manage and coordinate with various boards and departments including: The Board of Public Works, Electric Department, Street Department, Water Department, and Water Pollution Control Department. The City Administrator led the update of this hazard mitigation plan for the City.

**Gage County Emergency Management Agency:** This County department (located in Beatrice) works closely with Beatrice and other communities within the County to support the needs of the community. Gage County EMA assists communities with planning assistance, emergency response planning and execution, and risk assessment. The Gage County EMA was involved in the hazard mitigation planning process.

**PLANNING TOOLS**

Table 30 outlines the existing planning mechanisms employed by the City. Updates to the comprehensive plan occurred in 2006. The City also has and maintains zoning ordinances, LEOP (county plan), building codes, stormwater regulations, subdivision regulations and floodplain regulations. Ideally these tools would be updated in the future to reflect the findings of this hazard mitigation plan.

**Table 30: Existing Planning Mechanisms**

Jurisdiction	Website	Comprehensive Plan	Zoning	Local Emergency Operations Plan	Flood Insurance Study	Building Regulations	Stormwater Regulations	Subdivision Regulations	Floodplain Regulations
Beatrice	X	X	X	X		X	X	X	X

**CONCLUSION**

There are a range of professionals within the City government that are able to identify hazard concerns and develop projects, strategies, and approaches to address these concerns. The City has multiple boards, department, and staff that are/will be involved in mitigation project. The city also has mutual aid agreements that will help supplement their needs especially during the response to natural and man-made hazards. Like many communities in in Nebraska, and across the county, will need to be creative in funding of projects. The City will utilize taxing programs, grant programs, and even community donations and fund raising efforts to implement mitigation related projects.

The City of Beatrice can also draw upon county, regional, and state agencies, department, and groups for additional assistance as needed. Entities like Gage County Emergency Management Agency, Nebraska Emergency Management Agency and the Lower Big Blue Natural Resource District (among many other) all play a role in implementing mitigation related projects. It will be important for Beatrice to participate in the update of the regional hazard mitigation plan scheduled to begin early in 2015. The participation in this

regional planning effort will allow Beatrice and neighboring communities to ensure projects align across the region.

**Section Seven: Appendices**

*Appendix A: Resolution of Adoption*

**Appendix B: Documentation of Public Involvement**

**Hazard Identification Meetings**

From: **Tobias Tempelmeyer** <[ttempelmeyer@beatrice.ne.gov](mailto:ttempelmeyer@beatrice.ne.gov)>  
Date: Fri, Nov 16, 2012 at 2:11 PM  
Subject: Beatrice Hazard Mitigation Plan  
To: Roy Baker <[rbaker@bpsnebr.org](mailto:rbaker@bpsnebr.org)>, [bmorgan@southeast.edu](mailto:bmorgan@southeast.edu), [tsommers@bchhc.org](mailto:tsommers@bchhc.org), Matt Bauman <[mbauman@gagecountyd2.com](mailto:mbauman@gagecountyd2.com)>, [clabaugh@lbbnrd.org](mailto:clabaugh@lbbnrd.org)

The City of Beatrice is in the process of updating our Hazard Mitigation Plan. I invite you, or a representative from your organization, to join us on December 6, 2012 (Thursday) at 4:00 PM at the City Offices to assist in this process. Please let me know if you are able to attend.

Tobias J. Tempelmeyer  
City Administrator / General Manager  
City of Beatrice / Beatrice Board of Public Works  
400 Ella Street  
Beatrice, NE 68310  
Office - [\(402\) 228-5211](tel:(402)228-5211)  
Fax - [\(402\) 228-2312](tel:(402)228-2312)

The information contained in this electronic mail transmission (including any accompanying attachments) is intended solely for its authorized recipient(s), and may be confidential and/or legally privileged. If you are not an intended recipient, or responsible for delivering some or all of this transmission to an intended recipient, you have received this transmission in error and are hereby notified that you are strictly prohibited from reading, copying, printing, distributing or disclosing any of the information contained in it. If you have received this in error, please reply immediately to the sender and delete the original and all copies of this transmission (including attachments) without reading or saving in any manner. Thank you.

**FOR IMMEDIATE RELEASE**

**BEATRICE TO UPDATE HAZARD MITIGATION PLAN**

**Beatrice, Nebraska** – The City of Beatrice is undertaking a planning effort to update their All-Hazard Mitigation Plan as originally approved by the Federal Emergency Management Agency (FEMA) in March 2008. Hazard Mitigation Plans are required to be updated on a five-year cycle. The City of Beatrice is updating their plan in coordination with Nebraska Department of Natural Resources (NDNR), Nebraska Emergency Management Agency (NEMA), and FEMA.

The hazard mitigation plan is a publicly-guided document that will identify vulnerability to natural disasters such as flood, drought, earthquake, wildfire, winter storm, tornado/high wind storm, dam failure, etc. The plan will set goals, establish mitigation alternatives, and prioritize projects which can alleviate potential damages to property and provide protection when future disasters occur. Proactive hazard mitigation planning allows a community to take actions to reduce or eliminate these threats.

In order to reinforce the importance of hazard mitigation planning and to emphasize planning for disasters before they occur, the Disaster Mitigation Act of 2000 (DMA 2000) legislation was signed into law on October 10, 2000 (Public Law 106-390). This act established that a pre-disaster hazard mitigation program would be required before funding post-disaster mitigation projects. According to the DMA 2000, a community must have a FEMA-approved hazard mitigation plan in order to receive project grant funds. Once a hazard mitigation plan is developed and adopted, the jurisdiction will also be eligible for pre-disaster mitigation project grants to implement the mitigation solutions identified in the plan.

This planning effort is being led by a Planning Team consisting of representatives from the City of Beatrice, NDNR, and NEMA. A Public Meeting will be held on **December 6, 2012 at 4:00 p.m. at 400 Ella Street in Beatrice** to receive public input and comments on the disaster types, problem areas, and potential mitigation solutions.

The City of Beatrice has hired JEO Consulting Group, Inc. (JEO) to assist with the plan development over the next 12 to 18 months. JEO completed the City of Beatrice's original plan.

For more information on this planning effort contact Tobias Tempelmeyer, City Administrator, at 402-228-5211 or [ttempelmeyer@beatrice.ne.gov](mailto:ttempelmeyer@beatrice.ne.gov).



ENGINEERING ■ ARCHITECTURE ■ SURVEYING ■ PLANNING

**CITY OF BEATRICE  
HAZARD MITIGATION PLAN UPDATE  
HAZARD IDENTIFICATION PLANNING TEAM MEETING AGENDA  
Thursday December 6, 2012, 4:00 PM – Beatrice, NE  
JEO Project Number: R110018**

---

- 1. Introductions**
  - JEO Consulting Group, Inc. – Jeff Ray, AICP, Matthew Roque, and Amy Vrtiska
  - City of Beatrice Introductions
  
- 2. Overview of Hazard Mitigation Plan and Planning Process**
  - See PowerPoint handout
  - What is a Hazard Mitigation Plan
  - Why develop a Hazard Mitigation Plan
  - Why a Multi-Jurisdictional Plan
  - Hazard Mitigation Assistance Grant Programs
  
- 3. Planning Team Responsibilities**
  - Provide guidance and input
  - Review and advise plan development
  - Hazard mitigation projects review
  - Gather press concerning project
  
- 4. General Project Schedule**
  - City of Beatrice update process
  - Current FEMA Crosswalk/ correspondence with NEMA/ FEMA (October 2012 change)
  - Kick-Off Meeting – November 6, 2012
  - Hazard Identification Public Meeting – **TONIGHT**
    - Publicity efforts/ press – list of media outlets
  - Draft plan development – Planning Team draft prior to next meeting
  - Mitigation Alternative Public Meeting – February
  
- 5. Hazard Identification Public Meeting**
  - Purpose of Meetings – public involvement/ participation process (different from original plan)
  - Schools representation/ participation (public and parochial)
  - Hazard Identification meeting worksheets
  
- 6. Questions/ What's Next**
  - City of Beatrice
    - Completed or current project information/ documentation
    - Building permits to update structural inventory
    - Existing planning mechanisms
  - JEO Consulting Group, Inc.
    - Draft plan development

**JEO CONSULTING GROUP INC**  
650 J Street | Suite 215 | Lincoln, Nebraska 68508-2916 | p: 402.435.3080 | f: 402.435.4110  
[www.jeo.com](http://www.jeo.com)

Beatrice Hazard Mitigation Plan Update  
 "Planning Team Meeting"  
 Beatrice, NE - Thursday December 6, 2012 4:00PM  
 PLEASE PRINT CLEARLY- THANK YOU!

NAME	TITLE	JURISDICTION (Represented)	ADDRESS Street Number, Street Name, City, Zip	PHONE	EMAIL
Tobias Tempelmeyer	City Admin Facilities Supervisor	City of Beatrice	400 Ella St, Beatrice, NE 68310	228-5211	tttempelmeyer@beatrice.ne.gov
Mark Jobman	Director Facilities	Beatrice Community Hospital BCH	4800 Hospital Parkway Beatrice	228-6750	mjobman@bchne.org
Chris Schwann	EM Director	Colfax County	4800 Hospital Parkway Beatrice NE 68310	228-6542	cschwann@bchne.org
Mark Meints	City Engineer	City of Beatrice	P.O. Box 661 Beatrice	402-223-1705	gagocoeval@iadecon.net
Rex Behrends	Fire Chief	City of Beatrice	400 Ella Street, Beatrice	402-228-5208	rbehrends@beatrice.ne.gov
Brian Daake	City Council	City of Beatrice	310 Ella St Beatrice, NE 68310	402-228-5244	bdaake@beatrice.ne.gov
Allen Landstade	County Board	Colfax County	400 Ella Street, Beatrice	402-228-5244	allenc@colfaxcounty.org
Matt Bauman	County Board	Colfax County	Clert's Office Colfax County Courthouse Beatrice, NE	402-228-5244	mbauman@colfaxcounty.org
Bob Morgan	County Board	Colfax County	4771 West S. Highway Beatrice, NE	402-228-8272	bmorgan@colfaxcounty.org

**Mitigation Strategies Meetings**



*City of Beatrice, Nebraska*

400 ELLA STREET – BEATRICE, NE 68310  
PHONE (402) 228-5200 – FAX (402) 228-2312

**TOBIAS J. TEMPELMAYER**  
CITY ADMINISTRATOR  
400 ELLA STREET  
(402) 228-5211

**GREGORY A. BUTCHER**  
CITY ATTORNEY  
400 ELLA STREET  
(402) 228-5211

**STEVE PRINTY**  
BUILDING INSPECTOR (ACTING)  
205 NORTH 4<sup>TH</sup> STREET  
(402) 228-5250

**LINDA S. KOCH**  
CITY CLERK/  
ASST. TREASURER  
400 ELLA STREET  
(402) 228-5200

**REX A. BEHREND**  
CITY ENGINEER  
205 NORTH 4<sup>TH</sup> STREET  
(402) 228-5208

**BRIAN D. DAAKE**  
FIRE CHIEF  
310 ELLA STREET  
(402) 228-5246

**JEREMY ROSENTHAL**  
LANDFILL SUPERINTENDENT  
400 ELLA STREET  
(402) 223-2267

**LAUREN RIEDESEL**  
LIBRARY DIRECTOR  
100 NORTH 16<sup>TH</sup> STREET  
(402) 223-3584

**BRUCE E. LANG**  
CHIEF OF POLICE  
201 NORTH 5<sup>TH</sup> STREET  
(402) 223-4080

**MARK PETHOUD**  
DIRECTOR OF  
PUBLIC PROPERTIES  
800 DOANE STREET  
(402) 228-5248

April 23, 2013

Chris Schwan  
4800 Hospital Pkwy  
Beatrice, NE 68310

RE: City of Beatrice Hazard Mitigation Plan Update – Second Planning Team Meeting

Dear Chris:

The City of Beatrice is continuing a planning effort to update their All-Hazard Mitigation Plan as originally approved by the Federal Emergency Management Agency (FEMA) in March 2008. As a Planning Team Member, your role has been to provide guidance and input to the plan and assist with decisions to solidify the planning process.

The Planning Team Meeting has been scheduled for:

**Thursday, May 23, 2013 at 4:00 p.m. – City Hall – 400 Ella Street, Beatrice, NE 68310**

The intent of this meeting is as follows:

- 1) Discuss the Hazard Mitigation Plan review and evaluation worksheets
- 2) Discuss the Draft Plan
- 3) Identify information that is still needed for project completion
- 4) Review the current project list, projects that have been implemented, and new potential projects
- 5) Review the timeline for project completion

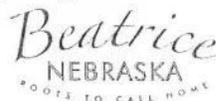
The Planning Team Meeting has been scheduled prior to the Public Meeting at 5:00 p.m. in the same location.

If you have questions or comments, please feel free to contact me at (402) 228-5211 or [ttempelmeyer@beatrice.ne.gov](mailto:ttempelmeyer@beatrice.ne.gov). Your commitment to the successful completion of this plan is greatly appreciated.

Sincerely,

Tobias J. Tempelmeyer, City Administrator

CC: Jeff Ray, JEO Consulting Group, Inc.



[www.beatrice.ne.gov](http://www.beatrice.ne.gov)

BEATRICE  
DAILY SUN



65°  
Clear  
Weekly Forecast

---

Home
News
Sports
Opinion
Obituaries
Entertainment
Celebrations
Calendar
Photos

---

Home / News / Local

## Hazard mitigation plan meeting set for Thursday

 Recommend 0

 Tweet 0

 +1 0

 Share

Print

Email

---

May 22, 2013 1:48 pm • Daily Sun staff reports
(0) Comments

A public meeting will be held May 23 to discuss the City of Beatrice's plans to update its all-hazard mitigation plan.

The plan was originally approved by the Federal Emergency Management Agency (FEMA) in March 2008 and is required to be updated on a five-year cycle.

The hazard mitigation plan is a publicly-guided document that will identify vulnerability to natural disasters such as flood, drought, earthquake, wildfire, winter storm, tornado/high wind storm, dam failure and other potential hazards.

The plan will set goals, establish mitigation alternatives, and prioritize projects, which can alleviate potential damages to property and provide protection when future disasters occur. Proactive hazard mitigation planning allows a community to take actions to reduce or eliminate these threats.

The planning effort is being led by a planning team consisting of representatives from the City of Beatrice, NDNR, and NEMA.

The public meeting will be held Thursday at 5 p.m. at the city offices, located at 400 Ella St. to receive public input and comments on the disaster types, problem areas, and potential mitigation solutions.

JEO Consulting Group, Inc. (JEO) was hired to assist with the plan development over the next six to 12 months. JEO completed the City of Beatrice's original plan.

For more information on this planning effort contact Tobias Tempelmeyer, City Administrator, at 402-228-5211 or [ttempelmeyer@beatrice.ne.gov](mailto:ttempelmeyer@beatrice.ne.gov).



ENGINEERING ■ ARCHITECTURE ■ SURVEYING ■ PLANNING

CITY OF BEATRICE  
HAZARD MITIGATION PLAN UPDATE  
HAZARD IDENTIFICATION PLANNING TEAM MEETING AGENDA  
Thursday May 22, 2013, 4:00 PM – Beatrice, NE  
JEO Project Number: R110018

---

1. **Introductions**
  - JEO Consulting Group, Inc. – Jeff Ray, AICP and Matthew Roque, AICP
  - City of Beatrice Introductions
2. **Overview of Hazard Mitigation Plan and Planning Process**
3. **Planning Team Responsibilities**
  - Provide guidance and input
  - Review and advise plan development
  - Hazard mitigation projects review
  - Gather press concerning project
4. **General Project Schedule**
  - City of Beatrice update process
  - Current FEMA Crosswalk/ correspondence with NEMA/ FEMA (October 2012 change)
  - Kick-Off Meeting – November 6, 2012
  - Hazard Identification Public Meeting
    - Publicity efforts/ press – list of media outlets
  - Draft plan development
  - Mitigation Alternative Public Meeting – May
5. **Hazard Identification Public Meeting**
  - Purpose of Meetings – public involvement/ participation process (different from original plan)
  - Schools representation/ participation (public and parochial)
  - Hazard Identification meeting worksheets
6. **Questions/ What's Next**
  - City of Beatrice
    - Completed or current project information/ documentation
    - Building permits to update structural inventory
    - Existing planning mechanisms
  - JEO Consulting Group, Inc.
    - Draft plan development

**JEO CONSULTING GROUP INC**  
650 J Street | Suite 215 | Lincoln, Nebraska 68508-2916 | p: 402.435.3080 | f: 402.435.4110  
www.jeo.com





ENGINEERING ■ ARCHITECTURE ■ SURVEYING ■ PLANNING

**CITY OF BEATRICE  
HAZARD MITIGATION PLAN UPDATE  
HAZARD IDENTIFICATION PLANNING TEAM MEETING AGENDA  
Thursday May 22, 2013, 4:00 PM – Beatrice, NE  
JEO Project Number: R110018**

1. **Introductions**
  - JEO Consulting Group, Inc. – Jeff Ray, AICP and Matthew Roque, AICP
  - City of Beatrice Introductions
2. **Overview of Hazard Mitigation Plan and Planning Process**
3. **Planning Team Responsibilities**
  - Provide guidance and input
  - Review and advise plan development
  - Hazard mitigation projects review
  - Gather press concerning project
4. **General Project Schedule**
  - City of Beatrice update process
  - Current FEMA Crosswalk/ correspondence with NEMA/ FEMA (October 2012 change)
  - Kick-Off Meeting – November 6, 2012
  - Hazard Identification Public Meeting
    - Publicity efforts/ press – list of media outlets
  - Draft plan development
  - Mitigation Alternative Public Meeting – May
5. **Hazard Identification Public Meeting**
  - Purpose of Meetings – public involvement/ participation process (different from original plan)
  - Schools representation/ participation (public and parochial)
  - Hazard Identification meeting worksheets
6. **Questions/ What’s Next**
  - City of Beatrice
    - Completed or current project information/ documentation
    - Building permits to update structural inventory
    - Existing planning mechanisms
  - JEO Consulting Group, Inc.
    - Draft plan development
7. **Minutes from the Meeting**
  - We reviewed the General Schedule
  - We reviewed the Goals and Objectives.
    - There were no changes to these
  - We reviewed the Project Screening Sheet.
    - A meeting will be set up between Tobias and the Engineering Dept at JEO. This meeting will be an opportunity to review the projects list and to determine which project to investigate further.
  - We reviewed the previous projects list, and made notes on the status of each. The current projects list will include all projects not previously completed or ongoing, or those that JEO was advised to remove from the list.
  - We reviewed the first three sections of the Draft Plan. Several notes were taken, and the updates have been made in the document.

**JEO CONSULTING GROUP INC**  
650 J Street | Suite 215 | Lincoln, Nebraska 68508-2916 | p: 402.435.3080 | f: 402.435.4110  
www.jeo.com

Appendix C: Public Meeting Materials

**Hazard Identification Worksheets**



ENGINEERING ■ ARCHITECTURE ■ SURVEYING ■ PLANNING

NAME/TITLE: Tobias Tempelmeyer  
 JURISDICTION: City of Beatrice  
 EMAIL/PHONE: \_\_\_\_\_  
 ADDRESS: \_\_\_\_\_

**HAZARD IDENTIFICATION**

For each Hazard Type, please complete the following table:

Hazard Type	Previous Occurrence?	Likely to Experience?	Probability*	Extent*
	Yes / No	Yes / No	Highly Likely Likely Possible Unlikely	Catastrophic Critical Limited Negligible
Flooding	Y	Y	HL	Critical
Tornadoes	Y	Y	HL	Catastrophic
High Winds	Y	Y	HL	Critical
Extreme Heat	Y	Y	HL	Critical
Grass/ Wildland Fires	N	N	Possible	Limited
Severe Winter Storms	Y	Y	HL	Catastrophic
Levee Failure	N	N	Unlikely	Limited
Drought	Y	Y	HL	Critical
Earthquakes	N	N	Unlikely	Catastrophic
Landslides	N	N	Unlikely	Negligible
Dam Failure	N	N	Unlikely	Limited
Severe Thunderstorms	Y	Y	HL	Critical

\*Probability: Based on historical occurrences, what is the likelihood of this event happening again?

\*Extent: If this hazard event were to happen, how extensive would the damage be?

**CURRENT INFORMATION AVAILABLE**

Part of the hazard mitigation planning process involves gathering data and identifying previous sources of information that have been made available. Please identify the studies, reports, memberships, etc. that your jurisdiction has, or is a member of.

Which of the following does your jurisdiction have? (Circle One)

Comprehensive Plan  Yes /  No Date Completed May 2006  
 Zoning  Yes /  No Date Completed Continually updated  
 Current Membership with NFIP  Yes /  No Date Completed \_\_\_\_\_  
 Drainage Studies or Reports  Yes /  No Date Completed Various  
 Others (Please List Below) \_\_\_\_\_ Date Completed \_\_\_\_\_  
 \_\_\_\_\_ Date Completed \_\_\_\_\_

**JEO CONSULTING GROUP INC**

650 J Street | Lincoln, Nebraska 68508 | p: 402.435.3080 | f: 402.435.4110  
 www.jeo.com

**GOALS AND OBJECTIVES**

Goals are broad-based statements of the ultimate result to be undertaken, while objectives provide specific direction to achieve the goal. These goals and objectives are standard for a multi-jurisdictional plan and general in nature to provide the basis for all mitigation alternatives identified in the plan.

**Goal 1: Protection the Public Health and Safety**

**Objective 1.1:** Reduce or prevent damage to property or prevent loss of life or serious injury (overall intent of the plan)

**Goal 2: Reduce Future Losses from Hazard Events**

**Objective 2.1:** Provide protection for existing structures and services, future development, critical facilities and infrastructure, utilities, and trees to the extent possible.

**Objective 2.2:** Develop hazard specific plans, conduct studies or assessments, and retrofit city/county to mitigate for hazards and minimize their impact.

**Objective 2.3:** Minimize and control the impact of hazard events through enacting or updating ordinances, permits, laws, or regulations.

**Goal 3: Increase Public Awareness and Educate on the Vulnerability of Hazards**

**Objective 3.1:** Develop and provide information to the public and property owners about the types of hazards they are exposed to, what the effects of them may be, where they occur, and what they can do to be better prepared.

**Goal 4: Improve Emergency Management Capabilities**

**Objective 4.1:** Develop or update City and/or County Emergency Response Plan(s) and procedures, and increase the capability to respond.

**Objective 4.2:** Develop or improve Evacuation Plans and procedures.

**Objective 4.3:** Improve warning systems and ability to communicate to the public during and following a disaster or emergency.

**Goal 5: Pursue Multi-Objective Opportunities Whenever Possible**

**Objective 5.1:** When possible, use existing resources, agencies, and programs to implement the projects

**Objective 5.2:** When possible implement projects that achieve several goals

Do you agree with these goals and objectives? YES/ NO



**\*\* If not, please provide comments below, or mark up the goals and objectives on this sheet \*\***

---

---

---

---

**HAZARD OCCURANCE RECORD**

Please provide details of past hazard events:

<b>Hazard:</b> <i>Flooding</i>	<b>Date of Occurrence:</b> <i>Various</i>
Description of Event (include location, damages, critical facilities, etc.):	
<i>Depends on the extent of the flooding</i>	
<b>Hazard:</b> <i>Tsunami</i>	<b>Date of Occurrence:</b> <i>1996</i>
Description of Event (include location, damages, critical facilities, etc.):	
<b>Hazard:</b> <i>Snow Storm</i>	<b>Date of Occurrence:</b> <i>2009</i>
Description of Event (include location, damages, critical facilities, etc.):	
<b>Hazard:</b> <i>Drought</i>	<b>Date of Occurrence:</b> <i>2012</i>
Description of Event (include location, damages, critical facilities, etc.):	
<i>Broken water lines &amp; street blow ups</i>	
<b>Hazard:</b>	<b>Date of Occurrence:</b>
Description of Event (include location, damages, critical facilities, etc.):	



**Project STAPLEE Sheets**

ENGINEERING ■ ARCHITECTURE ■ SURVEYING ■ PLANNING

**Beatrice, NE – Hazard Mitigation Plan Update****Ranking of Projects Using STAPLEE****RANKING OF PROJECTS USING STAPLEE**DATE: 6-19-13COMMUNITY: BeatriceCOMPLETED BY: Tobias Tempelmeyer

**INSTRUCTIONS ON RANKING** – On the following page is a list of projects that can be completed in your community based on your current hazard mitigation plan, input from the last round of meetings, and by researching projects that would be beneficial to your community. By listing these projects in the plan does not mean your community is required to do them. **Please complete the following on the worksheet:**

- 1) Add any additional projects.
- 2) Cross off any undesired projects.
- 3) Indicate whether a project has been **implemented or not** with an 'X'. If a project has been implemented, you do not have to evaluate it, but please provide details.
- 4) To evaluate projects place a 'yes' or 'no' in each of the columns referring to the STAPLEE criteria. (For example, if a project is 'socially' beneficial to your community then place a 'yes' under the *Social* column. If the project would have a negative impact 'politically' then place a 'no' under the *Political* column.)
- 5) Fill in the blanks for '**Priority**' (*high, medium, low*) and the '**Responsible Department**'.

**DEFINITION OF STAPLEE** – Mitigation alternatives or actions need to be prioritized based on certain considerations. FEMA recommends using the STAPLEE evaluation, as this process addresses all the major factors when weighing the costs to the benefits of implementing one action over another. Below is an explanation of the STAPLEE criteria taken from FEMA's Multi-Hazard Mitigation Planning Guidance (March 2004):

**S – Social:** Mitigation actions are acceptable to the community if they do not adversely affect a particular segment of the population, do not cause relocation of lower income people, and if they are compatible with the communities social and cultural values.

**T – Technical:** Mitigation actions are technically most effective if they provide long-term reduction of losses and have minimal secondary adverse impacts.

**A – Administrative:** Mitigation actions are easier to implement if the jurisdiction has the necessary staffing and funding.

**P – Political:** Mitigation actions can truly be successful if all stakeholders have been offered an opportunity to participate in the planning process and if there is public support of the action.

**L – Legal:** It is critical that the jurisdiction or implementing agency have the legal authority to implement and enforce a mitigation action.

**E – Economical:** Budget constraints can significantly deter the implementation of mitigations actions. Hence, it is important to evaluate whether an action is cost-effective, as determined by a cost-benefit review, and possible to fund.

**E – Environmental:** Sustainable mitigation actions that do not have an adverse effect on the environment, that comply with Federal, State, and local environmental regulations, and that are consistent with the community's environmental goals, have mitigation benefits while being environmentally sound.



Beatrice, NE – Hazard Mitigation Plan Update

Ranking of Projects Using STAPLEE

Projects List	Social	Tech.	Admin.	Polit.	Legal	Econ.	Env.	Priority (High, Medium, Low)	Responsible Agency
Bury Main Power Lines	Y	Yes	Yes	Y	Y	N	Y	M	BPW
Bury Power Service Lines	Y	Y	Y	Y	Y	N	Y	M	BPW
Provide Backup Power System	Y	Y	Y	Y	Y	N	Y	M	BPW
Review and upgrade, if necessary, infrastructure, security procedures and equipment at critical facilities in the community	Y	Y	Y	Y	N	N	N	M	City
Flood Control Projects In and Upstream of Beatrice	Y	Y	Y	Y	N	N	N	M	NRD
Modify or replace existing bridges and/or approaches over Big Blue River at Hwy 136 and Hwy 77	Y	Y	Y	Y	N	N	Y	M	NDOR
Preserve Natural Open Spaces	Y	Y	Y	Y	Y	Y	Y	L	City
Improve drainage patterns in and around the community	Y	Y	Y	Y	Y	N	N	M	City
Build additional Snow Fences	Y	Y	Y	Y	Y	Y	Y	M	City
Continue to improve the Maintenance of Roadway Snow Routes	Y	Y	Y	Y	Y	Y	Y	M	City
Capital Improvements Program (CIP)	Y	Y	Y	Y	Y	Y	Y	M	City
Determine downstream reduction in floodplain	Y	Y	Y	Y	N	Y	N	M	FEMA
Utilize the citywide Drainage Study, and/or perform additional assessment, to create a Citywide Master Plan to prioritize all flooding related projects	Y	Y	Y	Y	Y	Y	Y	M	City
Improve or acquire property at high-risk to flooding	Y	Y	Y	Y	Y	N	Y	L	City
Community Ratings System	Y	Y	Y	Y	Y	Y	Y	M	City
Provide backup Wastewater System	Y	Y	Y	Y	Y	N	N	M	BPW
Design and Construction of Storm Water Treatment Facility	Y	Y	Y	Y	Y	N	N	L	City
Minimize and control the impact of hazard events through enacting or updating ordinances, permits, laws or regulations.	Y	Y	Y	Y	Y	Y	Y	M	City
Evaluate and Improve Building Standards	Y	Y	Y	Y	Y	Y	Y	M	City



Beatrice, NE – Hazard Mitigation Plan Update

Ranking of Projects Using STAPLEE

Continue Floodplain Regulations	Y	Y	Y	Y	Y	Y	Y	Y	Y	M	City
Maintain Tree City USA Status	Y	Y	Y	Y	Y	Y	Y	Y	Y	M	City
Improve and Implement drought water conservation regulations	Y	Y	Y	Y	Y	Y	Y	Y	Y	M	BPW
Increase Public Awareness of Vulnerability to Hazards	Y	Y	Y	Y	Y	Y	Y	Y	Y	M	City
Education on Tree Types and Planting	Y	Y	Y	Y	Y	Y	Y	Y	Y	M	City
Education (Tornado Safety Week)	Y	Y	Y	Y	Y	Y	Y	Y	Y	M	City
Improve the Comprehensive City Disaster and Emergency Response Plan	Y	Y	Y	Y	Y	Y	Y	Y	Y	M	City
Additional Personnel for Emergency Response	Y	Y	Y	Y	Y	Y	Y	Y	Y	M	City
Additional Equipment for Emergency Response	Y	Y	Y	Y	Y	Y	Y	Y	Y	M	City
Develop strategies to provide necessary services in the event of flooding	Y	Y	Y	Y	Y	Y	Y	Y	Y	M	City
All Terrain or 4-wheel drive vehicles for transportation	Y	Y	Y	Y	Y	Y	Y	Y	Y	L	City
Identify, Design, and Develop Storm Shelters	Y	Y	Y	Y	Y	Y	Y	Y	Y	M	City
Improve Communication to Residents and Businesses During and Following Emergencies	Y	Y	Y	Y	Y	Y	Y	Y	Y	M	City
Cable TV Interrupt Warning System	Y	Y	Y	Y	Y	Y	Y	Y	Y	M	City
Tornado Warning System for Future Development	Y	Y	Y	Y	Y	Y	Y	Y	Y	M	City
Coordination with Surrounding Communities	Y	Y	Y	Y	Y	Y	Y	Y	Y	M	City
Continue to support Nebraska Dept. of Natural Resources water allocation regulations	Y	Y	Y	Y	Y	Y	Y	Y	Y	M	City

**Appendix D: Annual Update Surveys**



ENGINEERING ■ ARCHITECTURE ■ SURVEYING ■ PLANNING

**Beatrice – Hazard Mitigation Plan Update**

**Annual Update Survey**

This sheet was completed by: **Name/Title:** \_\_\_\_\_

**Date:** \_\_\_\_\_ **Jurisdiction:** \_\_\_\_\_

**Email/Phone:** \_\_\_\_\_

**Address:** \_\_\_\_\_

Has your community experienced any major/significant hazards over the last year?

Yes  No

If **yes** please provide a description:

<b>Hazard:</b>	<b>Date of Occurrence:</b>
Description of Event (include location, damages, critical facilities, etc.):	
<b>Hazard:</b>	<b>Date of Occurrence:</b>
Description of Event (include location, damages, critical facilities, etc.):	
<b>Hazard:</b>	<b>Date of Occurrence:</b>
Description of Event (include location, damages, critical facilities, etc.):	

Please Return to:  
Your Local Project Sponsor



ENGINEERING ■ ARCHITECTURE ■ SURVEYING ■ PLANNING

**Beatrice – Hazard Mitigation Plan Update**

**Annual Update Survey**

What projects have been implemented to mitigate the effects of hazards in your community?

Hazard Mitigated	Specific Project	Date Initiated	Date Completed	Cost	Is this project in the current HMP?

If your community has more hazard experiences or mitigation projects to report please include on additional sheets.

Are there any additional mitigation needs that you have identified which were not included in the current plan?

---



---



---



---



---

Please Return to:  
Your Local Project Sponsor