

Section One [Introduction]

Section One introduces hazard mitigation planning, including the purpose of the plan, benefits and challenges of utilizing the multi-jurisdictional approach, an overview of the laws, regulations, and guidance, hazard mitigation assistance grant programs, plan financing and preparation, and organization of the plan.

SECTION ONE [INTRODUCTION]

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HAZARD MITIGATION PLAN

ANTELOPE, HOLT, AND KNOX COUNTIES

SECTION ONE [INTRODUCTION]

HAZARD MITIGATION AND 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. Each year in the United States, natural disasters take the lives of hundreds of people and injure thousands more. Nationwide, taxpayers pay billions of dollars annually to help communities, organizations, businesses, and individuals recover from disasters. These dollars only partially reflect the true cost of disasters, because additional expenses incurred by insurance companies and non-governmental organizations are not reimbursed by tax dollars. Many natural disasters are predictable, and much of the damage caused by these events can be reduced or even eliminated. 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 is defined by the Federal Emergency Management Agency (FEMA) as “any sustained action taken to reduce or eliminate long-term risk to human life and property from a hazard event.” The results of a three-year, congressionally mandated independent study to assess future savings from mitigation activities provides evidence that mitigation activities are highly cost-effective. On average, each dollar spent on mitigation saves society an average of \$4 in avoided future losses, in addition to saving lives and preventing injuries (*National Institute of Building Science Multi-Hazard Mitigation Council 2005*).

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 will increase or decrease a jurisdiction’s hazard vulnerability over time.

As a jurisdiction formulates a comprehensive approach to reduce the impacts of hazards, a key means to accomplish this task is through the development, adoption, and regular update of a hazard mitigation plan. A hazard mitigation plan establishes the vision, guiding principles, and specific actions designed to reduce the future hazard vulnerabilities.

PURPOSE OF THE PLAN

The purpose of this plan is to guide hazard mitigation planning to better protect the people and property of the jurisdictions from the effects of hazard events. This plan demonstrates the jurisdiction’s commitment to reducing risks from hazards and serves as a tool to help decision-makers direct mitigation activities and resources. This plan was also developed, among other reasons, to ensure Antelope, Holt, and Knox Counties’ continued eligibility for certain federal disaster assistance; specifically, the Federal Emergency Management Agency (FEMA) Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation Program (PDM), and the Flood Mitigation Assistance Program (FMA). Completion also earns credits for the National Flood Insurance Program’s (NFIP) Community Rating System (CRS) which can lower flood insurance premiums for home and business owners in participating CRS communities.

Information in this plan will be used to help guide and coordinate mitigation activities and decisions for local land use policy in the future. Proactive mitigation planning will help reduce the cost of disaster response and recovery to jurisdictions and their residents by protecting critical facilities, reducing liability exposure, and minimizing overall impacts and disruptions. The Counties have been affected by hazards in the past and thus are committed to reducing future impacts from hazard events and maintaining eligibility for mitigation-related federal funding.

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All jurisdictions participating in this plan are vulnerable to a wide range of natural hazards that threaten the safety of residents, have the potential to damage or destroy both public and private property, and disrupt the local economy and overall quality of life. The Antelope, Holt, and Knox Counties Multi-Jurisdictional Hazard Mitigation Plan is an effective means to incorporate hazard mitigation principles and practices into the day-to-day activities of county and municipal governments. 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 recommending structural solutions to reduce existing vulnerability, such as elevation, retrofitting, and acquisition projects. 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.

MULTI-JURISDICTIONAL BENEFITS AND CHALLENGES

Mitigation is most effective when it is based on a comprehensive, long-term plan that is developed before a disaster occurs. The purpose of mitigation planning is to identify local policies and actions that can be implemented over the long-term to reduce risk and future losses from hazards. These mitigation policies and actions are identified based on an assessment of hazards, vulnerabilities, and risks through the participation of a wide range of stakeholders and the public in the planning process. Mitigation plans form the foundation for a jurisdiction's long-term strategy to reduce disaster losses and break the cycle of disaster damage, reconstruction, and repeated damage. The planning process is as important as the plan itself. It creates a framework for risk-based decision making to reduce damages to lives, property, and the economy from future disasters. Local governments benefit from mitigation planning by:

- ❑ Identifying cost effective actions for risk reduction that are agreed upon by stakeholders and the public.
- ❑ Focusing resources on the greatest risks and vulnerabilities.
- ❑ Building partnerships by involving citizens, organizations, and businesses.
- ❑ Increasing education and awareness of threats and hazards, as well as their risks.
- ❑ Communicating priorities to state and federal officials.
- ❑ Aligning risk reduction with other jurisdiction objectives.

According to FEMA, “A multi-jurisdictional hazard mitigation plan is a plan jointly prepared by more than one jurisdiction.” The term ‘jurisdiction’ is equal to any ‘local government’. This is defined at 44 CFR §201.2 as Title 44 Part 201, Mitigation Planning in the Code of Federal Regulations (CFR), defines a ‘local government’ as “any county, municipality, city, town, township, public authority, school district, special district, intrastate district, council of governments (regardless of whether the council of governments is incorporated as a nonprofit corporation under State law), regional or interstate government entity, or agency or instrumental of a local government; any Indian tribe or authorized tribal organization, or Alaska Native village or organization, and any rural community, unincorporated town or village, or other public entity.” For the purposes of this plan, any ‘taxing authority’ was included, except for public power districts. In Nebraska, public power districts are considered a ‘quasi-state government’ and are required to submit individual plans as an annex to the Nebraska State Hazard Mitigation Plan.

Multi-jurisdictional planning processes can offer the following benefits: improves communication and coordination among jurisdictions and other regional entities, enables comprehensive mitigation approaches to reduce risks that affect multiple jurisdictions, maximizes economies of scale by leveraging individual capabilities and sharing costs and resources, avoids duplication of efforts, and provides an organizational structure that local jurisdictions may find supportive. While offering these potential benefits, a multi-jurisdictional planning process can also present the following challenges: reduces individual control and ownership over the mitigation planning process, involves coordinating participation of multiple jurisdictions, which may have different capabilities, priorities, and histories working together, requires specific information on local risks and mitigation actions for each jurisdiction, and requires the organization of large amounts of information into a single plan document.

LAWS, REGULATIONS, AND GUIDANCE

Local governments are required to develop a hazard mitigation plan as a condition for receiving certain types of non-emergency disaster assistance, including funding for mitigation projects. The Robert T. Stafford Disaster Relief and Emergency Assistance Act (Public Law 93-288), as amended by the Disaster Mitigation Act of 2000, provides the legal basis for local governments to undertake a risk-based approach to reducing risks from natural hazards through mitigation planning. The purpose of the Stafford Act, as amended by the Disaster Mitigation Act of 2000, is “to reduce the loss of life and property, human suffering, economic disruption, and disaster assistance costs resulting from natural disasters.” Section 322 of the Act specifically addresses mitigation planning and requires state and local governments to prepare multi-hazard mitigation plans as a precondition for receiving FEMA mitigation project grants.

The requirements and procedures for Local Mitigation Plans are found in the Code of Federal Regulations (CFR) at Title 44, Chapter 1, Part 201 (44 CFR Part 201). FEMA’s Multi-Hazard Mitigation Planning Guidance is the official guidance for local governments to meet the requirements of the Mitigation Planning regulations under the Stafford Act and 44 CFR Part 201.

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 to remain eligible for pre- and post-disaster mitigation funding. These funds include the Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation Program (PDM), and the Flood Mitigation Assistance Program (FMA), all of which are administered by 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 update was prepared pursuant to the requirements of the Disaster Mitigation Act of 2000 (Public Law 106-390) and the implementing regulations set forth by the Interim Final Rule (IFR) published in the Federal Register on February 26, 2002, (44 CFR §201.6) and finalized on October 31, 2007. While the Act emphasized the need for mitigation plans and more coordinated mitigation planning and implementation efforts, the regulations established the requirements that local hazard mitigation plans must meet in order for a local jurisdiction to be eligible for certain federal disaster assistance and hazard mitigation funding under the Robert T. Stafford Disaster Relief and Emergency Act (Public Law 93-288).

This plan was prepared using current FEMA planning guidance in coordination with the Nebraska Emergency Management Agency (NEMA) 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). Antelope, Holt, and Knox Counties utilized the multi-jurisdiction planning process recommended by FEMA (*FEMA Publication Series 386*) to develop this plan.

MITIGATION PLANNING HANDBOOK

A *Local Mitigation Plan Review Guide and Tool* provides a detailed summary of FEMA’s current minimum standards of acceptability for compliance with the Disaster Mitigation Act of 2000. The requirements of 44 CFR §201.6 *Local Mitigation Plans* are highlighted throughout the *Local Mitigation Planning Handbook* to provide clear guidance on the Federal regulations that must be met before FEMA will approve a local hazard mitigation plan. References to the IFR throughout the plan provide specific section and subsection notations to aid the planning process.

The *Local Mitigation Planning Handbook* is a tool for local governments to use in developing or updating a local hazard mitigation plan. The purpose of the *Handbook* is the following:

- To provide guidance to local governments on developing or updating hazard mitigation plans to meet the requirements of Title 44 Code of Federal Regulations (CFR) §201.6 for FEMA approval and eligibility to apply for FEMA Hazard Mitigation Assistance grant programs; and

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- To offer practical approaches and examples for how communities can engage in effective planning to reduce long-term risk from natural hazards and disasters.

The *Handbook* is a companion to the *Local Mitigation Plan Review Guide* released by FEMA in 2011. While the *Plan Review Guide* is intended to help State and Federal officials review and approve local hazard mitigation plans, the *Handbook* is intended to help local officials develop these plans. The *Handbook* is applicable to new and updated mitigation plans. A jurisdiction must review and revise an existing plan to reflect changes in development, progress in local mitigation efforts, and changes in priorities and resubmit it for approval within five years to continue to be eligible for FEMA mitigation project grant funding. FEMA may accept multi-jurisdictional plans, which must meet all the requirements of 44 CFR §201.6. The *Handbook* tasks describe how to meet the requirements in a multi-jurisdictional planning effort and are relevant to each participating jurisdiction, whether the plan is for a single or multiple jurisdictions. Federally recognized Tribes may choose to participate in a multi-jurisdictional plan; however, they must meet the requirements for tribal mitigation planning specified in 44 CFR §201.7.

HAZARD MITIGATION ASSISTANCE

Hazard mitigation is sustained action taken to reduce or eliminate long-term risk to people and their property from hazards. Local governments are required to develop a hazard mitigation plan as a condition for receiving certain types of non-emergency disaster assistance. Hazard Mitigation Assistance (HMA) grant programs provide funding for eligible mitigation activities that reduce disaster losses and protect life and property from future disaster damages. The HMA grant programs provide funding opportunities for pre- and post-disaster mitigation. 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 natural hazards. Brief descriptions of the HMA grant programs can be found below.

For more information on the individual programs, specific plan requirements for the various mitigation grant programs, as well as FEMA funds available for mitigation plan development and mitigation projects, or to see information related to a specific fiscal year, please visit FEMA's HMA website. FEMA administers the HMA grant programs detailed in Figure 1.1 below.

FIGURE 1.1: HAZARD MITIGATION ASSISTANCE [FEMA] GRANT PROGRAMS



PLAN FINANCING AND PREPARATION

In regard to plan financing and preparation, in general, the local government (Antelope, Holt, and Knox Counties) 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 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 Antelope, Holt, and Knox Counties Plan was financed through the HMGP Grant Program. 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.

Antelope, Holt, and Knox Counties applied for a HMGP planning grant and received federal-cost share in June 2014 to provide 75 percent assistance for the completion of a ‘multi-jurisdictional’ hazard mitigation plan. A multi-jurisdictional plan includes any ‘taxing authority’ such as cities, villages, counties, school districts, natural resources districts, or other special districts. In total, 36 jurisdictions took part in the Antelope, Holt, and Knox Counties Plan. The 36 jurisdictions were contacted and asked to provide input and participation with the plan update. The level of participation for each jurisdiction varied and is explained in more detail in Section Two.

This plan is an update to the Antelope, Holt, and Knox Counties Multi-Jurisdictional All-Hazards Mitigation Plan, July 2010. That plan was heavily reviewed and is referenced many times throughout this plan update. Specific demographics information for jurisdictions identified in the plan have not changed significantly since the July 2010 plan. Refer to *Section Six: Participant Profiles* for additional information about the eight full participants. As described in *Section Six: Participant Profiles* the population growth in this area since 2010 has remained flat or decreased. No new substantial infrastructure has been built in the planning area since the 2010 plan. The critical facilities are listed below.

TABLE 1.1: CRITICAL FACILITIES SUMMARY

| CRITICAL FACILITY | TYPE | NUMBER IDENTIFIED | CRITICAL FACILITY | TYPE | NUMBER IDENTIFIED |
|----------------------------|----------------|-------------------|----------------------------|----------|-------------------|
| Communication Towers | Infrastructure | 8 | Elevator | Facility | 1 |
| Gas Pipeline Connection | Infrastructure | 1 | Fairgrounds | Facility | 1 |
| Internet Provider | Infrastructure | 1 | Fire Department | Facility | 9 |
| Lift Station | Infrastructure | 9 | Fuel Station | Facility | 2 |
| Light Plant Generator | Infrastructure | 1 | Golf Club | Facility | 1 |
| NPPD Substation | Infrastructure | 5 | Hospital | Facility | 11 |
| Phone Exchange | Infrastructure | 1 | Knox County District 9 | Facility | 1 |
| Waste Processing Facility | Infrastructure | 1 | Library/Museum | Facility | 7 |
| Waste Water Treatment | Infrastructure | 11 | Main Shop | Facility | 6 |
| Water Storage Facility | Infrastructure | 1 | Motel | Facility | 1 |
| Water Tower | Infrastructure | 10 | Mr. S's | Facility | 1 |
| Well | Infrastructure | 16 | NeDOT | Facility | 1 |
| Agronomy Center | Facility | 1 | Newspaper | Facility | 1 |
| Arboretum | Facility | 1 | Nursing Home/Senior Center | Facility | 9 |
| Ball Field | Facility | 9 | Nutrition Center | Facility | 1 |
| Bank | Facility | 3 | Park | Facility | 9 |
| Campground | Facility | 1 | Police Station | Facility | 2 |
| Church | Facility | 34 | Pool | Facility | 3 |
| City/Village/Tribal Office | Facility | 8 | Post Office | Facility | 11 |

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| CRITICAL FACILITY | TYPE | NUMBER IDENTIFIED | CRITICAL FACILITY | TYPE | NUMBER IDENTIFIED |
|-----------------------------|----------|-------------------|-------------------|----------|-------------------|
| Community Center/Hub | Facility | 23 | Road Department | Facility | 2 |
| County Bard | Facility | 1 | School/Day Care | Facility | 39 |
| County Maintenance Building | Facility | 2 | Siren | Facility | 1 |
| Courthouse | Facility | 3 | Tribal Building | Facility | 1 |
| Eastern Township Building | Facility | 1 | -- | -- | -- |

ORGANIZATION OF THE PLAN

The mitigation plan belongs to the local jurisdictions. While FEMA has the authority to approve plans for local governments to apply for mitigation project funding, there is no required format for the plan's organization. When developing the mitigation plan, keep the following guiding principles in mind:

- ❑ **Focus on the mitigation strategy.** The mitigation strategy is the plan's primary purpose. All other sections contribute to and inform the mitigation strategy and specific hazard mitigation actions.
- ❑ **Process is as important as the plan itself.** In mitigation planning, as with most other planning efforts, the plan is only as good as the process and people involved in its development. The plan should also serve as the written record, or documentation, of the planning process.
- ❑ **This is your plan.** To have value, the plan must represent the current needs and values of the jurisdictions and be useful for local officials and stakeholders. Develop the mitigation plan in a way that best serves your jurisdiction's purpose and people.

SECTIONS OF THE PLAN



INTRODUCTION

Section One introduces hazard mitigation planning, including the purpose of the plan, benefits and challenges of utilizing the multi-jurisdictional approach, an overview of the laws, regulations, and guidance, hazard mitigation assistance grant programs, plan financing and preparation, and organization of the plan.



PLANNING PROCESS

Section Two outlines the hazard mitigation planning process utilized for development of the plan, including resource organization, the planning team, key stakeholders, participating jurisdictions, public involvement and participation, and final plan adoption.



HAZARD IDENTIFICATION AND RISK ASSESSMENT

Section Three contains the hazard identification and risk assessment for the plan area, including the hazard profile, previous occurrence of hazard events, location and extent, hazard impact and vulnerability to the hazard, estimate of potential losses, probability of future hazard events, varying risks facing the plan area, and overall significance for all participants.



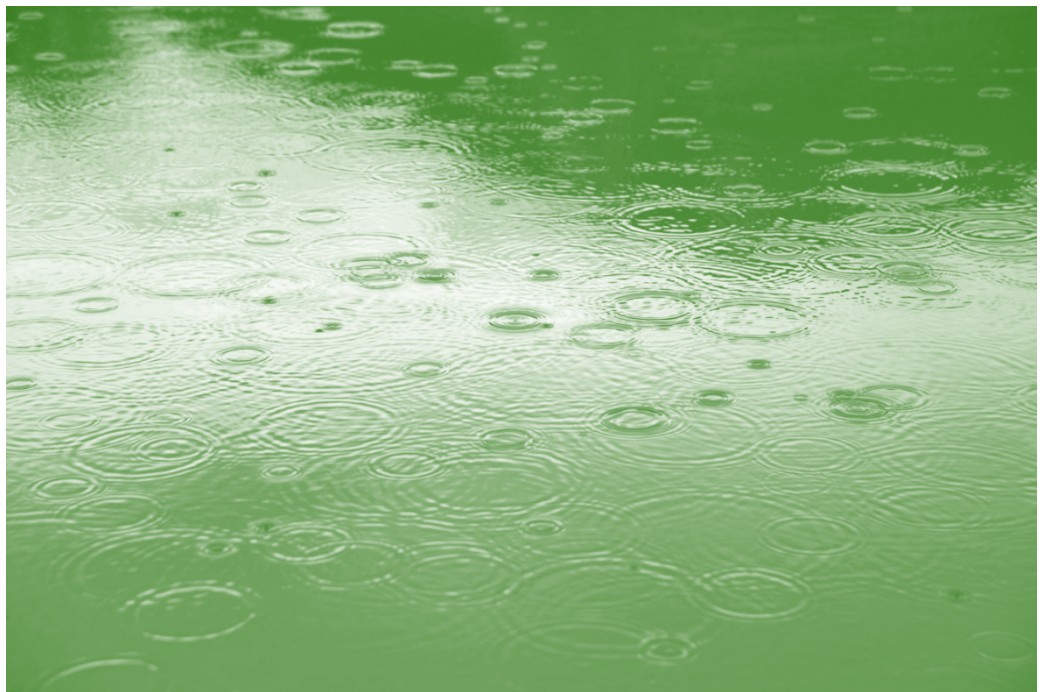
MITIGATION STRATEGY

Section Four discusses the establishment of mitigation goals, objectives, actions, and the action plan for implementation. Goals provide the framework for identifying mitigation actions, the on-the-ground activities to reduce the effects of natural hazards. All actions were evaluated by participants utilizing the FEMA recommended process.



REVIEW, EVALUATION, AND IMPLEMENTATION

Section Five contains recommendations for plan implementation and maintenance, including monitoring and evaluating the hazard identification and risk assessment, integration into existing planning mechanisms, continued public involvement and participation, annual review of mitigation actions, and the process for the five-year plan update.



Section Two [Planning Process]

Section Two outlines the hazard mitigation planning process utilized for development of the plan, including resource organization, the planning team, key stakeholders, participating jurisdictions, public involvement and participation, and final plan adoption.

SECTION TWO [PLANNING PROCESS]

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HAZARD MITIGATION PLAN

ANTELOPE, HOLT, AND KNOX COUNTIES

SECTION TWO [PLANNING PROCESS]

FEDERAL PLANNING REGULATIONS

REGULATION CHECKLIST 44 CODE OF FEDERAL REGULATIONS (CFR) 201.6 LOCAL MITIGATION PLANS



§201.6(b) 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:

§201.6(b)(1) An opportunity for the public to comment on the plan during the draft stage and prior to plan approval;
Does the Plan document how the public was involved in the planning process during the drafting stage? (Requirement §201.6(b)(1))

§201.6(b)(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

Does the Plan document an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, agencies that have the authority to regulate development as well as other interests to be involved in the planning process? (Requirement §201.6(b)(2))

§201.6(b)(3) Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.

Does the Plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement §201.6(b)(3))



§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.

• Does the Plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement §201.6(c)(1))



§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.

• Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating, and updating the mitigation plan within a five-year cycle)? (Requirement §201.6(c)(4)(i))



§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.

• Is there discussion of how the community(ies) will continue public participation in the plan maintenance process? (Requirement §201.6(c)(4)(iii))

INTRODUCTION

Hazard mitigation planning is the process through which hazards are identified, likely impacts determined, mitigation goals set, and appropriate mitigation strategies determined, prioritized, and implemented. Hazard mitigation activities may be implemented prior to, during, or after an event. However, it has been demonstrated that hazard mitigation is most effective when based on an inclusive, comprehensive, long-term plan that is developed before a disaster occurs.

As defined by the Federal Emergency Management Agency (FEMA), risk is a combination of hazard, vulnerability, and exposure. "It is the impact that a hazard would have on people, services, facilities, and structures in a community and refers to the likelihood of a hazard event resulting in an adverse condition that causes injury or damage." The risk assessment process provides the

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foundation for the rest of the mitigation planning process. The four basic components of the risk assessment are: 1) identify hazards; 2) profile hazard events; 3) inventory assets; and 4) estimate losses. This process measures the potential loss of life, personal injury, economic injury, and property damage resulting from natural hazards by assessing the vulnerability of people, buildings, and infrastructure to natural hazards.

Mitigation planning is a process for states and communities to identify policies, activities, and tools to implement mitigation actions. Mitigation core capabilities include planning, public information and warning, operational coordination, community resilience, long-term vulnerability reduction, risk and disaster resilience assessment, and threats and hazard identification. This plan documents Antelope, Holt, and Knox Counties' hazard mitigation planning process and identifies relevant hazards and vulnerabilities and strategies the jurisdictions will use to decrease vulnerability and increase resiliency and sustainability.

□ What is Mitigation Planning?

- Mitigation planning is a process through which communities assess risks and identify actions to reduce vulnerability to hazards through hazard mitigation.

□ What is a Mitigation Plan?

- A Mitigation Plan is a community-driven, living document that communities use to reduce their vulnerability to hazards.

□ Why assess and plan for risk?

- The plan and its process show the link between land-use decisions and vulnerability. It serves as a tool to be used by planners or other officials to advise and inform decision makers.

□ Why have a Mitigation Plan?

- Communities must have a plan to apply for or receive a mitigation grant. These grants can augment local mitigation activities already being done. Ultimately, these actions reduce vulnerability, and communities are able to recover more quickly from disasters.

Disasters can cause loss of life; damage buildings and infrastructure; and have devastating consequences for a community's economic, social, and environmental well-being. Hazard mitigation reduces disaster damages and is defined as sustained action taken to reduce or eliminate the long-term risk to human life and property from hazards. Outreach programs that increase risk awareness, projects to protect critical facilities, and the removal of structures from flood hazard areas are all examples of mitigation actions. Local mitigation actions and concepts can also be incorporated into land use plans and building codes.

Local governments have the responsibility to protect the health, safety, and welfare of their citizens. Proactive mitigation policies and actions help reduce risk and create safer, more disaster resilient communities. Mitigation is an investment in your community's future safety and sustainability. Consider the critical importance of mitigation to:

- Protect public safety and prevent loss of life and injury
- Reduce harm to existing and future development
- Prevent damage to a community's unique economic, cultural, and environmental assets
- Minimize operational downtime and accelerate recovery of government and business after disasters
- Reduce the costs of disaster response and recovery and the exposure to risk for first responders
- Help accomplish other community objectives, such as leveraging capital improvements, infrastructure protection, open space preservation, and economic resiliency

HAZARD MITIGATION PLANNING PROCESS

Hazard mitigation planning is the process of determining how to reduce or eliminate the loss of life and property damage resulting from natural and man-made hazards. It is the process of 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 that identifies specific mitigation actions, each designed to achieve both short-term planning objectives and a long-term vision. Plan maintenance procedures were 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.

State and local officials develop and adopt mitigation plans to meet the requirements of the Stafford Act. The Multi-Hazard Mitigation Planning Guidance provides the official guidance on these requirements and procedures for approval of hazard mitigation plans. The hazard mitigation planning process has four general steps, which include organizing resources, assessing risks, developing a mitigation strategy, and implementing the plan and monitoring the progress. The mitigation planning process is rarely a linear process. It is not unusual that ideas developed while assessing risks should need revision or additional information while developing the mitigation plan, or that implementation of the plan may result in new goals or additional risk assessment. The core steps in the graphic below show the process to complete a mitigation plan.

- ❑ **[Organize Resources]** “From the start, communities should focus on the resources needed for a successful mitigation planning process. Essential steps include identifying and organizing interested members of the community as well as the technical expertise required during the planning process”.
- ❑ **[Assess Risks]** “Next, communities need to identify the characteristics and potential consequences of hazards. It is important to understand how much of the community can be affected by specific hazards and what the impacts would be on important community assets”.
- ❑ **[Develop A Mitigation Plan]** “Armed with an understanding of the risks posed by hazards, communities need to determine what their priorities should be and then look at possible ways to avoid or minimize the undesired effects. The result is a hazard mitigation plan and strategy for implementation”.
- ❑ **[Implement Plan And Monitor Progress]** “Communities can bring the plan to life in a variety of ways, ranging from implementing specific mitigation projects to changes in day-to-day organizational operations. To ensure the success of an ongoing program, it is critical that the plan remains relevant. 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 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 less interruption.

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 with other 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.

RESOURCE ORGANIZATION

Antelope, and Holt, and Knox Counties began the process for developing a multi-jurisdictional hazard mitigation plan update in February 2014. Olsson Associates was contracted to guide and facilitate the planning process and assemble the multi-jurisdictional hazard mitigation plan. Liz Doerr (Antelope County Zoning Administrator), Cathy Pavel (Holt County City Clerk) and Laura Hintz (Knox County Emergency Manager) led the development of the plan at the county level and served as the primary points-of-contact throughout the plan. The project kick-off meeting provided an overview of the work to be completed

Section Two [Planning Process]

over the next 24 months, including the potential participants, establishment of a planning team, number and locations of public meetings, attendance requirements, and a discussion of what types of information would need to be provided to the consultant in order to successfully complete the plan.

To begin the development process for the Antelope, and Holt, and Knox Counties Plan, coordinating efforts with local, state, and federal agencies and organizations was the first activity. The Nebraska Department of Natural Resources (NDNR) and Nebraska Emergency Management Agency (NEMA) became involved in the planning process. Antelope, Holt, and Knox Counties along with Olsson Associates 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, a group of local participants and the consultant, was established to guide the planning process, review the plan, and serve as a liaison to plan participants throughout the planning area. Additional technical support was provided to the planning team through staff from NEMA and NDNR. Table 2.1 below lists the members of the planning team and key stakeholders.

- **[Planning Team]** The core group responsible for making decisions, guiding the planning process, and agreeing upon the final contents of the plan.
- **[Key Stakeholders]** Individuals or groups that affect or can be affected by a mitigation action or policy.

TABLE 2.1: PLANNING TEAM AND KEY STAKEHOLDERS

| Jurisdiction | Designated Representative Title | Jurisdiction | Designated Representative Title |
|-------------------------------|---|---|-----------------------------------|
| Antelope County | Liz Doerr, Zoning Administrator | Inman | Cynthia Couch, Clerk |
| City of Elgin | Vicki Miller, Clerk | Page | Karlee Hofer, Clerk |
| City of Neligh | Dana Klabenes, Clerk | Stuart | Mark Stracke, Clerk |
| Village of Brunswick | Jim Meuret, Board Chair | Stuart Schools | Robert Hanzilk, Superintendent |
| Village of Clearwater | Tina Snider, Clerk | Knox County | Laura Hintz, Emergency Manager |
| Village of Oakdale | Megan Brandt, Clerk | City of Bloomfield | Colette Planning, Administrator |
| Village of Orchard | Brenda Harrison, Clerk | Village of Center | Loren Hintz, Board Chair |
| Village of Royal | Heidi Blomenkamp, Clerk | City of Creighton | Lisa Parnell, Clerk |
| NE Unified #1 Schools (Royal) | Dale Martin, Superintendent | City of Crofton | Cherie Hendrix, Clerk |
| Holt County | Deb Hilker, Emergency Manager Cathy Pavel, Clerk | Village of Bazile Mills | Lane Pahl, Clerk |
| City of Atkinson | Nancy Kopejtka, Clerk | Village of Niobrara | Ester Nielsen, Clerk |
| Atkinson Public Schools | Paul Pistalka, Superintendent | Village of Santee | Julia Sage, Environmental Manager |
| City of O'Neill | Nikki Schwanz, Clerk | Village of Verdel | Village Clerk |
| Village of Chambers | Jo Harkins, Clerk | Village of Verdigre | Christine Minarik, Clerk |
| Chambers School | Justin Frederick, Superintendent | Village of Wausa | Karen Kleinschmit, Clerk |
| Village of Emmet | Susan Beckwith, Clerk | Village of Winetoon | Carol Berglund, Board Chair |
| Village of Ewing | Sharon Swails, Clerk | Lower Niobrara Natural Resources District | Terry Julesgard, General Manager |
| Ewing Schools | Greg Appleby, Principal | Cedar Knox Rural Water | Chad Reifenrath, Manager |

PUBLIC INVOLVEMENT AND PARTICIPATION

Public involvement was a vital component to the development of this multi-jurisdictional plan. Elected officials, key stakeholders, and residents of Antelope, Holt, and Knox Counties have experienced the area hazards first hand. The public was responsible for providing information necessary to complete the plan, such as identification of hazards, records of historical occurrences, establishment of goals and objectives, and potential mitigation action items.

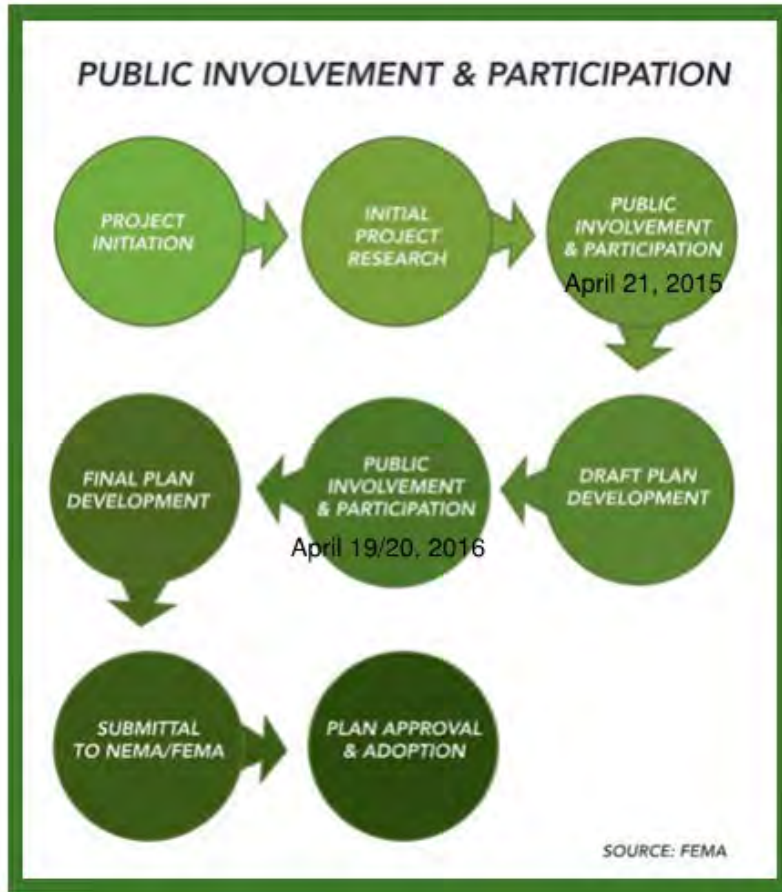
Public involvement was the highest priority for the planning team, so meeting attendance requirements were established at the beginning of the planning process. In order to participate in the plan, at least one representative from each jurisdiction had to be present at one of the 'hazard identification' and one of the 'mitigation alternative' public meetings. Sign-in sheets from all public meetings can be found in *Appendix B*. For those jurisdictions unable to attend the scheduled public meetings, presenting the information at their respective public meeting and completing the meeting materials would meet the attendance requirement. These jurisdictions were instructed by a planning team member to place 'participation in the Antelope, Holt, and Knox Counties Plan' on their meeting agenda, review the project summary materials, and take formal action to participate in the plan. They had to return the completed meeting materials along with a copy of their sign-in sheet and minutes. This effort enabled jurisdictions which could not attend a scheduled public meeting to participate in the plan.

The 'hazard identification' meetings provided the public an overview of the work to be completed over the next 30 months and discuss what types of information would need to be provided to complete the plan. The 'hazard identification' meetings were held on April 21, 2015, in O'Neill and Center. 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*). A planning team conference call was held prior to the public meetings.

The 'mitigation alternative' meetings provided an opportunity for the public to review a draft of the plan and collect any additional information necessary to finish the plan. The 'mitigation alternative' meetings were held on April 19, 2016, in Bloomfield and Center and on April 20, 2016, in O'Neill, Ewing, and Neligh. 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*). A planning team conference call was held prior to the public meetings.

Additional communication with the key stakeholders took place throughout the duration of the project through email. Plan updates, timelines, and additional questions were all items that were dealt with through email communications.

FIGURE 2.1: PUBLIC INVOLVEMENT AND PARTICIPATION [FEMA] PROCESS



Source: Federal Emergency Management Agency (FEMA).

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 table below displays the neighboring jurisdictions that were notified throughout the planning process. All jurisdictions are located in Nebraska unless otherwise noted.

TABLE 2.2: NEIGHBORING JURISDICTIONS [NOTIFICATION] ANTELOPE, HOLT, AND KNOX COUNTIES

| Neighboring Jurisdictions | |
|---------------------------|---|
| Rock County | Cedar County |
| Boyd County | Lewis and Clark Natural Resources District |
| Garfield County | Lower Elkhorn Natural Resources District |
| Wheeler County | Lower Loup Natural Resources District |
| Boone County | Lower Platte North Natural Resources District |
| Madison County | |
| Pierce County | |

PARTICIPATING JURISDICTIONS

This plan was developed through a collaborative effort by Antelope, Holt, Knox Counties, the incorporated cities and villages within the counties, the Cedar Knox Rural Water, and the Lower Niobrara Natural Resources District.

Representatives from each of the participating jurisdictions were responsible for providing information specific to their jurisdiction such as studies, reports, and plans. In addition, they were responsible for completing meeting worksheets, which provided vital information necessary to successfully complete the plan (refer to Appendix C). The representatives were also responsible for reviewing draft plan materials and final review of the plan prior to submittal to the Federal Emergency Management Agency (FEMA) for approval. Below, Table 2.2 summarizes each participant's attendance requirements throughout the planning process.

All 36 jurisdictions listed in Table 2.2 contributed to some extent for the Antelope Holt, Knox Local Hazard Mitigation Program, but not all of them are considered full participants by FEMA. Only Antelope County, Holt County, Ewing, Stuart, Knox County, Center, Creighton and Niobrara are considered full participants for this plan. Those eight jurisdictions have each participated in the planning process fully by attending the scheduled meetings and/or providing all the appropriate feedback worksheet per the meeting topic, they have analyzed their risks and vulnerabilities, they have designated mitigation actions that will address these risks and vulnerabilities and they have or will adopt this planning document upon approval. All the other jurisdictions listed in Table 2.2 are stakeholders that completed three or less of the required plan participation criteria. The stakeholders that have mitigation actions listed later in the action plan section will coordinate with their home County to pursue any said actions as projects under any HMA program as able and necessary.

Participates: Elgin, Neligh, Brunswick, Clearwater, Oakdale, Orchard, Royal, NE Unified #1 Schools (Royal), Atkinson, Atkinson Public Schools, O'Neill, Chambers, Chambers School, Emmet, Ewing Schools, Inman, Page, Stuart Schools, Bloomfield, Crofton, Bazile Mills, Santee, Verdel, Verdigre, Wausa, Winnetoon, Lower Niobrara Natural Resources District and Cedar Knox Rural Water. These jurisdictions provided some input during the plan update but did not meet the requirements of full participation.

Full Participates: Antelope County, Holt County, Ewing, Stuart, Knox County, Center, Creighton and Niobrara.

All communities or stakeholders were contacted multiple times through emails, phone calls and letters and asked to participate in this plan update.

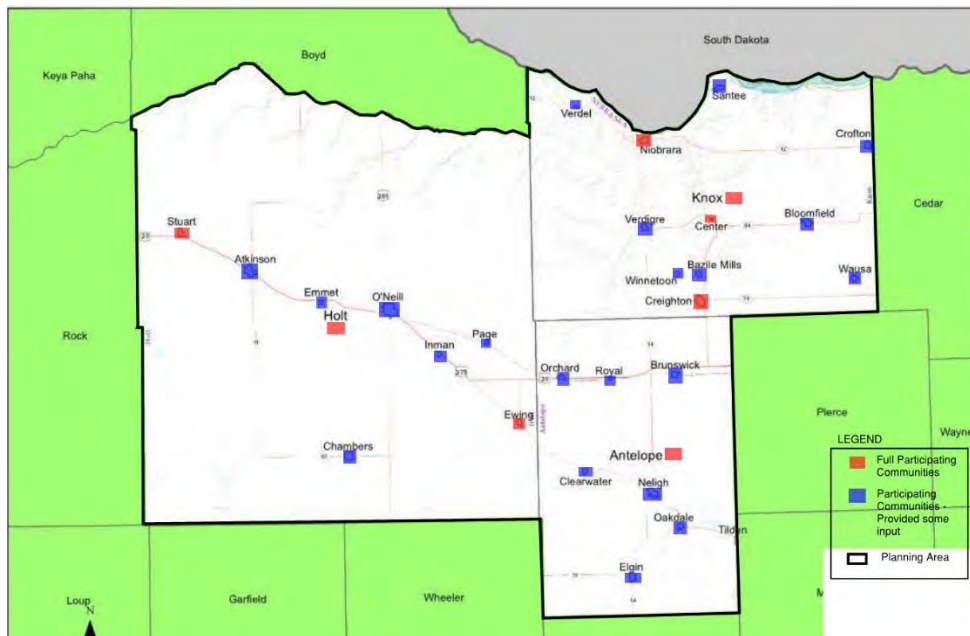
TABLE 2.3: PARTICIPATING JURISDICTIONS [FINAL] ANTELOPE, HOLT, AND KNOX COUNTIES

| Jurisdiction | Designated Representative Title | Memorandum of Agreement | Hazard Identification Meeting Attendance | Hazard Identification Worksheets Completed | Mitigation Alternative Worksheets Completed | Final Participation |
|-------------------------------|---|-------------------------|--|--|---|---------------------|
| Antelope County | Liz Doerr, Zoning Administrator | X | X | X | X | Yes |
| City of Elgin | Vicki Miller, Clerk | X | X | X | -- | No |
| City of Neligh | Dana Klabenes, Clerk | -- | X | -- | -- | No |
| Village of Brunswick | Jim Meuret, Board Chair | -- | X | -- | -- | No |
| Village of Clearwater | Tina Snider, Clerk | -- | -- | -- | -- | No |
| Village of Oakdale | Megan Brandt, Clerk | -- | -- | -- | -- | No |
| Village of Orchard | Brenda Harrison, Clerk | -- | -- | -- | -- | No |
| Village of Royal | Heidi Blomenkamp, Clerk | -- | -- | -- | -- | No |
| NE Unified #1 Schools (Royal) | Dale Martin, Superintendent | X | -- | X | -- | No |
| Holt County | Deb Hilker, Emergency Manager Cathy Pavel, Clerk | X | X | X | X | Yes |
| City of Atkinson | Nancy Kopejtko, Clerk | X | X | X | -- | No |
| Atkinson Public Schools | Paul Pistalka, Superintendent | X | -- | X | -- | No |
| City of O'Neill | Nikki Schwanz, Clerk | X | -- | X | -- | No |

Section Two [Planning Process]

| Jurisdiction | Designated Representative Title | Memorandum of Agreement | Hazard Identification Meeting Attendance | Hazard Identification Worksheets Completed | Mitigation Alternative Worksheets Completed | Final Participation |
|---|-----------------------------------|-------------------------|--|--|---|---------------------|
| Village of Chambers | Jo Harkins, Clerk | -- | -- | X | -- | No |
| Chambers School | Justin Frederick, Superintendent | X | -- | X | -- | No |
| Village of Emmet | Susan Beckwith, Clerk | -- | -- | X | -- | No |
| Village of Ewing | Sharon Swails, Clerk | X | -- | X | X | Yes |
| Ewing Schools | Greg Appleby, Principal | X | -- | X | -- | No |
| Village of Inman | Cynthia Couch, Clerk | -- | -- | X | -- | No |
| Village of Page | Karlee Hofer, Clerk | X | -- | X | -- | No |
| Village of Stuart | Mark Stracke, Clerk | X | -- | X | X | Yes |
| Stuart Schools | Robert Hanzilk, Superintendent | X | -- | X | -- | No |
| Knox County | Laura Hintz, Emergency Manager | X | X | X | X | Yes |
| City of Bloomfield | Colette Planning, Administrator | -- | -- | X | -- | No |
| Village of Center | Loren Hintz, Board Chair | -- | X | X | X | Yes |
| City of Creighton | Lisa Parnell, Clerk | X | -- | X | X | Yes |
| City of Crofton | Cherie Hendrix, Clerk | -- | -- | X | -- | No |
| Village of Bazile Mills | Lane Pahl, Clerk | -- | -- | X | -- | No |
| Village of Niobrara | Ester Nielsen, Clerk | X | -- | X | X | Yes |
| Village of Santee | Julia Sage, Environmental Manager | -- | X | X | -- | No |
| Village of Verdel | Village Clerk | -- | -- | X | -- | No |
| Village of Verdigre | Christine Minarik, Clerk | -- | -- | X | -- | No |
| Village of Wausa | Karen Kleinschmit, Clerk | -- | -- | X | -- | No |
| Village of Winnetoon | Carol Berglund, Board Chair | -- | -- | X | -- | No |
| Lower Niobrara Natural Resources District | Terry Julesgard, General Manager | X | -- | X | -- | No |
| Cedar Knox Rural Water | Chad Reifenrath, Manager | -- | X | X | X | No |

FIGURE 2.2: MAP OF PLANNING AREA



PLAN APPROVAL AND ADOPTION

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

Previous hazard mitigation plans and general local comprehensive plans as well as other resources were reviewed during the development of this Hazard Mitigation Plan Update and used to develop the plan. Those plans are listed below:

- Antelope, Holt, and Knox Counties Multi-Jurisdictional All-Hazards Mitigation Plan, July 2010, reviewed past plan and reference 2010 plan in this update
- State of Nebraska Hazard Mitigation Plan (2014) <https://nema.nebraska.gov/sites/nema.nebraska.gov/files/doc/hazmitplan.pdf>, NEMA, State of Nebraska Hazard Mitigation Plan, reviewed for pertinent data
- Local Mitigation Plan Review Guide (2013) www.fema.gov
- Local Mitigation Planning Handbook, www.fema.gov/media-library-data/20130726-1910-25045-9160/fema_local_mitigation_handbook.pdf, reviewed for pertinent data
- Community Comprehensive Plans, Respective Communities, City or Village Comprehensive Plans adopted by the governing bodies, reviewed and added to plan as needed (Antelope County, Elgin, Holt County, Knox County, Center)
- National Climatic Data Center, www.ndcd.noaa.gov, Largest active archive of weather data, collected past weather data
- Nebraska Department of Revenue Property Assessment Division, www.revenue.ne.gov, Statewide property assessment database, collected assessments for counties
- Flood Insurance Study, www.fema.gov, Data for flooding within in a community, collected maps and pertinent data
- National Centers for Environmental Information National Oceanic and Atmospheric Administration (NOAA), www.ncdc.noaa.gov, database of storm events, collected past storm events based off Nebraska State Plan's list of Hazards
- National Drought Mitigation Center, <http://drought.unl.edu>, Information about historical occurrence of drought, drought trends and likelihood, collected past drought history
- Federal Emergency Management Agency (FEMA), www.fema.gov, collected pertinent data
- Tornado History Project, www.tornadohistoryproject.com, Database of U.S. tornadoes from 1950 to current, collected past tornado data
- Nebraska Department of Natural Resources, <http://dnrdata.dnr.ne.us>, collected dam and levee information
- Nebraska Emergency Management Agency (NEMA), www.nema.ne.gov, collected pertinent data
- Various other website with pertinent information in databases

Once adopted, participants are responsible to implement and update the plan within five years. In addition, the plan will need to be reviewed and updated as appropriate when a hazard event occurs that significantly affects the area or individual participants. All participating jurisdictions will also review the plan annually and update as needed. Each jurisdiction's representative shall keep record of updates done to the plan and reviews of the plan. Each participating jurisdiction will need to continue to seek public participation after the plan has been approved either by soliciting public input after hazard events and periodically during the year. Copies of resolutions approved by each participant are located in *Appendix A*. Participants will need to monitor the implementation of the mitigation action items over time and adjust actions if needed. Routine maintenance of the plan is also needed and will include adding projects as situations change or as additional funding is made available. Removal of projects may also occur as those action items are completed. The designated representatives listed in Table 2.2 above will be responsible for leading the efforts to monitor, evaluate, and update the plan.

FIGURE 2.3: REGULATION CHECKLIST [FEMA] HAZARD MITIGATION PLAN



Source: Federal Emergency Management Agency (FEMA).

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Section Three [Hazard Identification and Risk Assessment]

Section Three contains the hazard identification and risk assessment for the plan area, including the hazard profile, previous occurrence of hazard events, location and extent, hazard impact and vulnerability to the hazard, estimate of potential losses, probability of future hazard events, varying risks facing the plan area, and overall significance for all participants.

SECTION THREE [HAZARD IDENTIFICATION AND RISK ASSESSMENT]

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HAZARD MITIGATION PLAN

ANTELOPE, HOLT, AND KNOX COUNTIES

SECTION THREE [HAZARD IDENTIFICATION AND RISK ASSESSMENT]

FEDERAL PLANNING REGULATIONS

REGULATION CHECKLIST 44 CODE OF FEDERAL REGULATIONS (CFR) 201.6 LOCAL MITIGATION PLANS



§201.6(c)(2)(i) [The risk assessment shall include a] description on the type, 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.

Does the Plan include a description of the type, location, and extent of all natural hazards that can affect each jurisdiction(s)? (Requirement §201.6(c)(2)(i))

Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for each jurisdiction? (Requirement §201.6(c)(2)(i))



§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 impacts on the community. All plans approved after October 1, 2008 must also address NFIP insured structures that have been repetitively damaged by floods. The plan should describe vulnerability in terms of:

§201.6(c)(2)(ii)(A) The types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas,

§201.6(c)(2)(ii)(B) An estimate of the potential dollar losses to vulnerable structures identified in...this section and a description of the methodology used to prepare the estimate.

§201.6(c)(2)(ii)(C) Providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.

Is there a description of each identified hazard's impact on the community as well as an overall summary of the community's vulnerability for each jurisdiction? (Requirement §201.6(c)(2)(ii))

Does the Plan address NFIP insured structures within the jurisdiction that have been repetitively damaged by floods? (Requirement §201.6(c)(2)(ii))



§201.6(c)(2)(iii) For multi-jurisdictional plans, the risk assessment section must assess each jurisdiction's risks where they vary from the risks facing the entire planning area.

INTRODUCTION

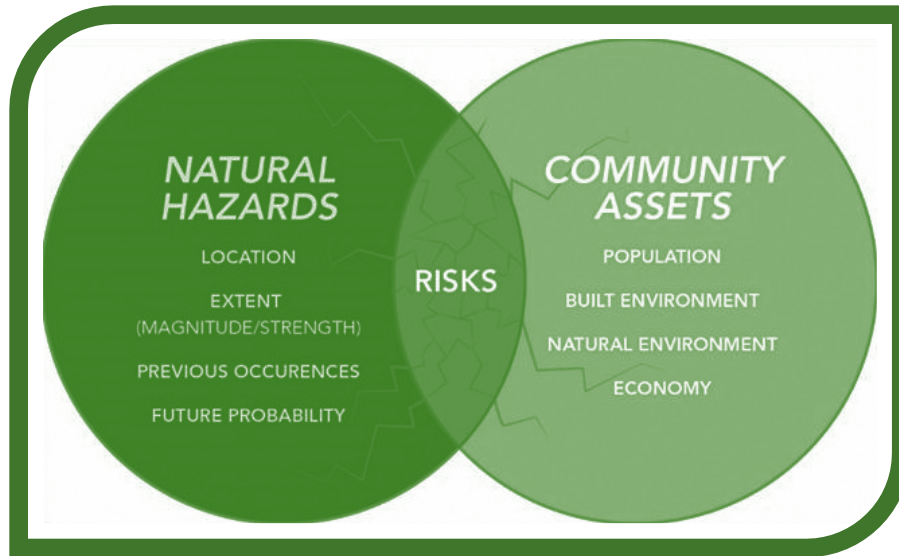
Antelope, Holt, and Knox Counties conducted a risk assessment update to determine and reevaluate the potential impacts of hazards to the people, economy, and built and natural environments of the jurisdictions. The risk assessment provides the foundation for the rest of the mitigation planning process, which is focused on identifying and prioritizing actions to reduce risk to hazards. In addition to informing the mitigation strategy, the risk assessment also can be used to establish emergency preparedness and response priorities, for land use and comprehensive planning, and for decision making by elected officials, city and county departments, businesses, and organizations in the jurisdictions.

Risk, for the purpose of hazard mitigation planning, is the potential for damage, loss, or other impacts created by the interaction of natural hazards with jurisdictions' assets. Hazards are natural processes, such as tornados and earthquakes. The exposure of people, property, and other jurisdictions' assets to natural hazards can result in disasters depending on the impacts. Impacts are

the consequences or effects of the hazard on the jurisdictions and their assets. The type and severity of impacts are based on the extent of the hazard and the vulnerability of the asset, as well as the jurisdictions' capabilities to mitigate, prepare for, respond to, and recover from events.

Figure 3.1 illustrates the concept of risk as the relationship, or overlap, between hazards and jurisdictions' assets (the smaller the overlap, the lower the risk). Table 3.1 provides definitions for the common risk assessment terminology.

FIGURE 3.1: RISKS [NATURAL HAZARDS VS. COMMUNITY ASSETS] FEMA



Source: Federal Emergency Management Agency (modified from the U.S. Geological Survey and Oregon Partnership for Disaster Resilience Models).

TABLE 3.1: RISK ASSESSMENT TERMINOLOGY [DEFINITIONS] FEMA

| Term | Definition |
|---------------------------------|---|
| Natural Hazard | Source of harm or difficulty created by a meteorological, environmental, or geological event. |
| Community Assets | The people, structures, facilities, and systems that have value to the community. |
| Vulnerability | Characteristics of community assets that make them susceptible to damage from a given hazard. |
| Impact | The consequences or effects of a hazard on the community and its assets. |
| Risk | The potential for damage, loss, or other impacts created by the interaction of natural hazards with community assets. |
| Probability | The extent to which an event is likely to occur. |
| Risk Assessment | Product or process that collects information and assigns values to risks for the purpose of informing priorities, developing or comparing courses of action, and informing decision making. |
| Threat or Human-Caused Incident | Intentional actions of an adversary, such as a threatened or actual chemical or biological attack or cyber event. |

Source: Definitions from FEMA Local Mitigation Plan Review Guide, October, 2011, Threat and Hazard Identification and Risk Assessment Guide: Comprehensive Preparedness Guide (CPG) 201, First Edition, April 2012, and adapted from the Department of Homeland Security Risk Lexicon, 2008.

HAZARD IDENTIFICATION

The hazard identification was conducted to determine the hazards that threaten Antelope, Holt, and Knox Counties. It was established through public input and information provided by elected officials, key stakeholders, and residents throughout the planning area, as well as conducting research on each hazard type identified in the State of Nebraska Hazard Mitigation Plan. For the purpose of this plan update, nine natural hazards were initially considered, including severe winter storms (including

Section Three [Hazard Identification and Risk Assessment]

extreme cold and severe winter weather), tornados, severe thunderstorms (including hail, lightning, and severe wind), 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 exceptions of dam failure and levee failure, were not included in this plan. Using existing hazards data and input gained through planning and public meetings, Antelope, Holt, and Knox Counties identified the hazards that could affect the planning area. The following hazards were not considered due to not being deemed a risk for this area: Ag Animal Disease, Chemical Transportation, Chemical Fixed Facility, Ag Plant Disease, Terrorism, Earthquake, Radiological Transportation, Civil Disorder, and Radiological Fixed Site.

In order to best describe the hazards that affect the jurisdictions, Antelope, Holt, and Knox Counties utilized the following activities for identifying hazards in the planning area:

- ❑ Reviewed the State Hazard Mitigation Plan for information on hazards affecting the planning area.
- ❑ Documented the disaster declaration history.
- ❑ Downloaded weather-related events from online resources, such as the National Climatic Data Center.
- ❑ Reviewed existing studies, reports, and plans related to hazards in the planning area.
- ❑ Used flood insurance rate maps (FIRM) and non-regulatory flood risk assessment products developed for the planning area by FEMA as part of the National Flood Insurance Program (NFIP) and the RiskMAP program.
- ❑ Contacted colleges or universities that have hazard-related academic programs or extension services.
- ❑ Interviewed the planning team and stakeholders about which hazards affect the planning area and should be described in the mitigation plan.
- ❑ Consulted local resources such as the newspaper, chamber of commerce, local historical society, or other resources with records of past occurrences.
- ❑ Referenced hazards previously identified to determine if they were still relevant.

Hazards data from the Nebraska Emergency Management Agency (NEMA) State of Nebraska Mitigation Plan, Federal Emergency Management Agency (FEMA), National Oceanic and Atmospheric Administration (NOAA), National Climatic Data Center (NCDC), as well as other sources were analyzed to gage the overall significance of the hazards to Antelope, Holt, and Knox Counties. Overall significance was calculated based on risk assessment criteria such as frequency and damage, including deaths and injuries, as well as property, crop, and economic damage. Hazards that occur relatively infrequent or have minimal to no impact on the planning area were deemed to be of low significance. This evaluation was used by Antelope, Holt, and Knox Counties to identify the hazards of greatest overall significance, allowing the Counties to concentrate resources where they are needed most.

The mitigation plan update focuses on how risk has changed since the previous plans were completed, particularly changes related to land use development and new hazard information. New development in hazard-prone areas, areas affected by recent disasters, and new data and reports were incorporated into the plan in order to analyze the current risk and update mitigation actions. The Nebraska State Hazard Mitigation Plan was consulted to assess the potential of new hazards for Antelope, Holt, and Knox Counties. Hazards from past plans were also reevaluated, and the comments in *Section Six: Participant Profiles* detail how hazards were updated.

SEVERE WEATHER EVENTS SUMMARY

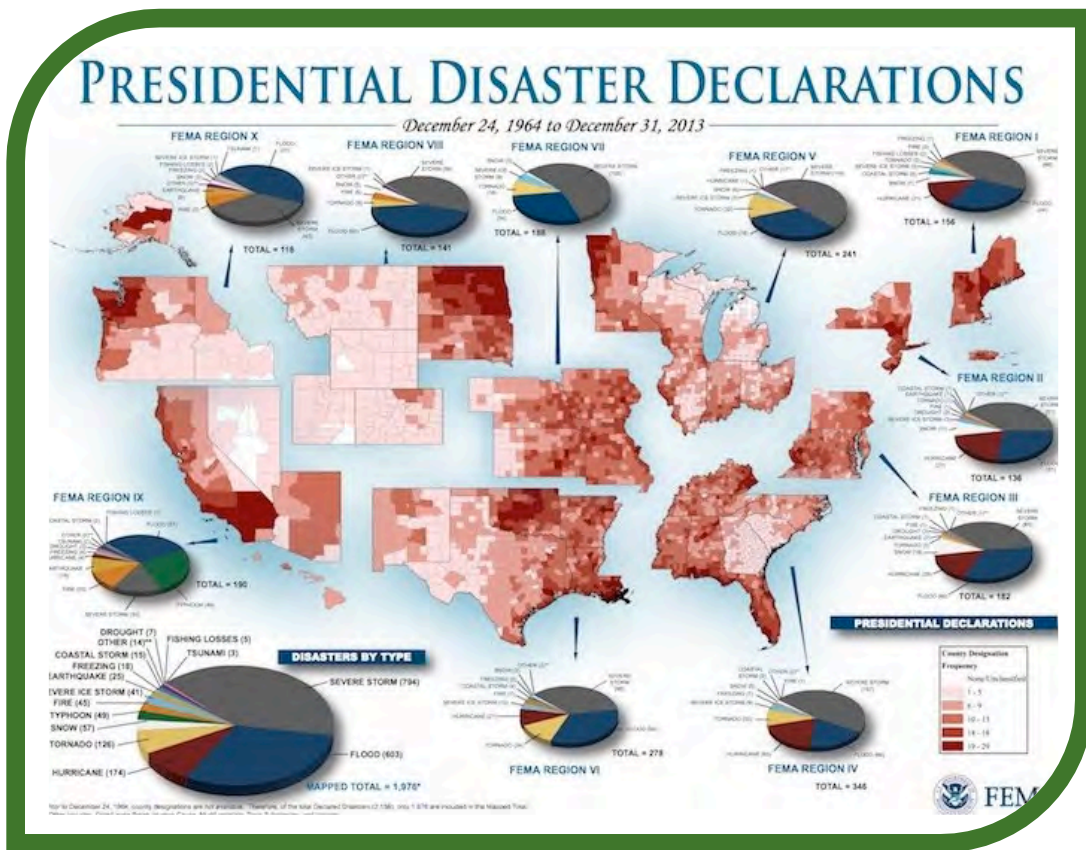
Severe weather refers to any dangerous meteorological phenomena with the potential to cause damage, serious social disruption, or loss of human life.

PRESIDENTIAL DISASTER DECLARATIONS

Antelope, Holt, and Knox Counties researched past events that triggered federal and/or state disaster declarations, in the planning area, to aid in hazard identification. Federal and/or state declarations are granted when the severity and magnitude of an event surpasses the ability of the local government to respond and recover. When the local government’s capacity has been exceeded, a state disaster declaration may be issued, allowing for assistance. If the disaster is so severe that both local and state governments’ capacities are surpassed; a federal declaration may be issued, allowing for further assistance. The federal government may issue a disaster declaration through FEMA, the U.S. Department of Agriculture (USDA), and/or the Small Business Administration (SBA).

Table 3.2, below, provides details on federal disaster declarations in Antelope, Holt, and Knox Counties since 1953. Figure 3.2 illustrates the number of presidential disaster declarations from 1964 to 2013 by FEMA Region. Antelope, Holt, and Knox Counties and the State of Nebraska are located in FEMA Region VII. The review of federal disaster declarations indicates that Antelope, Holt, and Knox Counties have received 14 declarations between 1953 and 2016.

FIGURE 3.2: PRESIDENTIAL DISASTER DECLARATIONS [FEMA] DECEMBER 24, 1964 – DECEMBER 31, 2013



Source: Federal Emergency Management Agency.

TABLE 3.2: PRESIDENTIAL DISASTER DECLARATIONS SUMMARY [FEMA] 1953 – 2016

| Disaster Declaration | Disaster Date | Declaration Date | Hazard Type | County |
|----------------------|-----------------------|------------------|---|--------|
| DR-4185 | 6/01/2014 – 6/04/2014 | 7/28/2014 | Severe Storms, Tornadoes, Straight-line Winds, and Flooding | Holt |
| DR – 4013 | 5/24/2011 – 8/01/2011 | 8/12/2011 | Flooding | Knox |

Section Three [Hazard Identification and Risk Assessment]

| Disaster Declaration | Disaster Date | Declaration Date | Hazard Type | County |
|----------------------|-------------------------|------------------|--|--------------------------|
| DR – 1924 | 6/1/2010 – 8/29/2010 | 7/15/2010 | Severe Storms, Flooding, and Tornadoes | Antelope, Holt, and Knox |
| DR – 1902 | 3/6/2010 – 4/3/2010 | 4/21/2010 | Severe Storms, Ice Jams, and Flooding | Antelope and Holt |
| DR – 1878 | 12/22/2009 – 1/8/2010 | 2/25/2010 | Severe Winter Storms and Snowstorm | Antelope, Holt, and Knox |
| DR – 1770 | 5/22/2008 – 6/24/2008 | 6/20/2008 | Severe Storms, Tornadoes, and Flooding | Holt |
| DR – 1706 | 5/04/2007 – 5/19/2007 | 6/06/2007 | Severe Storms, Flooding, and Tornadoes | Knox |
| DR – 1674 | 12/19/2006 – 1/1/2007 | 1/7/2007 | Severe Winter Storms | Antelope, Holt, and Knox |
| DR – 1627 | 11/27/2005 – 11/28/2005 | 1/26/2006 | Severe Winter Storms | Antelope, Holt, and Knox |
| DR – 1517 | 5/20/2004 – 6/01/2004 | 6/25/2004 | Severe Storms, Tornadoes, and Flooding | Antelope |
| DR – 1480 | 6/09/2003 – 7/14/2003 | 7/21/2003 | Severe Storms and Tornadoes | Holt and Knox |
| DR – 552 | 3/24/1978 | 3/24/1978 | Storms, Ice Jams, Snowmelt, and Flooding | Knox |
| DR – 303 | 2/23/1971 | 3/23/1971 | Floods | Knox |
| DR – 228 | 7/18/1967 | 7/18/1967 | Severe Storms and Flooding | Antelope and Knox |

Source: Federal Emergency Management Agency.

NATIONAL CLIMATIC DATA CENTER [NCDC]

The National Oceanic and Atmospheric Administration's National Climatic Data Center (NCDC) has been tracking severe weather since 1950. The NCDC Storm Events Database contains data on events from January 1, 1950 to January 31, 2016 (at the time of the plan). Data from the NCDC is summarized in the hazard sections below, with full event details in *Section Six: Participant Profiles*.

RISK ASSESSMENT

The risk assessment identifies and profiles relevant hazards and evaluates the potential loss of life, personal injury, economic injury, and property damage resulting from hazards by assessing the vulnerability of people, buildings, and infrastructure to hazards. The process provides the foundation for the rest of the mitigation planning process. The risk assessment allows for a better understanding of potential risk to hazards and creates a framework for developing and prioritizing mitigation actions to reduce risk from future hazard events.

The risk assessment followed the methodology described in FEMA publication *Understanding Your Risks—Identifying Hazards and Estimating Losses (FEMA 386-2, 2002)*, which breaks the assessment down into a four-step process. The four basic components of the risk assessment are: 1. Identify Hazards, 2. Profile Hazard Events, 3. Inventory Assets, and 4. Estimate Losses. The desired outcomes of these steps are 1) an evaluation of each hazard's potential impacts on the people, economy, and built and natural environments in the planning area and 2) an understanding of each jurisdiction's overall vulnerability and most significant risks. These potential impacts and the overall vulnerability identify mitigation actions to reduce risk.

RISK ASSESSMENT CRITERIA

The Antelope, Holt, and Knox Counties Multi-Jurisdictional Hazard Mitigation Plan Update involved a comprehensive review and update of the risk assessment. As part of the update, new data was used (when available) and new analyses were conducted. Each hazard was assessed through the process outlined in Figure 3.3.

FIGURE 3.3: RISK ASSESSMENT [FEMA] CRITERIA



Source: Federal Emergency Management Agency.

HAZARD PROFILE

This section provides a description of the hazard, associated issues, and details on the hazard specific to the planning area.

PREVIOUS OCCURRENCES OF HAZARD EVENTS

This section gives information on historical occurrences. Historical occurrence worksheets were used to obtain information from participating jurisdictions on previous occurrences. This information helps estimate the likelihood of future events and predict potential impacts.

LOCATION AND EXTENT

This section contains information on hazard location and extent, magnitude/ strength, speed of onset/ duration, seasonal patterns, and/or secondary effects (when known).

Location is the geographic areas within the planning area that are affected by the hazard, such as a floodplain. Hazard areas may be further defined, such as high wildfire hazard areas versus low wildfire hazard areas. The entire planning area may be uniformly affected by some hazards, such as drought or winter storm.

Extent is the strength or magnitude of the hazard. The extent of a hazard is not the same as its potential impacts on the jurisdictions. Extent defines the characteristics of the hazard regardless of the people and property it affects, while impact refers to the effect of a hazard on the people and property in the jurisdictions.

Location and Maximum Probable Extent are categorized into the following classifications:

Section Three [Hazard Identification and Risk Assessment]

TABLE 3.3: LOCATION [CLASSIFICATIONS] DEFINITIONS

| Classification | Definition |
|----------------|---|
| Negligible | Less than 10 percent of planning area or isolated single-point occurrences. |
| Limited | 10 to 25 percent of the planning area or limited single-point occurrences. |
| Significant | 26 to 75 percent of planning area or frequent single-point occurrences. |
| Extensive | 76 to 100 percent of planning area or consistent single-point occurrences. |

Location (geographic area affected). Source: Federal Emergency Management Agency.

TABLE 3.4: MAXIMUM PROBABLE EXTENT [CLASSIFICATIONS] DEFINITIONS

| Classification | Definition |
|----------------|---|
| Weak | Limited classification on scientific scale, slow speed of onset or short duration of event, resulting in little to no damage. |
| Moderate | Moderate classification on scientific scale, moderate speed of onset or moderate duration of event, resulting in some damage and loss of services for days. |
| Severe | Severe classification on scientific scale, fast speed of onset or long duration of event, resulting in devastating damage and loss of services for weeks or months. |
| Extreme | Extreme classification on scientific scale, immediate onset or extended duration of event, resulting in catastrophic damage and uninhabitable conditions. |

Maximum Probable Extent (magnitude/ strength based on historic events or future probability). Source: Federal Emergency Management Agency.

TABLE 3.5: MAXIMUM PROBABLE EXTENT [MAGNITUDE/STRENGTH] DROUGHT, EARTHQUAKE, AND TORNADO

| Hazard | Scale/ Index | Weak | Moderate | Severe | Extreme |
|------------|--|----------------|----------------|----------------|-----------------|
| Drought | Palmer Drought Severity Index ¹ | -1.99 to +1.99 | -2.00 to -2.99 | -3.00 to -3.99 | -4.00 and below |
| Earthquake | Modified Mercalli Scale ² | I to IV | V to VII | VIII | IX to XII |
| | Richter Magnitude ³ | 2, 3 | 4, 5 | 6 | 7, 8 |
| Tornado | Enhance Fujita Tornado Damage Scale ⁵ | F0 | F1, F2 | F3 | F4, F5 |

¹Cumulative meteorological drought and wet conditions: <http://ncdc.noaa.gov/>. ²Earthquake intensity and effect on population and structures: <http://earthquake.usgs.gov>. ³Earthquake magnitude as a logarithmic scale, measured by a seismograph: <http://earthquake.usgs.gov>. ⁴Tornado rating based on wind speed and associated damage: <http://spc.noaa.gov>.

HAZARD IMPACT AND VULNERABILITY TO THE HAZARD

This section evaluates the planning areas’ exposure to hazards, taking into account assets at risk, critical facilities, and future development trends. Vulnerability is expressed in general, qualitative terms. It assesses the possible impact based on previous occurrences, spatial extent, and damage/ life-threatening potential. Vulnerability is categorized into the following classifications:

TABLE 3.6: HAZARD IMPACT AND VULNERABILITY TO THE HAZARD [CLASSIFICATIONS] DEFINITIONS

| Classification | Definition |
|----------------|--|
| Extremely Low | The occurrence and potential cost of damage to life and property is very minimal to nonexistent. |
| Low | Minimal potential impact. The occurrence and potential cost of damage to life and property is minimal. |

| Classification | Definition |
|----------------|---|
| Medium | Moderate potential impact. This ranking carries a moderate threat level to the general population and/or built environment. Here the potential damage is more isolated and less costly than a more widespread disaster. |
| High | Widespread potential impact. This ranking carries a high threat to the general population and/or built environment. The potential for damage is widespread. Hazards in this category may have occurred in the past. |
| Extremely High | Very widespread with catastrophic impact. |

Source: Federal Emergency Management Agency.

ESTIMATE OF POTENTIAL LOSSES

This section of the risk analysis involves evaluating vulnerable assets, describing potential impacts, and estimating losses for each hazard. The purpose of this analysis is to help the jurisdictions understand the greatest risks facing the planning area. Methods for analyzing risk include exposure analysis, historical analysis, and scenario analysis. These methods can be expressed qualitatively or quantitatively. Qualitative evaluations describe the types of impacts that might occur during a hazard event. Quantitative evaluations assign values and measure the potential losses to the assets at risk.

TABLE 3.7: RISK ANALYSIS [METHODS] DEFINITIONS

| Method | Definition |
|---------------------|---|
| Exposure Analysis | An exposure analysis identifies the existing and future assets located in identified hazard areas. This also takes into account the magnitude of the hazard, such as assets located in high, medium, or low wildfire hazard areas or assets located in different flood frequency areas (1% annual flood and 0.2% annual flood risk). Exposure analysis quantifies the number, type, and value of structures, critical facilities, and infrastructure located in identified hazard areas, as well as assets exposed to multiple hazards. It is also used to quantify the number of future structures and infrastructure possible in hazard prone areas based on current zoning and building codes. |
| Historical Analysis | Historical analysis uses information on impacts and losses from previous hazard events to predict potential impacts and losses during a similar future event. This is especially useful for weather-related hazards, such as severe winter storms, hail, and drought. Because of the frequency of these events, communities are more likely to have experience with and data on impacts and losses. For recent events, consider not only what was damaged, but what might have been damaged if the event had been of greater magnitude. For hazard events that have not occurred recently, consider new development and infrastructure that would now be vulnerable in a similar event. |
| Scenario Analysis | Scenario analysis predicts the impacts of a particular event. Scenarios can be an especially helpful tool for low frequency, high consequence events, such as earthquakes, for which historical information is not available. Scenario analysis asks “what if” a particular event occurred and predicts potential impacts and losses in terms of monetary costs, casualties, infrastructure downtime, and other risk elements. This type of analysis can also be used to describe possible impacts for different growth and development scenarios. |

Source: Federal Emergency Management Agency, *Local Mitigation Planning Handbook*, March 2013.

Vulnerability and potential losses can be quantified in locations where there is a known, identified hazard area, such as a mapped floodplain, breach or inundation area. In those locations, the numbers and types of buildings at risk can be counted and their values calculated. Other data can be collected, such as locations of critical facilities, historic structures, and natural resources. This information further illustrates the impact and vulnerability of the area to the identified hazard.

Vulnerability and potential losses from other identified hazards, which do not have specific mapped areas or data to support additional analysis, are discussed in more general, qualitative terms.

Section Three [Hazard Identification and Risk Assessment]

Antelope, Holt, and Knox Counties identified two hazards for which specific geographical hazard areas and adequate data exists to support a quantitative analysis – floods and dam failure. The planning area was evaluated, to the extent possible, to quantify vulnerability in the identified floodplains and inundation areas:

- ❑ Impacts to life, safety, and health
- ❑ Land and improvements (including types, numbers, and value)
- ❑ Populations (based on land use and occupancy)
- ❑ Critical facilities
- ❑ Cultural and natural resources
- ❑ Development trends

PROBABILITY OF FUTURE HAZARD EVENTS

Probability is the likelihood of a specific hazard occurring in the future, and can be described in a variety of ways. Probability may be defined using historical frequencies or statistical probabilities. Statistical probabilities often refer to events of a specific size or strength. Hazard likelihood can also be compared using general descriptions or rankings. Some hazards are most likely to occur during a specific time of year, but others may occur at any time.

In this section, frequency of historical occurrences was used to assess the likelihood of future hazard events. The historical frequency was determined utilizing existing data (when available). It was calculated by dividing the number of recorded events by the number of years on record, then multiplying by 100, to determine the percent chance of the hazard occurring in any given year. The likelihood of future hazard events was classified into categories defined below in Table 3.8.

TABLE 3.8: PROBABILITY OF FUTURE HAZARD EVENTS [CLASSIFICATIONS] DEFINITIONS

| Classification | Definition |
|----------------|--|
| Unlikely | Less than 1 percent probability of occurrence in the next year or a recurrence interval of greater than every 100 years. |
| Occasional | 1 to 10 percent probability of occurrence in the next year or a recurrence interval of 11 to 100 years. |
| Likely | 11 to 90 percent probability of occurrence in the next year or a recurrence interval of 1 to 10 years. |
| Highly Likely | 91 to 100 percent probability of occurrence in the next year or a recurrence interval of less than 1 year. |

Source: Federal Emergency Management Agency.

OVERALL SIGNIFICANCE

In this section the overall significance was calculated based on risk assessment criteria such as frequency and damage, including deaths and injuries, as well as property, crop, and economic damage. Hazards that occur relatively infrequent or have minimal to no impact on the planning area were deemed to be of low significance.

This evaluation was used by Antelope, Holt, and Knox Counties to identify the hazards of greatest overall significance, allowing the Counties to concentrate resources where they are needed most.

TABLE 3.9: OVERALL SIGNIFICANCE [CLASSIFICATIONS] DEFINITIONS

| Classification | Definition |
|----------------|--|
| Low | Two or more criteria fall in lower classifications or the event has a minimal impact on the planning area. This rating is sometimes used for hazards with a minimal or unknown record of occurrences or for hazards with minimal mitigation potential. |
| Medium | The criteria fall mostly in the middle ranges of classifications and the event's impacts on the planning area are noticeable but not devastating. This rating is sometimes used for hazards with a high extent rating but very low probability rating. |
| High | The criteria consistently fall in the high classifications and the event is likely/highly likely to occur with severe strength over a significant to extensive portion of the planning area. |

Source: Federal Emergency Management Agency.

VARYING RISKS FACING THE PLANNING AREA

In this section, for the multi-jurisdictional plan, the risk assessment evaluates the potential impacts and overall vulnerability for each participating jurisdiction to further development specific mitigation actions. Assets, vulnerabilities, and overall risk that are unique to each jurisdiction are addressed in this multi-jurisdictional plan. Although hazards may be described for the entire planning area, the plan also explains any hazards that are unique or varied within jurisdictions.

The risk assessment information, as provided by individual participants, in *Section Six: Participant Profiles* varies in large part due to the extent of the geographical area and the jurisdictions designated representatives (who were responsible for completing meeting worksheets) personal opinion on the identification of hazards and the presence and risk of each hazard type. Individual hazard identification tables for each participant, including all eleven hazards initially considered, as well as any hazards that are unique or varied within jurisdictions can be found in their respective sections in *Section Six: Participant Profiles*.

RISK ASSESSMENT SUMMARY

The Disaster Mitigation Act requires that Antelope, Holt, and Knox Counties evaluate the risks associated with each hazard identified in the planning process. The overall risk assessment for the identified hazard types represents the presence and vulnerability to each hazard type throughout the planning area. The individual hazard identification tables, based on the public input and information received, identify those hazard types which have occurred, have a significant likelihood to occur again, or have reason to potentially occur in Antelope, Holt, and Knox Counties. These tables were compiled after receiving responses from the public, discussing the public responses with the State Hazard Mitigation Officer, and conducting detailed research on the presence and risk of each hazard type. The individual participant hazard identification tables and responses may or may not reflect the consensus for risk and vulnerability to each hazard type for the planning area. Individual hazard identification tables for each participant, including all eleven hazards initially considered, can be found in their respective sections in *Section Six: Participant Profiles*.

Table 3.10 summarizes the results of the hazard identification and risk assessment for Antelope, Holt, and Knox Counties, based on the hazard data and input from the public. For each hazard identified, this table includes the location, maximum probable extent, probability of future events, and overall significance for the planning area.

TABLE 3.10: HAZARD IDENTIFICATION & RISK ASSESSMENT [ANTELOPE, HOLT, AND KNOX COUNTIES] 2016

| Hazard | Location | Maximum Probable Extent | Probability of Future Events | Overall Significance |
|----------------------|-------------|-------------------------|------------------------------|----------------------|
| Severe Winter Storms | Extensive | Moderate | Highly Likely | Medium |
| Severe Thunderstorms | Significant | Moderate | Highly Likely | Medium |
| Tornados | Negligible | Severe | Highly Likely | Medium |

Section Three [Hazard Identification and Risk Assessment]

| Hazard | Location | Maximum Probable Extent | Probability of Future Events | Overall Significance |
|--------------|-------------|-------------------------|------------------------------|----------------------|
| Floods | Significant | Moderate | Highly Likely | Medium |
| Extreme Heat | Extensive | Severe | Unlikely | Medium |
| Drought | Extensive | Severe | Likely | High |
| Dam Failure | Significant | Severe | Unlikely | Low |

Earthquakes, landslides, wildfires, and levee failure were not evaluated in the plan update. During the hazard identification and risk assessment these hazards were deemed to be of low significance to Antelope, Holt, and Knox Counties. The planning team eliminated these hazards from further consideration in development of mitigation actions due to: the risk of a hazard event in the planning area is unlikely or non-existent; the vulnerability of the planning area is low; and/or capabilities are already in place to mitigate negative impacts. Additionally the following reasons were used to decide to not evaluate these four hazards:

Earthquakes

- Antelope County, NE has a very low earthquake risk, with a total of 0 earthquakes since 1931. The USGS database shows that there is a 0.67% chance of a major earthquake within 50km of Antelope County, NE within the next 50 years.
- Holt County, NE has a very low earthquake risk, with a total of 2 earthquakes since 1931. The USGS database shows that there is a 0.87% chance of a major earthquake within 50km of Holt County, NE within the next 50 years. The largest earthquake within 30 miles of Holt County, NE was a 4.3 Magnitude in 2016.
- Knox County, NE has a very low earthquake risk, with a total of 1 earthquakes since 1931. The USGS database shows that there is a 1.00% chance of a major earthquake within 50km of Frontier County, NE within the next 50 years. The largest earthquake within 30 miles of Knox County, NE was a 3.6 Magnitude in 1996.

These facts were the main reasons for not including earthquakes in the evaluation.

Landslides

- Antelope County, NE does not have any current landslides
- Holt County, NE currently has 5 recognized landslides of which 4 are active. Several of them are along stream and do not currently present any danger to the population. The other ones are against Highway bridges and the Nebraska Department of Transportation is responsible for the repair or maintenance of these areas.
- Knox County, NE does not have any current landslides.

Wildfires

In referencing the Nebraska Statewide Forest Action Plan there are low forested areas in the planning region and thereby the threat of wildfires is relatively low as well. Most trees in this region only follow the rivers and streams and are in the more urban areas. On the north side of Holt & Knox County there is a small portion of the Niobrara River Valley that is of some concern for wildfires but numerous other groups and agencies are addressing overall mitigation of this region under the Community Wildfire Protection Plans. There is also a predominance of prairie or pasture land in the planning area and prairie-fires are as likely to occur but also a low enough threat that the jurisdictions are not doing a full assessment of this hazard for this plan. The main actions that can occur for this hazard is to have appropriate grass-fire-fighting equipment at the volunteer fire departments and MOA's with other districts to assist as necessary and the potential of tilling under the prairie as a means of providing a fire-break. Both measures are really an operationally focused endeavor and not rooted in mitigation. For the Niobrara Valley any mitigation measures, such as fuels reduction and defensible space, are addressed in the Missouri River NE or the Northcentral Nebraska CWPP.

Levee Failure

Review of state and federal databases indicated that there are no levees in, or proximate to, the planning area. There may be an undetermined number of agricultural levees present in the three-county area, but their potential failure would be limited to

crop or pasture land and would have minimal or no impact on critical infrastructure, such as roads, bridges, buildings or any population center.

The following hazard sections describe the possible impacts and quantify, to the extent feasible using the best available data, Antelope, Holt, and Knox Counties' risk and vulnerability to each of the identified hazards. When hazards vary across the Counties, additional information can be found in *Section Six: Participant Profiles*. The hazards evaluated as part of the plan update include: Severe Winter Storms (including extreme cold and severe winter weather), Severe Thunderstorms (including hail, lightning, and severe wind), Tornadoes, Floods, Extreme Heat, Drought, and Dam Failure.

The assessment covers the entire geographical extent of Antelope, Holt, and Knox Counties.



Section Three [Severe Winter Storms]

A winter storm is an event in which the varieties of precipitation are formed that only occur at low temperatures, such as snow or sleet, or a rainstorm where ground temperatures are low enough to allow ice to form (freezing rain).

SECTION THREE [SEVERE WINTER STORMS]

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HAZARD MITIGATION PLAN

ANTELOPE, HOLT, AND KNOX COUNTIES

SECTION THREE [SEVERE WINTER STORMS]

SEVERE WINTER STORMS

This sub-section outlines the risk assessment for the hazard event severe winter storms, including hazard profile, previous occurrences of hazard events, location and extent, hazard impact and vulnerability to the hazard, estimate of potential losses, probability of future hazard events, and overall significance. Data on previous occurrences of hazard events from the National Climatic Data Center (NCDC) is summarized below, with full event details in Section Six: Participant Profiles. Geographic, demographic, assets inventory, capabilities assessment, and climate summaries are also provided in Section Six: Participant Profiles, with varying risks facing the planning area discussed in the appropriate sub-sections.

HAZARD PROFILE

The hazard profile provides a description of the hazard, associated issues, and details on the hazard specific to the planning area.

While the danger from winter weather varies across the country, nearly all Americans, regardless of where they live, are likely to face some type of severe winter weather at some point in their lives. Winter storms can range from a moderate snow over a few hours to a blizzard with blinding, wind-driven snow that lasts for several days. Many winter storms are accompanied by dangerously low temperatures and sometimes by strong winds, icing, sleet, and freezing rain (*ready.gov*).

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. 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.

Nearly every winter, hard freeze warnings are issued advising residents to protect exposed pipes, plants and outdoor pets. Additionally, shelter locations are given and those who do not live in heated homes can go to shelters overnight. The National Weather Service refers to winter storms as the “Deceptive Killers” because most deaths are indirectly related to the storm. Instead, people die in traffic accidents on icy roads and of hypothermia from prolonged exposure to cold. Table 3.11 provides descriptions for the most common severe winter storm events.

TABLE 3.11: SEVERE WINTER STORM EVENTS [DESCRIPTIONS] NWS

| Event | Description |
|--------------|---|
| Blizzard | Winds of 35 miles per hour (mph) or more with snow and blowing snow reducing visibility to less than ¼ mile for at least three hours. |
| Blowing Snow | Wind-driven snow that reduces visibility. Blowing snow may be falling snow and/ or snow on the ground picked up by the wind. |

| Event | Description |
|---------------|--|
| Snow Squalls | Brief, intense snow showers accompanied by strong, gusty winds. Accumulation may be significant. |
| Snow Showers | Snow falling at varying intensities for brief periods of time. Some accumulation is possible. |
| Freezing Rain | Measurable rain that falls onto a surface with a temperature below freezing. This causes it to freeze to surfaces, such as trees, cars, and roads, forming a coating or glaze of ice. Most freezing rain events are short lived and occur near sunrise between the months of December and March. |
| Sleet | Rain drops that freeze into ice pellets before reaching the ground. Sleet usually bounces when hitting a surface and does not stick to objects. |
| Heavy Snow | Two to four inches or more in a 12-hour period. |
| Ice Storm | Any accumulation of ice ¼ inch or more within a 12- to 24-hour period. |
| Winter Storm | Any combination of ice or snow above. A mixture of snow and freezing rain would trigger a winter storm warning issued by the NWS. |

Source: National Weather Service (NWS).

PREVIOUS OCCURRENCES OF HAZARD EVENTS

Previous occurrences of hazard events give information on historical occurrences. Historical occurrence worksheets were used to capture information from participating jurisdictions on past occurrences.

Presidential disaster declarations are summarized in Section Three: Hazard Identification and Risk Assessment – Severe Weather Events Summary. Data from the NCDC is summarized in Table 3.14 below.

The NCDC reported 161 severe winter storms events for Antelope, Holt, and Knox Counties from January 1, 1950 to January 31, 2016. Of the reported events, 10 events recorded damages, with \$14,044,000 in total property damages and \$0 in total crop damages. Data from the NCDC is available in Section Six: Participant Profiles. However, 69 of these events took place across multiple counties and thus are counted multiple times. This means that 92 separate severe winter storms events occurred in Antelope, Holt, and Knox Counties from January 1, 1950 to January 31, 2016.

TABLE 3.12: NCDC EVENTS SUMMARY [SEVERE WINTER STORMS] JANUARY 1, 1950 – JANUARY 31, 2016

| | Antelope County | Holt County | Knox County | Totals |
|-----------------|-----------------|-------------|-------------|--------------|
| Events | 49 | 50 | 62 | 161 |
| Deaths | 0 | 0 | 0 | 0 |
| Injuries | 0 | 0 | 0 | 0 |
| Property Damage | \$5,000,000 | \$5,544,000 | \$3,500,000 | \$14,044,000 |
| Crop Damage | \$0 | \$0 | \$0 | \$0 |

Source: United States Department of Commerce, National Oceanic Atmospheric Administration, National Environmental Satellite, Data, and Information Service, National Climatic Data Center.

LOCATION AND EXTENT

Location and extent contain information on hazard location and extent, magnitude/ strength, speed of onset/ duration, seasonal patterns, and/or secondary effects (when known).

LOCATION [GEOGRAPHIC AREA AFFECTED]

- ✓ [Extensive] 76 to 100 percent of planning area or consistent single-point occurrences.

Section Three [Severe Winter Storms]

MAXIMUM PROBABLE EXTENT [MAGNITUDE/ STRENGTH BASED ON HISTORIC EVENTS OR FUTURE PROBABILITY]

- ✓ [Moderate] Moderate classification on scientific scale, moderate speed of onset or moderate duration of event, resulting in some damage and loss of services for days.

Severe winter storms occur on a regional scale, and can equally affect the entire planning area. All building stock and infrastructure, including critical facilities, are at risk of being damaged or affected by a severe winter storm. One of the primary concerns is the winter weather's ability to knock out heat, power, and communications services, sometimes for days at a time. Heavy snowfall and extreme cold can immobilize an entire region.

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.

Severe winter storms can cause immense economic losses to the State of Nebraska. Hampered transportation routes caused by closed or blocked roads and airports can prevent the movement of essential economic goods. Other secondary problems included flooding from melting ice and snow, and rainfall on heavily glazed and saturated surfaces. Icy, snow-covered areas can create a hazard to drivers and to walkers with increased accidents. Downed power lines can create a risk of electrocution to residents and to electric power workers. Finally, frozen and broken water lines in homes are not only costly to repair, but create additional hazards from electrocution.

HAZARD IMPACT AND VULNERABILITY TO THE HAZARD

Impact and vulnerability assesses the planning areas' exposure to hazards; considering assets at risk, critical facilities, and future development trends. Vulnerability is measured in general, qualitative terms and is a summary of the potential impact based on past occurrences, spatial extent, and damage/ casualty potential.

- ✓ [Medium] Moderate potential impact. This ranking carries a moderate threat level to the general population and/or built environment. Here the potential damage is more isolated and less costly than a more widespread disaster.

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 nursing homes and young children, elderly, 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.

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.

ESTIMATE OF THE POTENTIAL LOSSES

Vulnerability and potential losses can be quantified in locations where there is a known, identified hazard area, such as a mapped floodplain. In those locations, the numbers and types of buildings at risk to the identified hazard can be counted and their values calculated. Other data can be collected in regard to the hazard area, such as the location of critical facilities, historic structures, and valued natural resources. This information illustrates the impact and vulnerability of the area to the identified hazard. The vulnerability and potential losses from the other identified hazards, which do not have specific mapped areas or the data to support additional analysis, are discussed in more general, qualitative terms.

The event damage and frequency estimate formulas were determined based upon recorded historical occurrences since 1950. 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 estimate (crop damages are not mitigated by FEMA).

If a severe thunderstorm occurred within the planning area, the table below assumes the event could potentially cause 0.2 percent damage to the total assessed value in an incorporated jurisdiction and throughout rural areas of the Counties.

TABLE 3.13: ASSUMED DAMAGE [SEVERE WINTER STORMS] SCENARIO ANALYSIS BY JURISDICTION

| Event Damage and Frequency Estimate Formulas | | |
|--|-----------|--|
| Average Annual Damage | \$216,062 | Total Damages Recorded [\$14,044,000] / Total Years on Record [65] |
| Average Damage per Event | \$152,652 | Total Damages Recorded [\$14,044,000] / Total Events Recorded [92] |
| Annual Event Frequency | 1.4/year | Total Events Recorded [92] / Total Years on Record [65] |

PROBABILITY OF FUTURE HAZARD EVENTS

The frequency of historical occurrences was used to gauge the likelihood of future occurrences. Frequency was calculated based on existing data (when available). It was determined by dividing the number of events recorded by the number of years on record, and then multiplying by 100 to calculate a percent. This gives the percent chance of the event occurring in any given year.

- ✓ [Highly Likely] 91 to 100 percent probability of occurrence in the next year.

OVERALL SIGNIFICANCE

Overall significance was determined based on criteria such as frequency and damage, including deaths and injuries, as well as property, crop, and economic damage. Hazards that occur infrequently or have little or no impact on the planning area were determined to be of low significance.

- ✓ [Medium] The criteria fall mostly in the middle ranges of classifications and the event’s impacts on the planning area are noticeable but not devastating. This rating is sometimes used for hazards with a high extent rating but very low probability rating.



Section Three [Severe Thunderstorms]

A thunderstorm is defined as a storm of heavy rain accompanied by lightning, thunder, wind, and sometimes hail.

SECTION THREE [SEVERE THUNDERSTORMS]

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HAZARD MITIGATION PLAN

ANTELOPE, HOLT, AND KNOX COUNTIES

SECTION THREE [SEVERE THUNDERSTORMS]

SEVERE THUNDERSTORMS

This sub-section outlines the risk assessment for the hazard event severe thunderstorms, including hazard profile, previous occurrences of hazard events, location and extent, hazard impact and vulnerability to the hazard, estimate of potential losses, probability of future hazard events, and overall significance. Data on previous occurrences of hazard events from the National Climatic Data Center (NCDC) is summarized below, with full event details in Section Six: Participant Profiles. Geographic, demographic, assets inventory, capabilities assessment, and climate summaries are also provided in Section Six: Participant Profiles, with varying risks facing the planning area discussed in the appropriate sub-sections.

HAZARD PROFILE

The hazard profile provides a description of the hazard, associated issues, and details on the hazard specific to the planning area.

Thunderstorms are responsible for the development and formation of many severe weather events, posing great threats to the population and built environment. Damage that results from thunderstorms is mainly inflicted by severe winds, large hailstones, and flash flooding (discussed in *Section Three: Hazard Identification and Risk Assessment – Floods*) caused by heavy precipitation. Stronger thunderstorms are capable of producing tornados (discussed in *Section Three: Hazard Identification and Risk Assessment – Tornados*).

Most 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. Flash floods often result from the heavy rainfall of thunderstorm systems and nationally are considered the number one thunderstorm-related killer because they often occur at night and people in affected areas may not be able to see the extent of the rapidly rising water. Approximately ten percent of the thunderstorms that occur each year in the United States are classified as severe.

A thunderstorm is classified as severe when it contains one or more of the following events:

- ❑ Hail that is one inch or greater;
- ❑ Winds in excess of 50 knots (57.5 mph); or
- ❑ The presence of tornado activity.

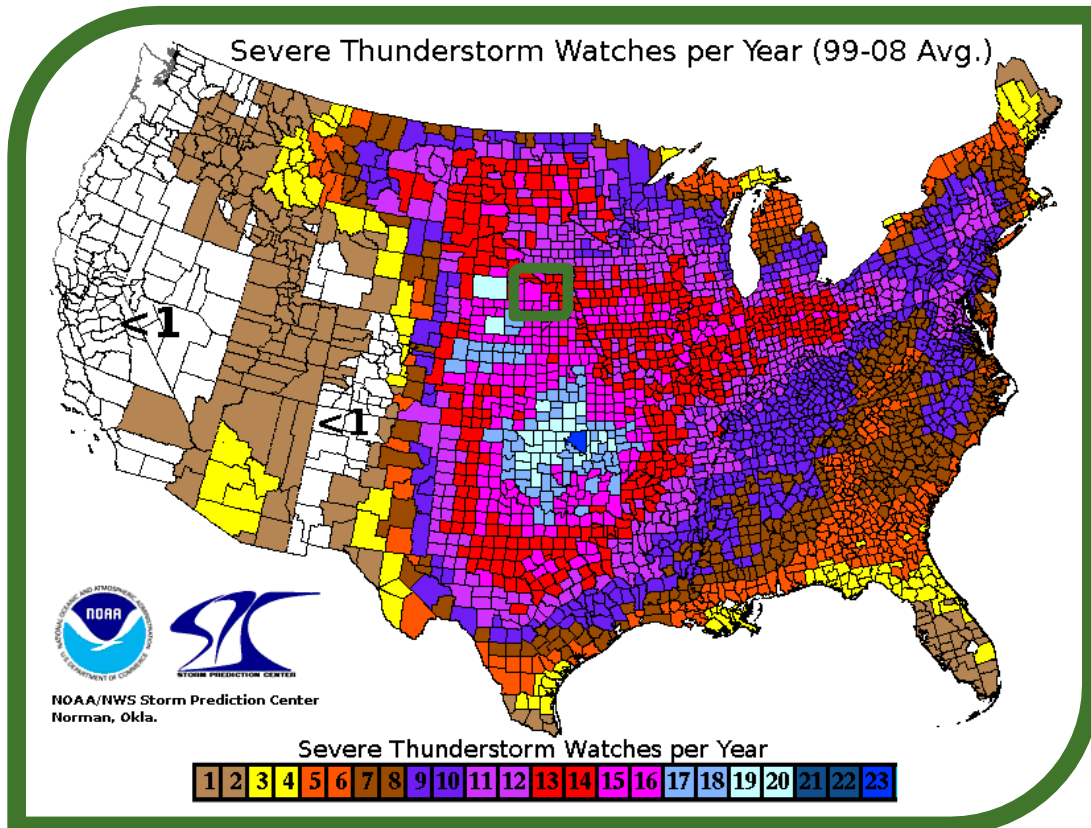
Severe thunderstorms usually occur in the evening during the spring and summer months. These often-massive storms can include heavy rain, hail, lightning, high wind, and tornados. Furthermore, heavy rains can cause flooding, lightning can cause wildfires, and high winds can down trees, cause power outages, and destroy property with their shear force. The National Weather Service issues two types of alerts for severe thunderstorms:

- ❑ **[Severe Thunderstorm Watch]** indicates when and where severe thunderstorms are likely to occur. Citizens are urged to watch the sky and stay tuned to NOAA Weather Radio, commercial radio, or television for information. Severe Thunderstorm Watches are issued by the Storm Prediction Center.
- ❑ **[Severe Thunderstorm Warning]** is issued when severe weather has been reported by spotters or indicated by radar. Warnings indicate imminent danger to life and property to those in the path of the storm. Severe Thunderstorm Warnings are issued by the National Weather Service.

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.

Figure 3.4 displays the average number of severe thunderstorm watches per year for the continental United States from 1999 to 2008 (with the planning area outlined in green). Antelope, Holt, and Knox Counties experienced between 15 to 18 severe thunderstorm watches on average per year from 1999 to 2008.

FIGURE 3.4: SEVERE THUNDERSTORM WATCHES [PER YEAR AVERAGE] 1999 – 2008



Source: National Oceanic and Atmospheric Administration/ National Weather Service Storm Prediction Center.

LIGHTNING

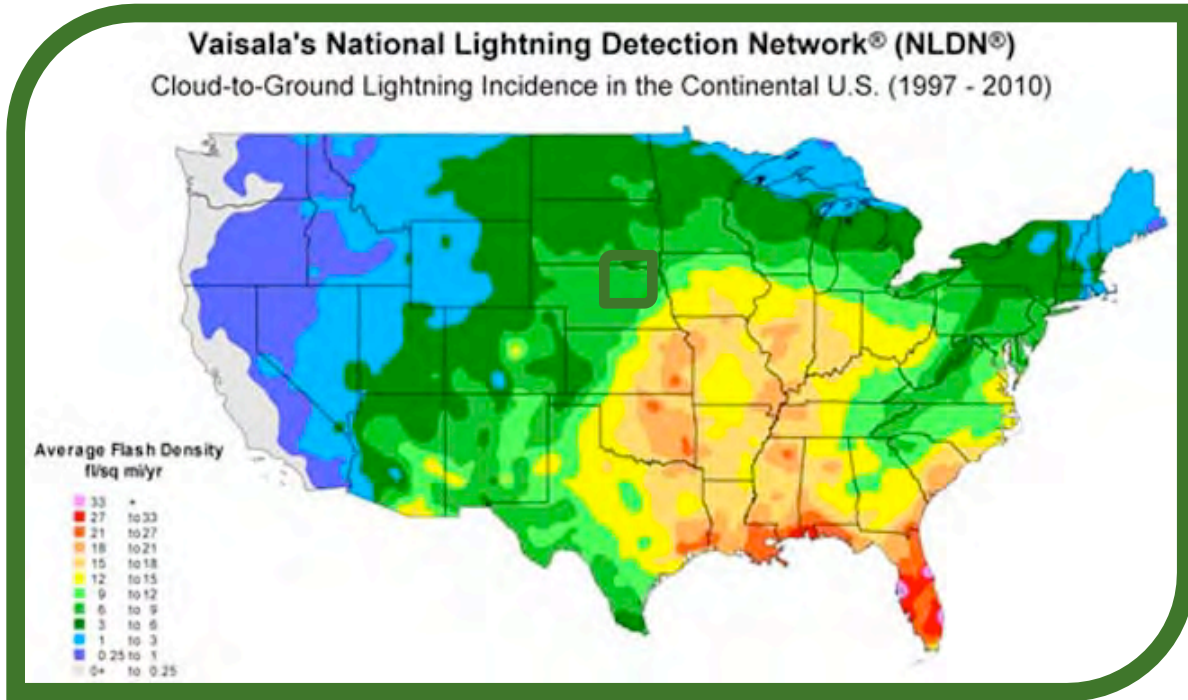
All thunderstorms are dangerous. Every thunderstorm produces lightning. While lightning fatalities have decreased over the past 30 years, lightning continues to be one of the top three storm-related killers in the United States. In 2010 there were 29 fatalities and 182 injuries from lightning. Although most lightning victims survive, people struck by lightning often report a variety of long-term, debilitating symptoms (ready.gov).

Lightning is one of the more dangerous weather hazards in the United States. Each year, lightning is responsible for deaths, injuries, and millions of dollars in property damage, including damage to buildings, communications systems, power lines, and electrical systems. Lightning also causes forest and brush fires, and deaths and injuries to livestock and other animals. According to the National Lightning Safety Institute, lightning causes more than 26,000 fires in the United States each year. The Institute estimates property damage, increased operating costs, production delays, and lost revenue from lightning and secondary effects to be more than \$6 billion per year. Impacts can be direct or indirect. People or objects can be directly struck, or damage can

Section Three [Severe Thunderstorms]

occur indirectly when the current passes through or near it. Using a network of lightning detection systems, the United States monitors an average of 25 million strokes of lightning from the cloud-to-ground every year. Figure 3.5 displays the cloud-to-ground lightning strikes per year for the continental United States from 1997 to 2010 (with the planning area outlined in green). Antelope, Holt, and Knox Counties experienced between six to nine cloud-to-ground lightning strikes on average per year from 1997 to 2010.

FIGURE 3.5: CLOUD-TO-GROUND LIGHTNING INCIDENCES [CONTINENTAL UNITED STATES] 1997 – 2010



Source: VAISALA National Lightning Detection Network.

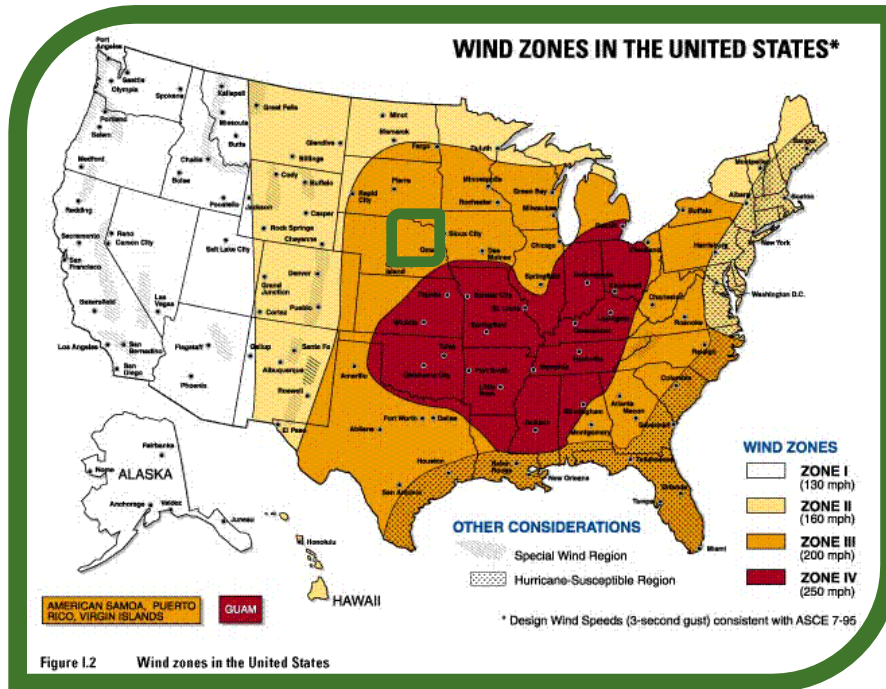
HAIL

Hail is often associated with severe thunderstorms. Hailstorms occur throughout the spring, summer, and into the fall, but are more frequent in late spring and early summer. Hailstones are usually less than two inches in diameter and can fall at speeds of 120 mph. Hail causes nearly \$1 billion in damage to crops and property each year in the United States. Hail is also one of the requirements which the National Weather Service uses to classify thunderstorms as 'severe'. If hail more than 3/4 of an inch is produced in a thunderstorm, it qualifies as severe.

HIGH WINDS

High winds, often accompanying severe thunderstorms, can cause significant property damage, threaten public safety, and have adverse economic impacts from business closures and power loss. Straight-line winds are generally any thunderstorm wind that is not associated with rotation (i.e., not tornadic). These winds can overturn mobile homes, tear roofs off houses, topple trees, snap power lines, shatter windows, and sandblast paint from cars. Other associated hazards include utility outages, arcing power lines, debris blocking streets, dust storms, and an occasional structure fire. Strong winds, when combined with saturated ground conditions, can down very mature trees. Figure 3.6 displays the wind zones in the United States (with the planning area outlined in green). Antelope, Holt, and Knox Counties are located in Wind Zone III.

FIGURE 3.6: WIND ZONES [UNITED STATES] FEMA



Source: Federal Emergency Management Agency.

PREVIOUS OCCURRENCES OF HAZARD EVENTS

Previous occurrences of hazard events give information on historical occurrences. Historical occurrence worksheets were used to capture information from participating jurisdictions on past occurrences.

Presidential disaster declarations are summarized in Section Three: Hazard Identification and Risk Assessment – Severe Weather Events Summary. Data from the NCDc is summarized in Table 3.14 below, with full event details in Section Six: Participant Profiles.

The NCDc reported 1260 severe thunderstorm events for Antelope, Holt, and Knox Counties from January 1, 1950 to January 31, 2016. Of the reported events, 112 events recorded damages, with \$6,262,000 in total property damages and \$7,256,000 in total crop damages. However, 813 of these events took place across multiple counties and thus counted multiple times. This means that 447 separate severe thunderstorm events occurred in Antelope, Holt, and Knox Counties from January 1, 1950 to January 31, 2016.

TABLE 3.14: NCDc EVENTS SUMMARY [SEVERE THUNDERSTORMS] JANUARY 1, 1950 – JANUARY 31, 2016

| | Antelope County | Holt County | Knox County | Totals |
|-----------------|-----------------|-------------|-------------|-------------|
| Events | 320 | 572 | 368 | 1260 |
| Deaths | 1 | 0 | 0 | 1 |
| Injuries | 0 | 0 | 6 | 6 |
| Property Damage | \$267,000 | \$4,338,000 | \$1,657,000 | \$6,262,000 |
| Crop Damage | \$220,000 | \$2,806,000 | \$4,230,000 | \$7,256,000 |

Source: United States Department of Commerce, National Oceanic Atmospheric Administration, National Environmental Satellite, Data, and Information Service, National Climatic Data Center.

Section Three [Severe Thunderstorms]

LOCATION AND EXTENT

Location and extent contain information on hazard location and extent, magnitude/ strength, speed of onset/ duration, seasonal patterns, and/or secondary effects (when known).

LOCATION [GEOGRAPHIC AREA AFFECTED]

- ✓ [Significant] 26 to 75 percent of planning area or frequent single-point occurrences.

MAXIMUM PROBABLE EXTENT [MAGNITUDE/ STRENGTH BASED ON HISTORIC EVENTS OR FUTURE PROBABILITY]

- ✓ [Moderate] Moderate classification on scientific scale, moderate speed of onset or moderate duration of event, resulting in some damage and loss of services for days.

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.

Severe thunderstorms occur on an irregular basis, and can equally affect the entire planning area. 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.

HAZARD IMPACT AND VULNERABILITY TO THE HAZARD

Impact and vulnerability assesses the planning areas' exposure to hazards; considering assets at risk, critical facilities, and future development trends. Vulnerability is measured in general, qualitative terms and is a summary of the potential impact based on past occurrences, spatial extent, and damage/ casualty potential.

- ✓ [Medium] Moderate potential impact. This ranking carries a moderate threat level to the general population and/or built environment. Here the potential damage is more isolated and less costly than a more widespread disaster.

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. Severe thunderstorms can also cause significant damage to crops and dams throughout the rural areas of the planning area.

ESTIMATE OF THE POTENTIAL LOSSES

Vulnerability and potential losses can be quantified in locations where there is a known, identified hazard area, such as a mapped floodplain. In those locations, the numbers and types of buildings at risk to the identified hazard can be counted and their values calculated. Other data can be collected in regard to the hazard area, such as the location of critical facilities, historic structures, and valued natural resources. This information illustrates the impact and vulnerability of the area to the identified hazard. The vulnerability and potential losses from the other identified hazards, which do not have specific mapped areas or the data to support additional analysis, are discussed in more general, qualitative terms.

The event damage and frequency estimate formulas were determined based upon recorded historical occurrences since 1950. 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 estimate (crop damages are not mitigated by FEMA).

If a severe thunderstorm occurred within the planning area, the table below assumes the event could potentially cause 0.2 percent damage to the total assessed value in an incorporated jurisdiction and throughout rural areas of the Counties.

TABLE 3.15: EVENT DAMAGE AND FREQUENCY ESTIMATE [SEVERE THUNDERSTORMS] HISTORICAL ANALYSIS

| Event Damage and Frequency Estimate Formulas | | |
|--|-----------|--|
| Average Annual Damage | \$96,339 | Total Damages Recorded [\$6,262,000] / Total Years on Record [65] |
| Average Damage per Event | \$14,009 | Total Damages Recorded [\$6,262,000] / Total Events Recorded [447] |
| Annual Event Frequency | 6.88/year | Total Events Recorded [447] / Total Years on Record [65] |

PROBABILITY OF FUTURE HAZARD EVENTS

The frequency of historical occurrences was used to gauge the likelihood of future occurrences. Frequency was calculated based on existing data (when available). It was determined by dividing the number of events recorded by the number of years on record, and then multiplying by 100 to calculate a percent. This gives the percent chance of the event occurring in any given year.

- ✓ [Highly Likely] 91 to 100 percent probability of occurrence in the next year.

OVERALL SIGNIFICANCE

Overall significance was determined based on criteria such as frequency and damage, including deaths and injuries, as well as property, crop, and economic damage. Hazards that occur infrequently or have little or no impact on the planning area were determined to be of low significance.

- ✓ [Medium] The criteria fall mostly in the middle ranges of classifications and the event's impacts on the planning area are noticeable but not devastating. This rating is sometimes used for hazards with a high extent rating but very low probability rating.



Section Three [Tornados]

A tornado is defined as a mobile, destructive vortex of violently rotating winds having the appearance of a funnel-shaped cloud and advancing beneath a large storm system.

SECTION THREE [TORNADOS]

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HAZARD MITIGATION PLAN

ANTELOPE, HOLT, AND KNOX COUNTIES

SECTION THREE [TORNADOS]

TORNADOS

This sub-section outlines the risk assessment for the hazard event tornados, including hazard profile, previous occurrences of hazard events, location and extent, hazard impact and vulnerability to the hazard, estimate of potential losses, probability of future hazard events, and overall significance. Data on previous occurrences of hazard events from the National Climatic Data Center (NCDC) is summarized below, with full event details in Section Six: Participant Profiles. Geographic, demographic, assets inventory, capabilities assessment, and climate summaries are also provided in Section Six: Participant Profiles, with varying risks facing the planning area discussed in the appropriate sub-sections.

HAZARD PROFILE

The hazard profile provides a description of the hazard, associated issues, and details on the hazard specific to the planning area.

A tornado is defined by FEMA as — a violently rotating column of air, pendant from a cumulonimbus, with circulation reaching the ground. It nearly always starts as a funnel cloud and may be accompanied by a loud roaring noise. A tornado is typically associated with a supercell thunderstorm. 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.

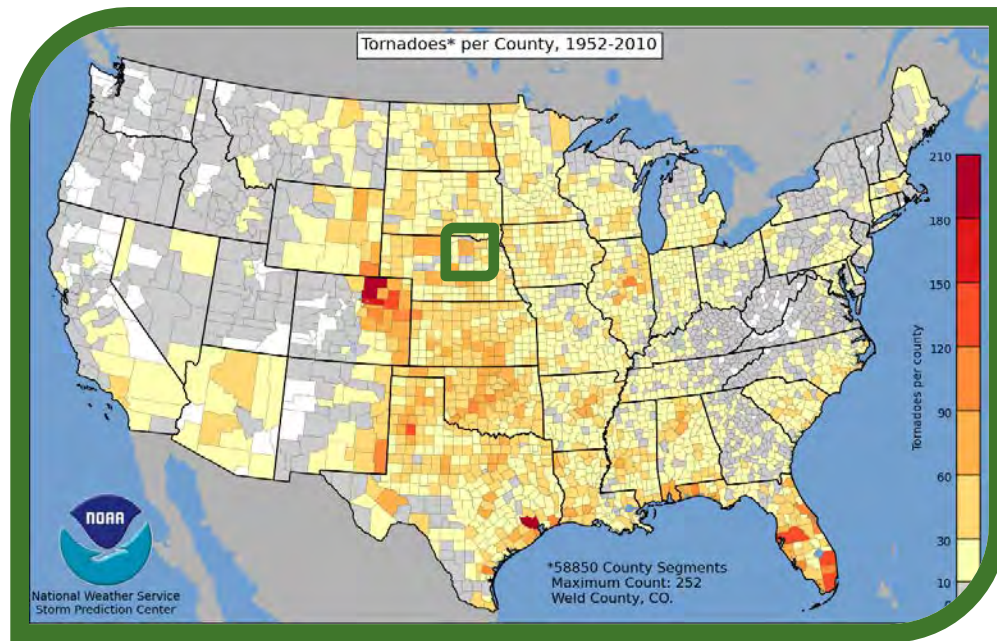
On a local scale, tornados are the most destructive of all atmospheric phenomena. Tornados are nature's most violent storm. Spawned from powerful thunderstorms, tornados can cause fatalities and devastate a neighborhood in seconds with whirling winds that can reach 300 miles per hour. Damage paths can be in excess of one mile wide and 50 miles long.

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 and reach over 11 miles above ground. Tornados usually stay on the ground no more than 20 minutes. Nationally, the tornado season typically occurs between March and April. On average, 80 percent of tornados occur between noon and midnight.

Some tornados are clearly visible, while rain or nearby low-hanging clouds obscure others. Occasionally, tornados develop so rapidly that little, if any, advance warning is possible. Before a tornado hits, the wind may die down and the air becomes very still. A cloud of debris can mark the location of a tornado even if a funnel is not evident. Tornados generally occur near the trailing edge of a thunderstorm. It is not uncommon to see clear, sunlit skies behind a tornado.

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 the record being 102 in 1999. All 93 counties in Nebraska have experienced tornados. The peak month for tornados in Nebraska is June, with 78 percent of all tornados having occurred between May and July. Historically in Nebraska, 71 percent of all tornados have occurred between 3:00 and 9:00 pm. Figure 3.7 shows the number of tornados per county for the continental United States from 1952 to 2010 (with the planning area outlined in green). Antelope, Holt, and Knox Counties are shaded in the 10 to 30 tornados category. The State of Nebraska experienced 51 tornados on average annually from 1981 to 2010.

FIGURE 3.7: TORNADOS PER COUNTY [CONTINENTAL UNITED STATES] 1952 – 2010



Source: National Oceanic and Atmospheric Administration Storm Prediction Center.

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 is measured by intensity on the Fujita 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 Fujita Scale was updated in 2007 with the Enhanced F-Scale. Both scales are sets of wind estimates (not measurements) based on damage. The new scale provides more damage indicators (28) and associated degrees of damage, allowing for more detailed analysis, and better correlation between damage and wind speed. It is also more precise because it takes into account the materials affected and the construction of structures damaged by a tornado. The enhanced scale classifies F0-F5 damage as determined by engineers and meteorologists across the 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 an engineer, an F-Scale number is assigned to the tornado. Table 3.16 shows the wind speeds and damage indicators associated with the Enhanced Fujita Scale ratings and Figure 3.8 illustrates the potential impacts and damage from a tornado.

TABLE 3.16: ENHANCED FUJITA SCALE [EF] DAMAGE INDICATORS

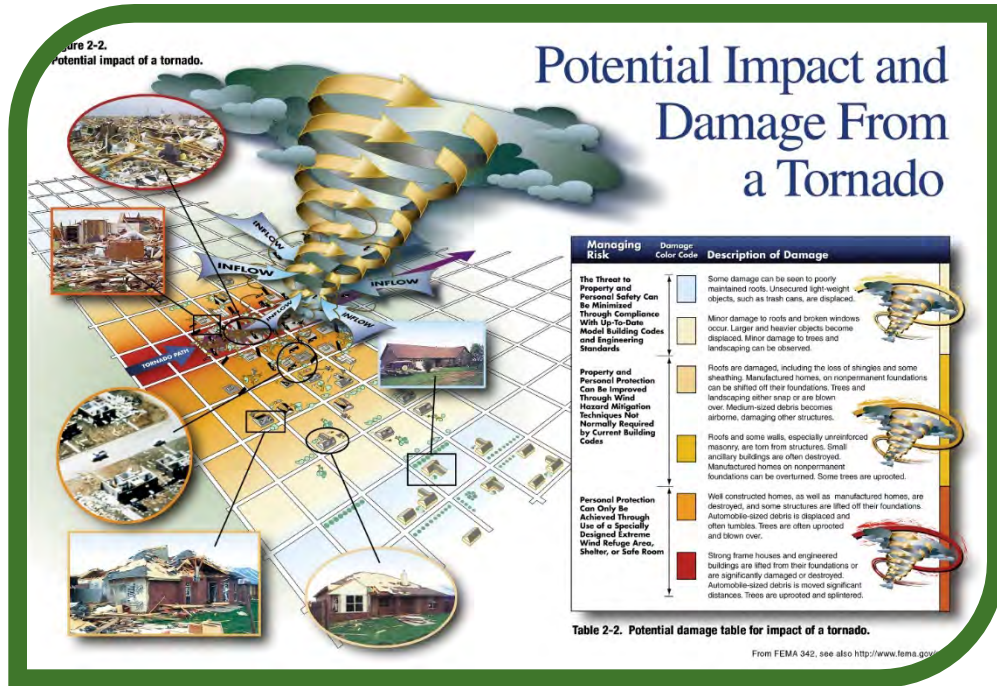
| EF Rating | Wind Speeds | Expected Damage |
|-----------|---------------|--|
| EF-0 | 65 – 85 MPH | [Minor Damage] shingles blown off or parts of a roof peeled off, damage to gutters/siding, branches broken off trees, shallow rooted trees toppled. |
| EF-1 | 86 – 110 MPH | [Moderate Damage] more significant roof damage, windows broken, exterior doors damaged or lost, mobile homes overturned or badly damaged. |
| EF-2 | 111 – 135 MPH | [Considerable Damage] roofs torn off well-constructed homes, homes shifted off their foundation, mobile homes completely destroyed, large trees snapped or uprooted, cars can be tossed. |
| EF-3 | 136 – 165 MPH | [Severe Damage] entire stories of well-constructed homes destroyed, significant damage done to large buildings, homes with weak foundations can be blown away, trees begin to lose their bark. |
| EF-4 | 166 – 200 MPH | [Extreme Damage] well-constructed homes are leveled, cars are thrown significant distances, top story exterior walls of masonry buildings would likely collapse. |

Section Three [Tornados]

| EF Rating | Wind Speeds | Expected Damage |
|-----------|-------------|---|
| EF-5 | > 200 MPH | [Massive/Incredible Damage] Well-constructed homes are swept away, steel-reinforced concrete structures are critically damaged, high-rise buildings sustain sever structural damage, trees are usually completely debarked, stripped of branches and snapped. |

Source: National Oceanic and Atmospheric Administration Storm Prediction Center.

FIGURE 3.8: POTENTIAL IMPACTS AND DAMAGE [TORNADO] FEMA



Source: Federal Emergency Management Agency.

PREVIOUS OCCURRENCES OF HAZARD EVENTS

Previous occurrences of hazard events give information on historical occurrences. Historical occurrence worksheets were used to capture information from participating jurisdictions on past occurrences.

Presidential disaster declarations are summarized in Section Three: Hazard Identification and Risk Assessment – Severe Weather Events Summary. Data from the NCDC is summarized in Table 3.18 below, with full event details in Section Six: Participant Profiles.

The Tornado History Project was launched in 2005. The Tornado History Project is a free, searchable database of all reported U.S. tornados from 1950 to 2015. There are over 60,000 tornados currently in the database, each with its own map and forum. The Project's main goal is to combine historical data with user submitted items (eyewitness memories, photos, videos, etc.) to recreate the history of as many tornados as possible. Figure 3.9 displays the Project's data for Antelope, Holt, and Knox Counties.

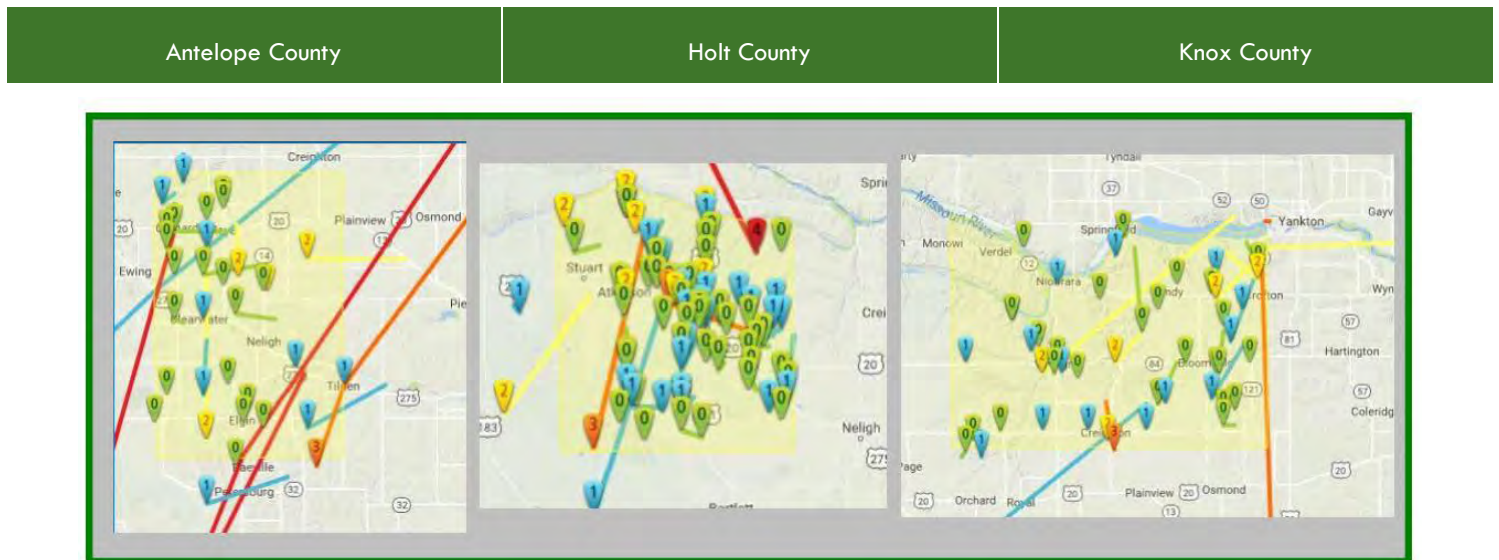
The NCDC reported 158 tornado events for Antelope, Holt, and Knox Counties from January 1, 1950 to January 31, 2016. Of the reported events, 88 events recorded damages, with \$70,538,000 in total property damages and \$1,364,000 in total crop damages. However, 77 of these events took place across multiple counties and thus counted multiple times. This means that 81 separate drought events occurred in Antelope, Holt, and Knox Counties from January 1, 1950 to January 31, 2016.

TABLE 3.17: NCDL EVENTS SUMMARY [TORNADOS] JANUARY 1, 1950 – JANUARY 31, 2016

| | Antelope County | Holt County | Knox County | Totals |
|-----------------|-----------------|--------------|-------------|--------------|
| Events | 34 | 78 | 46 | 158 |
| Deaths | 0 | 0 | 1 | 1 |
| Injuries | 0 | 5 | 107 | 112 |
| Property Damage | \$28,695,000 | \$36,110,000 | \$5,733,000 | \$70,538,000 |
| Crop Damage | \$0 | \$1,364,000 | \$0 | \$1,364,000 |

Source: United States Department of Commerce, National Oceanic Atmospheric Administration, National Environmental Satellite, Data, and Information Service, National Climatic Data Center.

FIGURE 3.9: TORNADO HISTORY [ANTELOPE, HOLT, AND KNOX COUNTIES] 1950 – 2016



Source: <http://www.tornadohistoryproject.com/>.

LOCATION AND EXTENT

Location and extent contain information on hazard location and extent, magnitude/ strength, speed of onset/ duration, seasonal patterns, and/or secondary effects (when known).

LOCATION [GEOGRAPHIC AREA AFFECTED]

- ✓ [Negligible] Less than 10 percent of planning area or isolated single-point occurrences.

MAXIMUM PROBABLE EXTENT [MAGNITUDE/ STRENGTH BASED ON HISTORIC EVENTS OR FUTURE PROBABILITY]

- ✓ [Severe] Severe classification on scientific scale, fast speed of onset or long duration of event, resulting in devastating damage and loss of services for weeks or months.

Tornados are nature's most violent storms. Spawned from powerful thunderstorms, tornados can cause fatalities and devastate a neighborhood in seconds. A tornado appears as a rotating, funnel-shaped cloud that extends from a thunderstorm to the ground with whirling winds that can reach 300 miles per hour. Damage paths can be in excess of one mile wide and 50 miles long. Every state is at some risk from this hazard. Some tornados are clearly visible, while rain or nearby low-hanging clouds obscure others. Occasionally, tornados develop so rapidly that little, if any, advance warning is possible. Before a tornado hits, the wind may die down and the air may become very still. A cloud of debris can mark the location of a tornado even if a funnel

Section Three [Tornados]

is not visible. Tornados generally occur near the trailing edge of a thunderstorm. It is not uncommon to see clear, sunlit skies behind a tornado (ready.gov).

HAZARD IMPACT AND VULNERABILITY TO THE HAZARD

Impact and vulnerability assesses the planning areas’ exposure to hazards; considering assets at risk, critical facilities, and future development trends. Vulnerability is measured in general, qualitative terms and is a summary of the potential impact based on past occurrences, spatial extent, and damage/ casualty potential.

- ✓ [Medium] Moderate potential impact. This ranking carries a moderate threat level to the general population and/or built environment. Here the potential damage is more isolated and less costly than a more widespread disaster.

Tornados occur on an irregular basis, and can equally affect the entire planning area. All building stock and above ground infrastructure, including critical facilities, are at risk of being damaged or affected by tornados. Tornados 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 jurisdictions. High wind speeds and flying debris can pose a significant threat to human life.

ESTIMATE OF THE POTENTIAL LOSSES

Vulnerability and potential losses can be quantified in locations where there is a known, identified hazard area, such as a mapped floodplain. In those locations, the numbers and types of buildings at risk to the identified hazard can be counted and their values calculated. Other data can be collected in regards to the hazard area, such as the location of critical facilities, historic structures, and valued natural resources. This information illustrates the impact and vulnerability of the area to the identified hazard. The vulnerability and potential losses from the other identified hazards, which do not have specific mapped areas or the data to support additional analysis, are discussed in more general, qualitative terms.

The event damage and frequency estimate formulas were determined based upon recorded historical occurrences since 1950. 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 estimate (crop damages are not mitigated by FEMA).

If an EF-3 tornado occurred within the planning area, the table below assumes the event could potentially cause 0.05 percent damage to the total assessed value in an incorporated jurisdiction and throughout rural areas of the Counties.

TABLE 3.18: EVENT DAMAGE AND FREQUENCY ESTIMATE [TORNADOS] HISTORICAL ANALYSIS

| Event Damage and Frequency Estimate Formulas | | |
|--|-------------|--|
| Average Annual Damage | \$1,085,200 | Total Damages Recorded [\$70,538,000] / Total Years on Record [65] |
| Average Damage per Event | \$870,840 | Total Damages Recorded [\$70,538,000] / Total Events Recorded [81] |
| Annual Event Frequency | 1.25/year | Total Events Recorded [81] / Total Years on Record [65] |

PROBABILITY OF FUTURE HAZARD EVENTS

The frequency of historical occurrences was used to gauge the likelihood of future occurrences. Frequency was calculated based on existing data (when available). It was determined by dividing the number of events recorded by the number of years on record, and then multiplying by 100 to calculate a percent. This gives the percent chance of the event occurring in any given year.

- ✓ [Highly Likely] 91 to 100 percent probability of occurrence in the next year.

OVERALL SIGNIFICANCE

Overall significance was determined based on criteria such as frequency and damage, including deaths and injuries, as well as property, crop, and economic damage. Hazards that occur infrequently or have little or no impact on the planning area were determined to be of low significance.

- ✓ [Medium] The criteria fall mostly in the middle ranges of classifications and the event's impacts on the planning area are noticeable but not devastating. This rating is sometimes used for hazards with a high extent rating but very low probability rating.



Section Three [Floods]

A flood is defined as an overflowing of a large amount of water beyond its normal confines, especially over what is normally dry land.

SECTION THREE [FLOODS]

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FIRM MAPS

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HAZARD MITIGATION PLAN

ANTELOPE, HOLT, AND KNOX COUNTIES

SECTION THREE [FLOODS]

FLOODS

This sub-section outlines the risk assessment for the hazard event floods, including hazard profile, previous occurrences of hazard events, location and extent, hazard impact and vulnerability to the hazard, estimate of potential losses, probability of future hazard events, and overall significance. Data on previous occurrences of hazard events from the National Climatic Data Center (NCDC) is summarized below, with full event details in Section Six: Participant Profiles. Geographic, demographic, assets inventory, capabilities assessment, and climate summaries are also provided in Section Six: Participant Profiles, with varying risks facing the planning area discussed in the appropriate sub-sections.

HAZARD PROFILE

The hazard profile provides a description of the hazard, associated issues, and details on the hazard specific to the planning area.

Flood events are the most damaging and costly hazard in the United States, and account for 90 percent of all presidential disaster declarations. Floods are one of the most common hazards in the United States, however not all floods are alike. Some floods develop slowly, while others such as flash floods, can develop in just a few minutes and without visible signs of rain. Additionally, floods can be local, impacting a neighborhood or community, or very large, affecting entire river basins and multiple states.

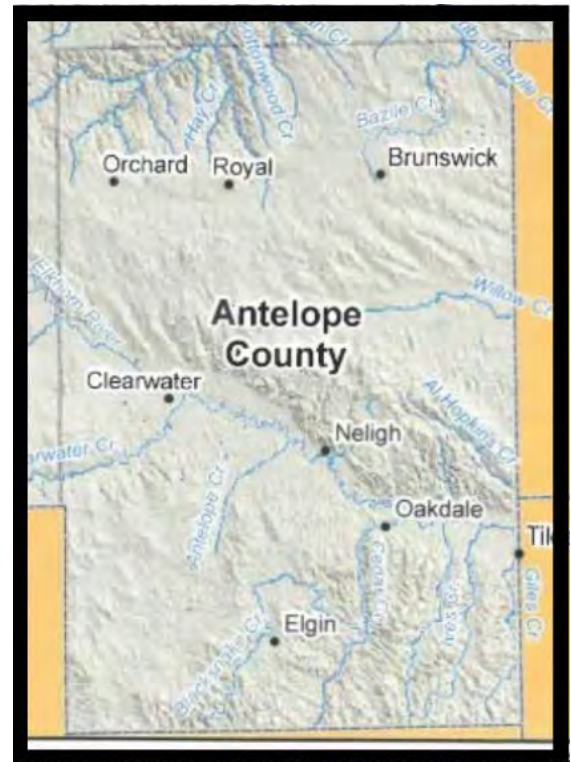
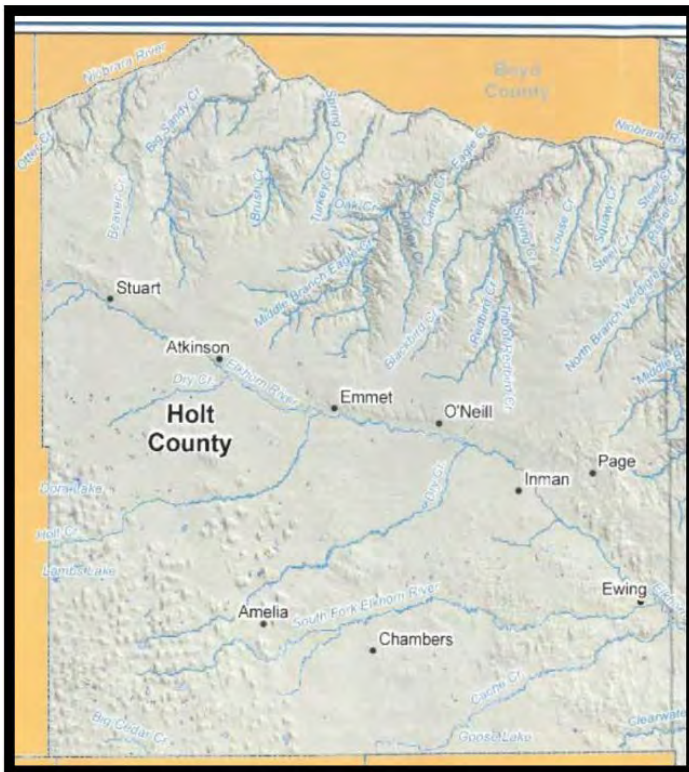
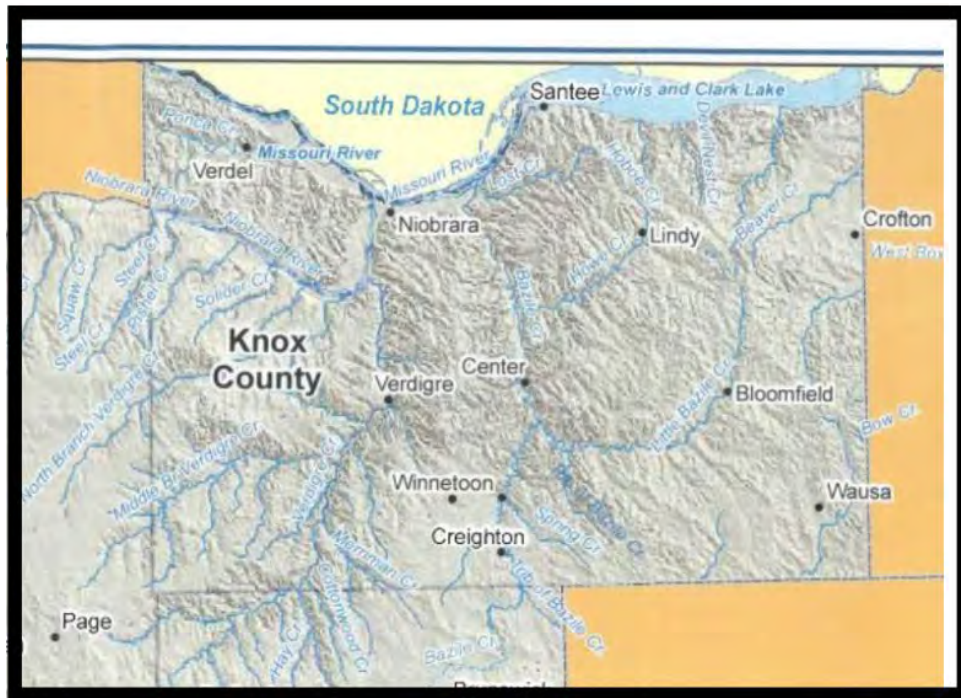
Flash floods can occur within a few minutes or hours of excessive rainfall, a dam or levee failure, or a sudden release of water held by an ice jam. Flash floods often have a dangerous wall of roaring water carrying rocks, mud and other debris. Overland flooding, the most common type of flooding event, typically occurs when waterways such as rivers or streams overflow their banks because of rainwater or a possible levee breach and cause flooding in surrounding areas. It can also occur when rainfall or snowmelt exceeds the capacity of underground pipes, or the capacity of streets and drains designed to carry flood water away from urban areas. The principal type of flood most common to Nebraska, due to geographic location and topography, is riverine flooding.

In Antelope, Holt, and Knox Counties, most flooding can be defined as riverine, drainage, or flash flooding.

- ❑ **[Riverine Flooding]** 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.
- ❑ **[Flash or Rapid Flooding]** Flash floods, faster in nature, are usually the result of heavy, localized rainfall, associated with slow-moving intense thunderstorms, or sudden release from an upstream impoundment created by the collapse of an ice jam, or a man-made structure, such as a dam 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. In the planning area, flash floods are most common when rainfall on built-up areas where impervious surfaces, gutters, and storm sewers speed up the flow of run-off. Flash floods most often occur in normally dry areas that have recently received precipitation when the ground becomes saturated with water that has fallen too quickly to be absorbed. Flash floods are extremely dangerous because of their sudden nature.
- ❑ **[Drainage Flooding]** Drainage flooding occurs primarily in urban or developed areas when the volume of runoff exceeds the capacity of the drainage system. Flooding of this nature can be the result of increased development, inadequate drainage structures, riverine flooding, or a combination of these causes.

Figure 3.10 below shows all the major rivers and bodies of water in the plan area.

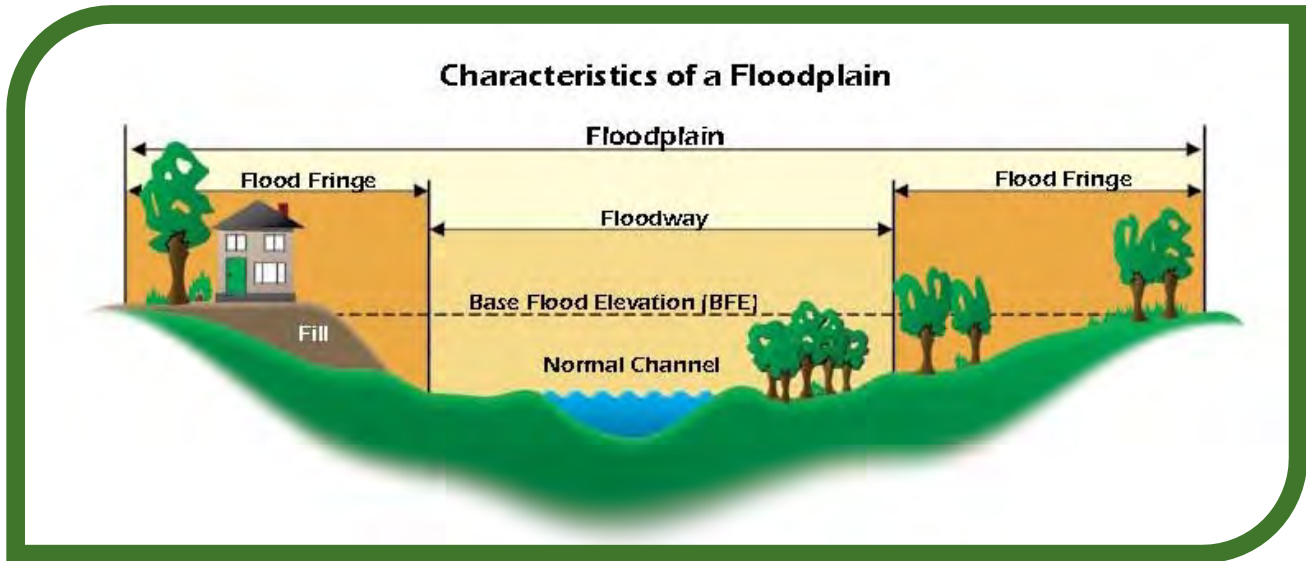
FIGURE 3.10: ANTELOPE, HOLT, AND KNOX COUNTIES: RIVERS AND BODIES OF WATER



Section Three [Floods]

The area adjacent to a river or channel is the floodplain, which most often refers to the area that is inundated by the 100-year flood, the flood that has a 1% chance in any given year of being equaled or exceeded. It includes the floodway, which consists of the stream channel and adjacent areas that carry flood flows, and the flood fringe, which are areas covered by the flood, but do not experience a strong current. Floodplains are made when floodwaters exceed the capacity of the main channel or escape the channel by eroding its banks. When this occurs, sediments (including rocks and debris) are deposited and gradually build up over time to create the floor of the floodplain. Floodplains generally contain unconsolidated sediments, often extending below the bed of the stream. Figure 3.10 below diagrams the basic characteristics of a floodplain.

FIGURE 3.11: CHARACTERISTICS OF A FLOODPLAIN [FLOOD] FLOODSMART



Source: FloodSmart.gov

NATIONAL FLOOD INSURANCE PROGRAM

The National Flood Insurance Program (NFIP) goal is to reduce the impact of flooding on private and public structures by providing affordable insurance for property owners. The program encourages communities to adopt and enforce floodplain management regulations, which will mitigate the effects of flooding on new and improved structures.

Nearly 20,000 communities across the United States and its territories participate in the NFIP by adopting and enforcing floodplain management ordinances to reduce future flood damage. In exchange, the NFIP makes federally backed flood insurance available to homeowners, renters, and business owners in these communities. Community participation in the NFIP is voluntary.

Flood insurance is designed to provide an alternative to disaster assistance to reduce the escalating costs of repairing damage to buildings and their contents caused by floods. Flood damage is reduced by nearly \$1 billion a year through communities implementing sound floodplain management requirements and property owners purchasing of flood insurance. Additionally, buildings constructed in compliance with NFIP building standards suffer approximately 80 percent less damage annually than those not built in compliance.

In addition to providing flood insurance and reducing flood damages through floodplain management regulations, the NFIP identifies and maps the nation's floodplains. Mapping flood hazards creates broad-based awareness of the flood hazards and provides the data needed for floodplain management programs and to actuarially rate new construction for flood insurance. There are specific requirements for facilities located within the Special Flood Hazard Area (SFHA). These requirements are not technically insurance issues but are related to the NFIP. These requirements apply to flood damaged buildings and the contents of buildings located in the 100-year floodplain.

If your community is not participating in the NFIP, FEMA will not provide Public Assistance funds for damages to your buildings, or the contents of such buildings, that are located within the 100-year floodplain. FEMA will also not provide funding for damages within the floodplain if you have been sanctioned by NFIP (i.e., if your community was suspended from the program by NFIP).

If your community is participating in the NFIP, FEMA will reduce all grants for buildings and the contents of buildings located within the 100-year floodplain. The amount of the reduction will be the maximum amount of insurance proceeds available for the work under a standard NFIP flood insurance policy or the actual insurance proceeds received, whichever is greater.

FLOOD MAPS [FLOOD INSURANCE RATE MAPS OR FIRMS]

According to the official National Flood Insurance Program website, FloodSmart.gov, many conditions can result in a flood, including dam failures, wildfires, heavy rains, ice jams, levee failures, mudflows, new development, snowmelt, spring thaw, and a winter rainy season. Flood risk isn't just based on history, it's also based on several factors, including rainfall, river-flow data, topography, flood-control measures, and changes due to building and development.

Flood Insurance Rate Maps (FIRM) are the official map of a community on which the FEMA has delineated both the Special Flood Hazard Areas (SFHA) and the risk premium zones applicable to the community. The 100-year flood, which is the minimum standard used by most federal and state agencies, is also used by the NFIP as the standard for floodplain management and to determine the need for flood insurance. The Flood Insurance Study (FIS) defines the probability of flooding as flood events of a magnitude which are expected to be equaled or exceeded once on the average during any 100-year period (recurrence intervals) or the 100-year flood zone has a one percent probability of being equaled or exceeded during any given year. FIRM maps for each jurisdiction can be found at one of the following website:

<https://msc.fema.gov/portal/search> - Map based search

<https://msc.fema.gov/portal/advanceSearch> – Address based search

The firm maps for the full participants that have a mapped floodplain are included for reference at the end of this section. Ewing and Stuart do not have mapped floodplains so no maps are included for those two communities. Center, Creighton, and Niobrara have mapped floodplains and the pertinent floodplain maps are included at this end of this section. Also refer to Table 3.20 for the specific FIRM maps that can be accessed on FEMA's website for all participants that have a mapped floodplain.

Participation in the NFIP requires adoption of a local floodplain management ordinance and its enforcement within a mapped SFHA. A jurisdiction's eligibility to participate is based on their adoption and enforcement of state and community floodplain management regulations intended to prevent unsafe development in the floodplain and reducing future flood damages. If a community adopts and enforces a floodplain management ordinance to reduce future flood risk to new construction in floodplains, the federal government will make flood insurance available within the community as a financial protection against flood losses.

Since floods have an annual probability of occurrence, have a known magnitude, depth, and velocity for each event, and in most cases, have a map indicating where they will occur, they are in many ways often the most predictable and manageable hazard. Private citizens and insurance agents use FIRMs to determine whether specific properties are located within flood hazard areas. Community officials use FIRMs to administer floodplain management regulations and to mitigate flood damage. Lending institutions and federal agencies use FIRMs to locate properties and buildings in relation to mapped flood hazards, and to determine whether flood insurance is required when making loans or providing grants following a disaster for the purchase or construction of a building.

Flooding can happen anywhere, but certain areas are especially prone to serious flooding. To help communities understand their risk, flood maps (Flood Insurance Rate Maps or FIRMs) have been created to show the locations of high-risk, moderate-to-low risk, and undetermined-risk areas.

Section Three [Floods]

- ❑ **High-Risk Areas [Special Flood Hazard Area or SFHA]** In high-risk areas, there is at least a 1 in 4 chance of flooding during a 30-year mortgage. All home and business owners in these areas with mortgages from federally regulated or insured lenders are required to buy flood insurance. They are shown on the flood maps as zones labeled with the letters A or V.
- ❑ **Moderate-to-Low Risk Areas [Non-Special Flood Hazard Area or NSFA]** In moderate-to-low risk areas, the risk of being flooded is reduced but not completely removed. These areas submit over 20% of NFIP claims and receive one-third of disaster assistance for flooding. Flood insurance isn't federally required in moderate-to-low areas, but it is recommended for all property owners and renters. They are shown on flood maps as zones labeled with the letters B, C or X (or a shaded X).
- ❑ **Undetermined-Risk Areas** No flood-hazard analysis has been conducted in these areas, but a flood risk still exists. Flood insurance rates reflect the uncertainty of the flood risk. These areas are labeled with the letter D on the flood maps.

PREVIOUS OCCURRENCES OF HAZARD EVENTS

Previous occurrences of hazard events give information on historical occurrences. Historical occurrence worksheets were used to capture information from participating jurisdictions on past occurrences.

Presidential disaster declarations are summarized in *Section Three: Hazard Identification and Risk Assessment – Severe Weather Events Summary*. Data from the NCDL is summarized in Table 3.19 below, with full event details in *Section Six: Participant Profiles*.

The NCDL reported 65 flood events for Antelope, Holt, and Knox Counties from January 1, 1950 to January 31, 2016. Of the reported events, 30 events recorded damages, with \$5,734,000 in total property damages and \$258,000 in total crop damages. However, 15 of these events took place across multiple counties and thus counted multiple times. This means that 50 separate flooding events occurred in Antelope, Holt, and Knox Counties from January 1, 1950 to January 31, 2016.

TABLE 3.19: NCDL EVENTS SUMMARY [FLOODS] JANUARY 1, 1950 – JANUARY 31, 2016

| | Antelope County | Holt County | Knox County | Totals |
|-----------------|-----------------|-------------|-------------|-------------|
| Events | 19 | 13 | 33 | 65 |
| Deaths | 0 | 0 | 0 | 0 |
| Injuries | 0 | 0 | 0 | 0 |
| Property Damage | \$4,260,000 | \$1,070,000 | \$404,000 | \$5,734,000 |
| Crop Damage | \$175,000 | \$83,000 | \$0 | \$258,000 |

Source: United States Department of Commerce, National Oceanic Atmospheric Administration, National Environmental Satellite, Data, and Information Service, National Climatic Data Center.

LOCATION AND EXTENT

Location and extent contain information on hazard location and extent, magnitude/ strength, speed of onset/ duration, seasonal patterns, and/or secondary effects (when known).

LOCATION [GEOGRAPHIC AREA AFFECTED]

- ✓ [Significant] 26 to 75 percent of planning area or frequent single-point occurrences.

MAXIMUM PROBABLE EXTENT [MAGNITUDE/ STRENGTH BASED ON HISTORIC EVENTS OR FUTURE PROBABILITY]

- ✓ [Moderate] Moderate classification on scientific scale, moderate speed of onset or moderate duration of event, resulting in some damage and loss of services for days.

At the time of the plan, six of the full participants had delineated 100-year floodplains, according to the FEMA Map Service Center website (www.msc.fema.gov). The jurisdictions with a delineated 100-year floodplain, generally due to the presence and proximity of a significant floodway, are more vulnerable to riverine and flash flooding. 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 still present for jurisdictions or rural areas of the counties without a delineated 100-year floodplain.

Table 3.20 below summarizes Antelope, Holt, and Knox Counties participation in the National Flood Insurance Program, including Flood Insurance Rate Map panels and effective dates. Table 3.21 details the flood zones and corresponding descriptions as referenced on the Flood Insurance Rate Maps.

TABLE 3.20: NFIP STATUS AND FIRM PANELS [FEMA] MAPS AND DATES

| Jurisdiction | NFIP Participation | Eligible Regular Program | FIRM/FHBM Panel | Map Effective Date |
|-----------------|--------------------|--------------------------|--------------------------------------|-----------------------|
| Antelope County | Yes | 11/17/2008 | -- | 08/01/2009 |
| Elgin | Yes | 06/17/1986 | 310002B | 06/17/1986 |
| Neligh | Yes | 08/05/1986 | 310003B | 08/05/1986 |
| Brunswick | No | 04/02/1976 | 310254 | 04/02/1976 |
| Clearwater | Yes | 09/01/1986 | 3102620001B | 09/01/1986 |
| Oakdale | Yes | 09/01/1986 | 310004B | 09/01/1986 |
| Orchard | Yes | 09/24/1984 | NSFHA | NA |
| Royal | No | NA | -- | NA |
| Holt County | No | NA | -- | NA |
| Atkinson | Yes | 07/01/15 | 310343A | 07/01/15 |
| O'Neill | Yes | 09/29/1986 | 3101160001C/3101160003C3/3101160004C | 09/22/1999 |
| Chambers | No | NA | -- | NA |
| Emmet | No | NA | -- | NA |
| Ewing | No | NA | -- | NA |
| Inman | Yes | 09/24/1984 | NSFHA | NA |
| Page | No | NA | -- | NA |
| Stuart | Yes | 09/01/1986 | 310400A | 09/01/1896 |
| Knox County | Yes | 11/14/2005 | -- | 10/02/2015 |
| Bloomfield | Yes | 06/18/07 | 31107C0560D | 10/02/15 |
| Center | Yes | 02/27/2006 | 31107C0525C/31107C0550C | 08/18/2005 |
| Creighton | Yes | 09/01/1996 | 31107C0725C | 08/18/2005 |
| Crofton | Yes | 09/01/1986 | 3107C0400D/31107C0425C | 10/02/2015 |
| Bazile Mills | No | 08/18/2006 | 31007C0525C | 08/18/2005 |
| Niobrara | Yes | 08/19/1986 | 31107C0300C/31107C0100C | 08/18/2005 |
| Santee | No | 08/14/1980 | 31007C0150C | 08/18/2005 |
| Verdel | Yes | 02/12/2009 | 31107C0075C | 08/18/2005 |
| Verdigre | Yes | 09/01/1986 | 31107C0500C | 08/18/2005 |
| Wausa | No | 08/08/1976 | 31107C0800C/31107C0600D | 08/18/2005&10/02/2015 |

Section Three [Floods]

| Jurisdiction | NFIP Participation | Eligible Regular Program | FIRM/FHBM Panel | Map Effective Date |
|--------------|--------------------|--------------------------|-----------------|--------------------|
| Winnetoon | Yes | 02/12/2009 | 31107C0525C | 08/18/2005 |

Source: Federal Emergency Management Agency (FEMA).

TABLE 3.21: SIGNIFICANT FLOOD HAZARD AREAS [FEMA] ZONE AND DESCRIPTION

| Zone | Description |
|-------------------|---|
| Zone A | Areas subject to inundation by the 1-percent-annual-chance flood event generally determined using approximate methodologies. Because detailed hydraulic analyses have not been performed, no Base Flood Elevations (BFEs) or flood depths are shown. Mandatory flood insurance purchase requirements and floodplain management standards apply. |
| Zone AE and A1-30 | Areas subject to inundation by the 1-percent-annual-chance flood event determined by detailed methods. Base Flood Elevations (BFEs) are shown. Mandatory flood insurance purchase requirements and floodplain management standards apply. |
| Zone AH | Areas subject to inundation by 1-percent-annual-chance shallow flooding (usually areas of ponding) where average depths are between one and three feet. Base Flood Elevations (BFEs) derived from detailed hydraulic analyses are shown in this zone. Mandatory flood insurance purchase requirements and floodplain management standards apply. |
| Zone AO | Areas subject to inundation by 1-percent-annual-chance shallow flooding (usually sheet flow on sloping terrain) where average depths are between one and three feet. Average flood depths derived from detailed hydraulic analyses are shown in this zone. Mandatory flood insurance purchase requirements and floodplain management standards apply. Some Zone AO have been designated in areas with high flood velocities such as alluvial fans and washes. Communities are encouraged to adopt more restrictive requirements for these areas. |
| Zone AR | Areas that result from the decertification of a previously accredited flood protection system that is determined to be in the process of being restored to provide base flood protection. Mandatory flood insurance purchase requirements and floodplain management standards apply. |
| Zone A99 | Areas subject to inundation by the 1-percent-annual-chance flood event, but which will ultimately be protected upon completion of an under-construction Federal flood protection system. These are areas of special flood hazard where enough progress has been made on the construction of a protection system, such as dikes, dams, and levees, to consider it complete for insurance rating purposes. Zone A99 may only be used when the flood protection system has reached specified statutory progress toward completion. No Base Flood Elevations (BFEs) or depths are shown. Mandatory flood insurance purchase requirements and floodplain management standards apply. |
| Zone V | Areas along coasts subject to inundation by the 1-percent-annual-chance flood event with additional hazards associated with storm-induced waves. Because detailed hydraulic analyses have not been performed, no Base Flood Elevations (BFEs) or flood depths are shown. Mandatory flood insurance purchase requirements and floodplain management standards apply. |
| Zone VE and V1-30 | Areas subject to inundation by the 1-percent-annual-chance flood event with additional hazards due to storm-induced velocity wave action. Base Flood Elevations (BFEs) derived from detailed hydraulic analyses are shown. Mandatory flood insurance purchase requirements and floodplain management standards apply. |

Source: Federal Emergency Management Agency (FEMA).

REPETITIVE LOSS STRUCTURES

A repetitive loss structure is an NFIP-insured structure that has had at least two paid flood losses of more than \$1,000 each in any 10-year period since 1978.

The Nebraska Department of Natural Resources (NDNR) was contacted to determine if any existing buildings, infrastructure, or critical facilities are classified as NFIP Repetitive Loss Structures. According to the NDNR, the planning area has no NFIP Repetitive Loss Structures.

HAZARD IMPACT AND VULNERABILITY TO THE HAZARD

Impact and vulnerability assesses the planning areas' exposure to hazards; considering assets at risk, critical facilities, and future development trends. Vulnerability is measured in general, qualitative terms and is a summary of the potential impact based on past occurrences, spatial extent, and damage/ casualty potential.

- ✓ [Medium] Moderate potential impact. This ranking carries a moderate threat level to the general population and/or built environment. Here the potential damage is more isolated and less costly than a more widespread disaster.

Flooding can also cause extensive property damage, contributing to significant structural damage and in some cases structural failure from velocity associated with moving water and from saturation from flood waters. In nearly all cases of structural flooding unless personal property is relocated above the anticipated flood stage, it is also at risk. Localized, stormwater flooding also occurs throughout the planning area. Urban storm drainpipes and pump stations have a finite capacity. When rainfall exceeds this capacity, or the system is clogged, water accumulates in the street until it reaches a level of overland release. This type of flooding may occur when intense storms occur over the planning area.

In addition to flooding, damage to these areas during heavy storms includes pavement deterioration, washouts, mudslides, debris areas, and downed trees. The frequency and type of damage or flooding that occurs varies from year to year, depending on the quantity of runoff.

Various health hazards are also common following flood events. One comes from the actual floodwaters. Floodwaters can carry anything on the ground upstream through runoff, including dirt, oil, animal waste, and lawn, farm and industrial chemicals. Pastures and areas where livestock are kept can contribute to polluted waters downstream. Floodwaters also saturate the ground, which leads to infiltration into sanitary sewer lines. If wastewater treatment plants are flooded, there is nowhere for sewage to go. Infiltration and lack of treatment ability can cause overloaded sewer lines to back up into low-lying areas and homes. Untreated sewage can contain bacteria such as e. coli and other diseases. Post flooding, stagnant pools of standing water can become breeding grounds for mosquitoes, and wet areas in homes and buildings, that have not been properly cleaned, can lead to mold and mildew. A structure that is not properly and thoroughly cleaned can become a health hazard, especially for small children and the elderly.

ESTIMATE OF THE POTENTIAL LOSSES

Vulnerability and potential losses can be quantified in locations where there is a known, identified hazard area, such as a mapped floodplain. In those locations, the numbers and types of buildings at risk to the identified hazard can be counted and their values calculated. Other data can be collected in regard to the hazard area, such as the location of critical facilities, historic structures, and valued natural resources. This information illustrates the impact and vulnerability of the area to the identified hazard. The vulnerability and potential losses from the other identified hazards, which do not have specific mapped areas or the data to support additional analysis, are discussed in more general, qualitative terms.

The event damage and frequency estimate formulas were determined based upon recorded historical occurrences since 1950. 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 estimate (crop damages are not mitigated by FEMA).

Potential losses associated with a flood event vary greatly depending on the severity of the event. Properties in or near low lying areas as well as areas where drainage is inadequate could experience localized flooding. Potential losses could include water damage, disruption in transportation, or health issues due to insects and stagnant water.

If a flood or flash flood occurred within the planning area, the table below assumes the event could potentially cause 0.05 percent damage to the total assessed value in an incorporated jurisdiction and throughout rural areas of the Counties.

TABLE 3.22: EVENT DAMAGE AND FREQUENCY ESTIMATE [FLOODS] HISTORICAL ANALYSIS

| Event Damage and Frequency Estimate Formulas | | |
|--|-----------|---|
| Average Annual Damage | \$88,216 | Total Damages Recorded [\$5,734,000] / Total Years on Record [65] |
| Average Damage per Event | \$114,680 | Total Damages Recorded [\$5,734,000] / Total Events Recorded [50] |
| Annual Event Frequency | 0.77/year | Total Events Recorded [50] / Total Years on Record [65] |

PROBABILITY OF FUTURE HAZARD EVENTS

The frequency of historical occurrences was used to gauge the likelihood of future occurrences. Frequency was calculated based on existing data (when available). It was determined by dividing the number of events recorded by the number of years on record, and then multiplying by 100 to calculate a percent. This gives the percent chance of the event occurring in any given year.

- ✓ [Highly Likely] 91 to 100 percent probability of occurrence in the next year.

OVERALL SIGNIFICANCE

Overall significance was determined based on criteria such as frequency and damage, including deaths and injuries, as well as property, crop, and economic damage. Hazards that occur infrequently or have little or no impact on the planning area were determined to be of low significance.

- ✓ [Medium] The criteria fall mostly in the middle ranges of classifications and the event's impacts on the planning area are noticeable but not devastating. This rating is sometimes used for hazards with a high extent rating but very low probability rating.

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevation (BFE)** and/or **Floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevation (BFCE) shown on this map apply only landward of 0.0' North American Vertical Datum (NAVD). Users of this FIRM should be aware that coastal flood elevations may also be provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this community. Elevations shown in the Summary of Stillwater Elevations table should be used for construction, and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures in this jurisdiction.

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Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

Spatial Reference System Division
National Geodetic Survey, NOAA
Silver Spring Metro Center
1315 East-West Highway
Silver Spring, Maryland 20910
(301) 713-3191

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FAX: 800-358-9620
www.fema.gov/msc

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This map reflects more detailed and up-to-date stream channel configurations than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study report may reflect stream channel distances that differ from what is shown on this map.

LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD EVENT

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AD, AR, A99, V, and VE. The Base Flood Elevation is the water surface elevation of the 1% annual chance flood.

- ZONE A** No base flood elevations determined.
- ZONE AE** Base flood elevations determined.
- ZONE AH** Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined.
- ZONE AD** Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
- ZONE AR** Area of special flood hazard formerly protected from the 1% annual chance flood event by a flood control system that was subsequently identified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood event.
- ZONE A99** Area to be protected from 1% annual chance flood event by a Federal flood protection system under construction; no base flood elevations determined.
- ZONE V** Coastal flood zone with velocity hazard (wave action); no base flood elevations determined.
- ZONE VE** Coastal flood zone with velocity hazard (wave action); base flood elevations determined.

FLOODWAY AREAS IN ZONE AE
The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS
ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS
ZONE X Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)
CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% annual chance floodplain boundary
- 0.2% annual chance floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or velocities.
- Base Flood Elevation line and value; elevation in feet*
- Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

- A ○ A Cross Section Line
- ⊕ --- ⊕ Transect Line
- 97°07'30", 32°22'30" Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
- 4276000M 1000-meter Universal Transverse Mercator grid values, zone 14
- 600000 FT 5000-foot grid ticks

DX5510 X Bench mark (see explanation in Notes to Users section of this FIRM panel).

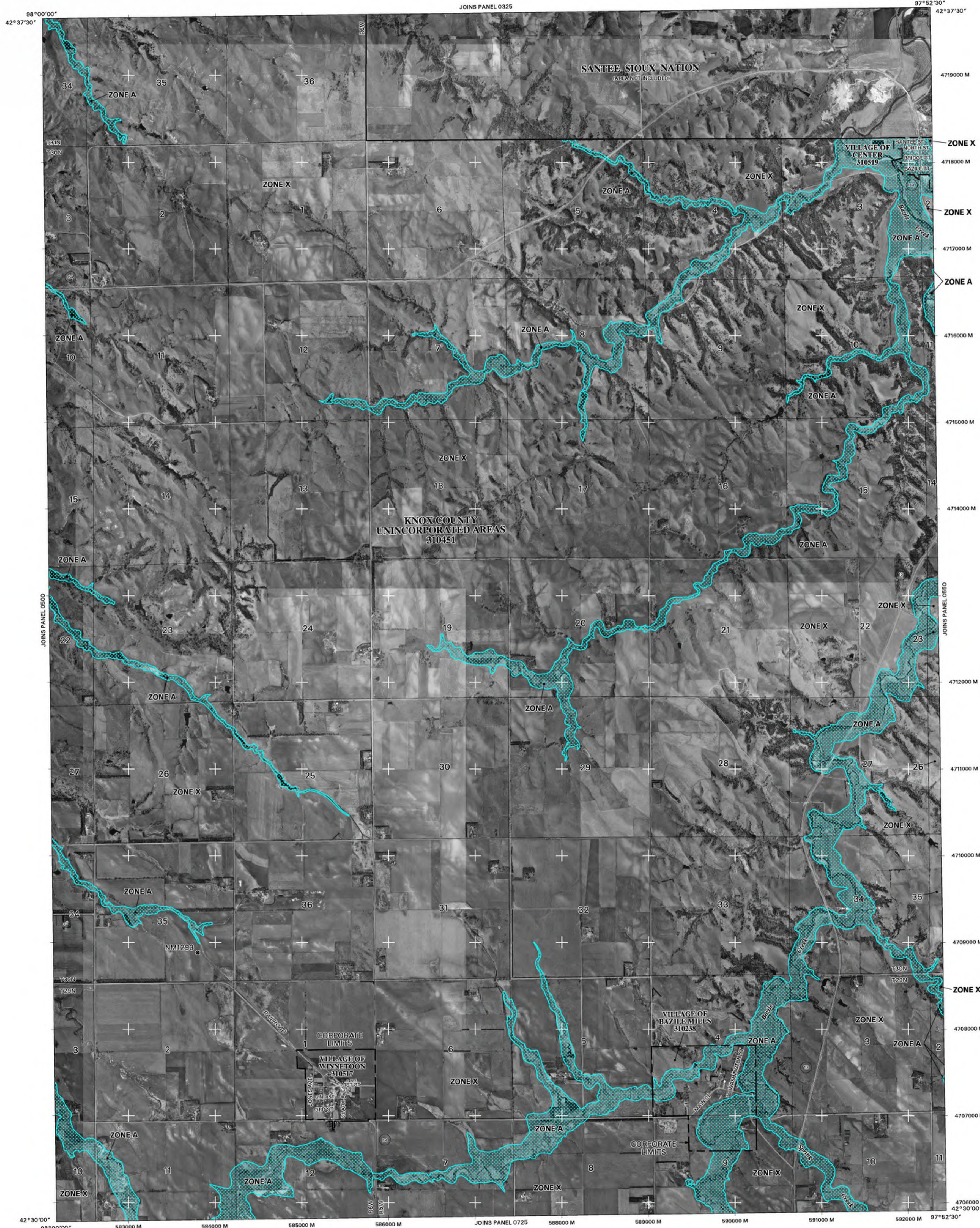
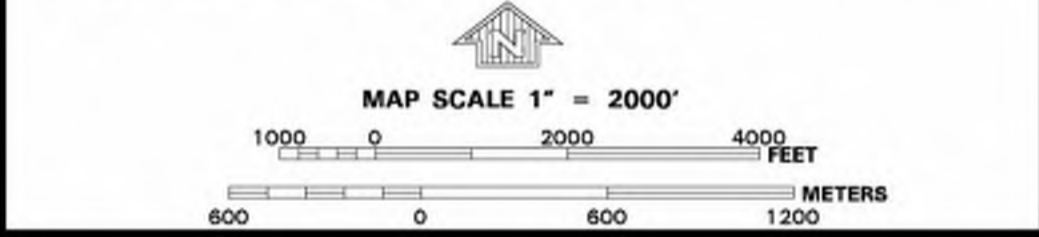
● M1.5 River Mile

MAP REPOSITORY
Refer to Repository Listing on Index Map

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
AUGUST 18, 2005

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.



NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0525C

FIRM
FLOOD INSURANCE RATE MAP
KNOX COUNTY,
NEBRASKA AND
INCORPORATED AREAS

PANEL 525 OF 825
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

| COMMUNITY | NUMBER | PANEL | SUFFIX |
|-----------------------------------|--------|-------|--------|
| KNOX COUNTY, UNINCORPORATED AREAS | 310451 | 525C | C |
| CENTER VILLAGE OF | 310519 | 525C | C |
| BATTLE MILLS VILLAGE OF | 310298 | 525C | C |
| WINDYBUSH VILLAGE OF | 310117 | 525C | C |

Notice to User: The **Map Number** shown below should be used when ordering map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
31107C0525C

EFFECTIVE DATE:
AUGUST 18, 2005

Federal Emergency Management Agency

NOTES TO USERS

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Coastal Base Flood Elevation (BFCE) shown on this map apply only landward of 0.0' North American Vertical Datum (NAVD). Users of this FIRM should be aware that coastal flood elevations may also be provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this community. Elevations shown in the Summary of Stillwater Elevations table should be used for construction, and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

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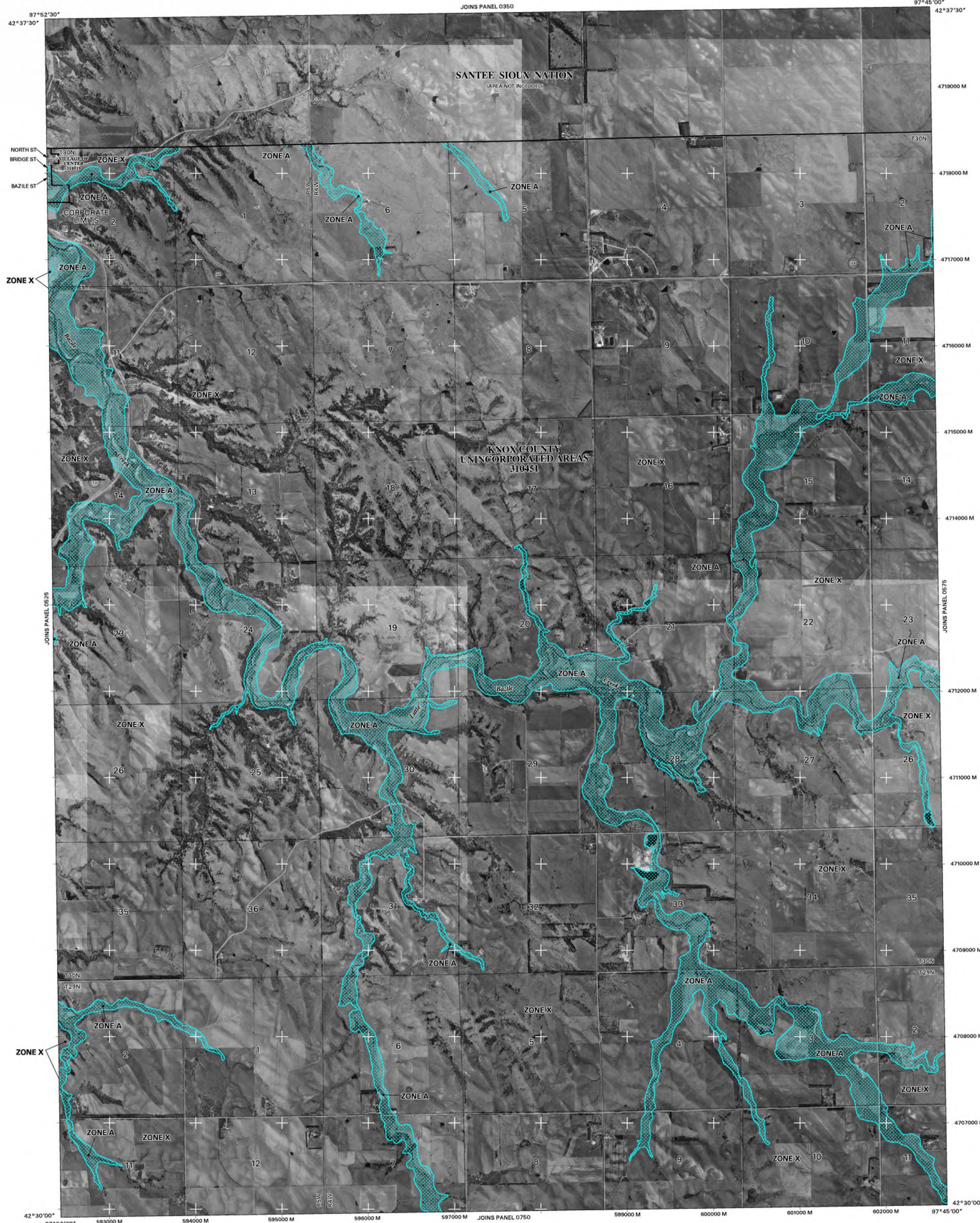
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LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD EVENT

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AD, AR, A99, V, and VE. The Base Flood Elevation is the water surface elevation of the 1% annual chance flood.

- ZONE A** No base flood elevations determined.
- ZONE AE** Base flood elevations determined.
- ZONE AH** Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined.
- ZONE AD** Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
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- ZONE A99** Area to be protected from 1% annual chance flood event by a Federal flood protection system under construction; no base flood elevations determined.
- ZONE V** Coastal flood zone with velocity hazard (wave action); no base flood elevations determined.
- ZONE VE** Coastal flood zone with velocity hazard (wave action); base flood elevations determined.

FLOODWAY AREAS IN ZONE AE
The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

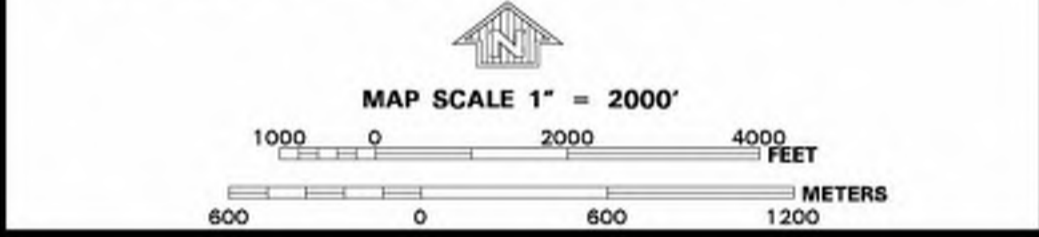
OTHER FLOOD AREAS
ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

- OTHER AREAS**
- ZONE D** Areas determined to be outside the 0.2% annual chance floodplain.
- ZONE I** Areas in which flood hazards are undetermined, but possible.
- COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS**
- OTHERWISE PROTECTED AREAS (OPAs)**
CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% annual chance floodplain boundary
- 0.2% annual chance floodplain boundary
- Floodway boundary
- Zone D boundary
- Zone I boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or velocities.
- Base Flood Elevation line and value; elevation in feet*
- Base Flood Elevation value where uniform within zone; elevation in feet*

- *Referenced to the North American Vertical Datum of 1988
- — ○ Cross Section Line
- ⊙ — ⊙ Transect Line
- 97°07'30", 32°22'30" Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
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- 600000 FT 5000-foot grid ticks
- DX5510 X Bench mark (see explanation in Notes to Users section of this FIRM panel).
- M1.5 River Mile
- MAP REPOSITORY
Refer to Repository Listing on Index Map
- EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
AUGUST 18, 2005
- EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.



PANEL 0550C

FIRM
FLOOD INSURANCE RATE MAP
KNOX COUNTY,
NEBRASKA AND
INCORPORATED AREAS

PANEL 550 OF 825
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

| COMMUNITY | NUMBER | PANEL | SUFFIX |
|-----------------------------------|--------|-------|--------|
| KNOX COUNTY, UNINCORPORATED AREAS | 310451 | 550C | 0 |
| CENTER VILLAGE OF | 310519 | 550C | 0 |

Notice to User: The **Map Number** shown below should be used when ordering map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
31107C0550C
EFFECTIVE DATE:
AUGUST 18, 2005

Federal Emergency Management Agency

NOTES TO USERS

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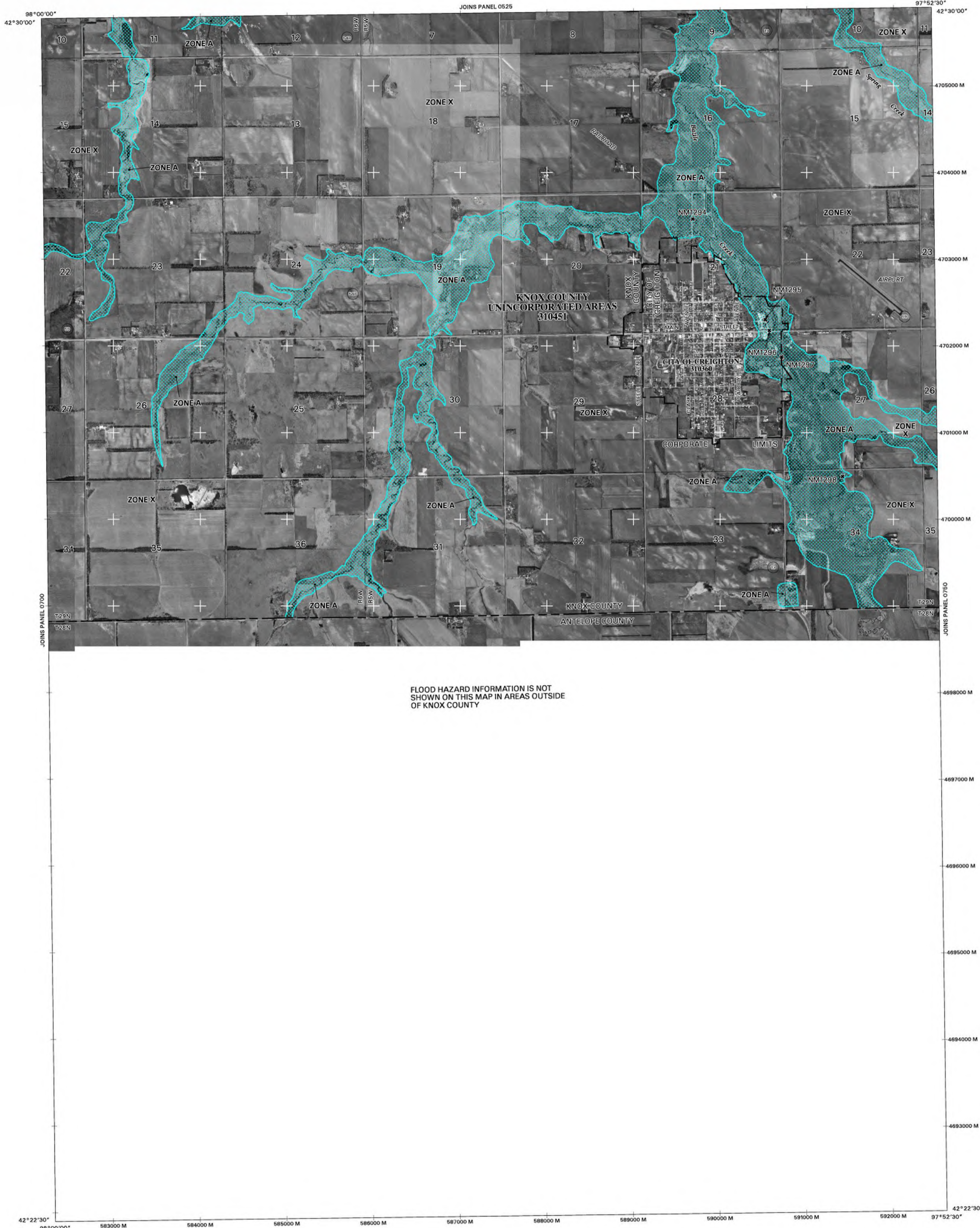
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FLOOD HAZARD INFORMATION IS NOT SHOWN ON THIS MAP IN AREAS OUTSIDE OF KNOX COUNTY

LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD EVENT

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- ZONE V** Coastal flood zone with velocity hazard (wave action); no base flood elevations determined.
- ZONE VE** Coastal flood zone with velocity hazard (wave action); base flood elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE D Areas determined to be outside the 0.2% annual chance floodplain.
ZONE U Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

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- Floodway boundary
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- Base Flood Elevation line and value; elevation in feet*
- Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

- Circle with A: Cross Section Line
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97°07'30", 32°22'30" Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)

4276000M 1000-meter Universal Transverse Mercator grid values, zone 14

600000 FT 5000-foot grid ticks

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M1.5 River Mile

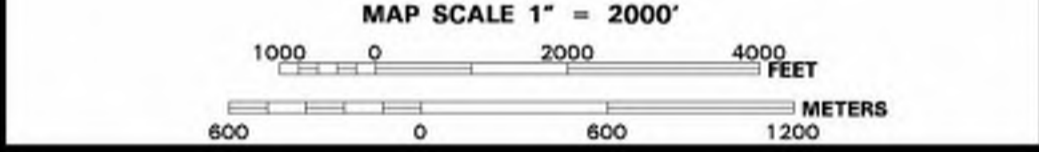
MAP REPOSITORY
Refer to Repository Listing on Index Map

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
AUGUST 18, 2005

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at (800) 638-6620.



PANEL 0725C

FIRM
FLOOD INSURANCE RATE MAP
KNOX COUNTY,
NEBRASKA AND
INCORPORATED AREAS

PANEL 725 OF 825
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

| COMMUNITY | NUMBER | PANEL | SUFFIX |
|-----------------------------------|--------|-------|--------|
| KNOX COUNTY, UNINCORPORATED AREAS | 910461 | 0725 | 0 |
| CREDITON, CITY OF | 910868 | 0725 | 0 |

Notice to User: The **Map Number** shown below should be used when ordering map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
31107C0725C
EFFECTIVE DATE:
AUGUST 18, 2005

Federal Emergency Management Agency

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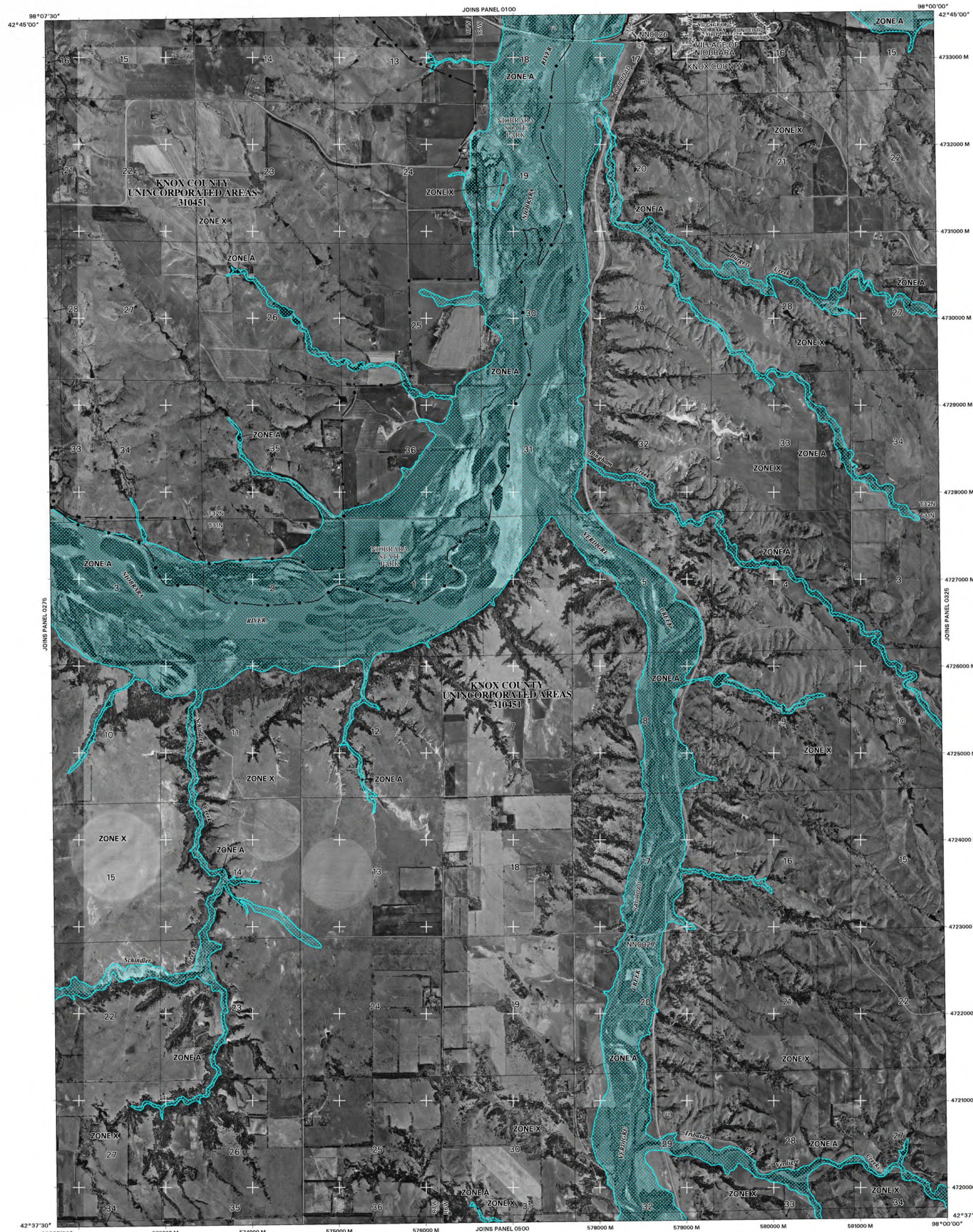
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Phone: 800-358-9616
FAX: 800-358-9620
www.fema.gov/msc

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA website at www.fema.gov.

This map reflects more detailed and up-to-date stream channel configurations than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study report may reflect stream channel distances that differ from what is shown on this map.



LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD EVENT

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equalled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water surface elevation of the 1% annual chance flood.

- ZONE A** No base flood elevations determined.
- ZONE AE** Base flood elevations determined.
- ZONE AH** Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined.
- ZONE AO** Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
- ZONE AR** Area of special flood hazard formerly protected from the 1% annual chance flood event by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood event.
- ZONE A99** Area to be protected from 1% annual chance flood event by a Federal flood protection system under construction; no base flood elevations determined.
- ZONE V** Coastal flood zone with velocity hazard (wave action); no base flood elevations determined.
- ZONE VE** Coastal flood zone with velocity hazard (wave action); base flood elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% annual chance floodplain boundary
- 0.2% annual chance floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or velocities.

Base Flood Elevation line and value; elevation in feet*
Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

Cross Section Line

Transect Line

Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)

1000-meter Universal Transverse Mercator grid values, zone 14

5000-foot grid ticks

Bench mark (see explanation in Notes to Users section of this FIRM panel).

River Mile

MAP REPOSITORY

Refer to Repository Listing on Index Map

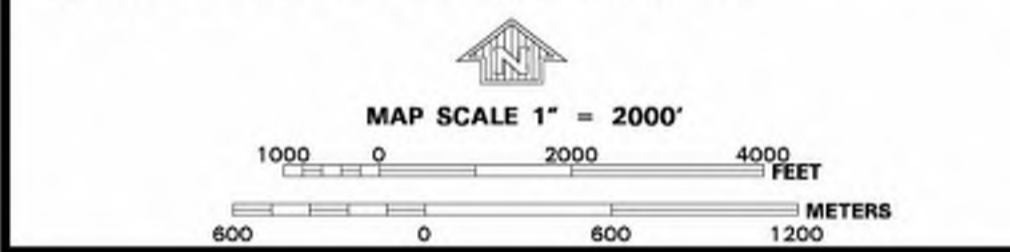
EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP

AUGUST 18, 2005

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at (800) 638-6620.



PANEL 0300C

FIRM FLOOD INSURANCE RATE MAP
KNOX COUNTY, NEBRASKA AND INCORPORATED AREAS

PANEL 300 OF 825
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

| CONTAINS: | COMMUNITY: | NUMBER: | PANEL: | SUFFIX: |
|-------------|----------------------|---------|--------|---------|
| KNOX COUNTY | UNINCORPORATED AREAS | 310451 | 0300 | C |
| | NIOBARA, VILLAGE OF | 310132 | 0300 | C |

Notice to User: The Map Number shown below should be used when obtaining map updates; the Community Number shown above should be used on insurance applications for the subject community.

MAP NUMBER 31107C0300C

EFFECTIVE DATE: AUGUST 18, 2005

Federal Emergency Management Agency

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevation (BFEs)** and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevation (BFES) shown on this map apply only landward of 0.0' North American Vertical Datum (NAVD). Users of this FIRM should be aware that coastal flood elevations may also be provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this community. Elevations shown in the Summary of Stillwater Elevations table should be used for construction, and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures in this jurisdiction.

The **projection** used in the preparation of this map is Universal Transverse Mercator (UTM), zone 14. The **horizontal datum** is NAD83, GRS1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of the FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

Spatial Reference System Division
National Geodetic Survey, NOAA
Silver Spring Metro Center
1315 East-West Highway
Silver Spring, Maryland 20910
(301) 713-3191

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242, or visit their website at www.ngs.noaa.gov.

Base map information shown on this FIRM was provided in digital format by U.S. Geological Survey Digital Orthophoto Quadrangles produced at a scale of 1:12000 from photography dated 1999 or later.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

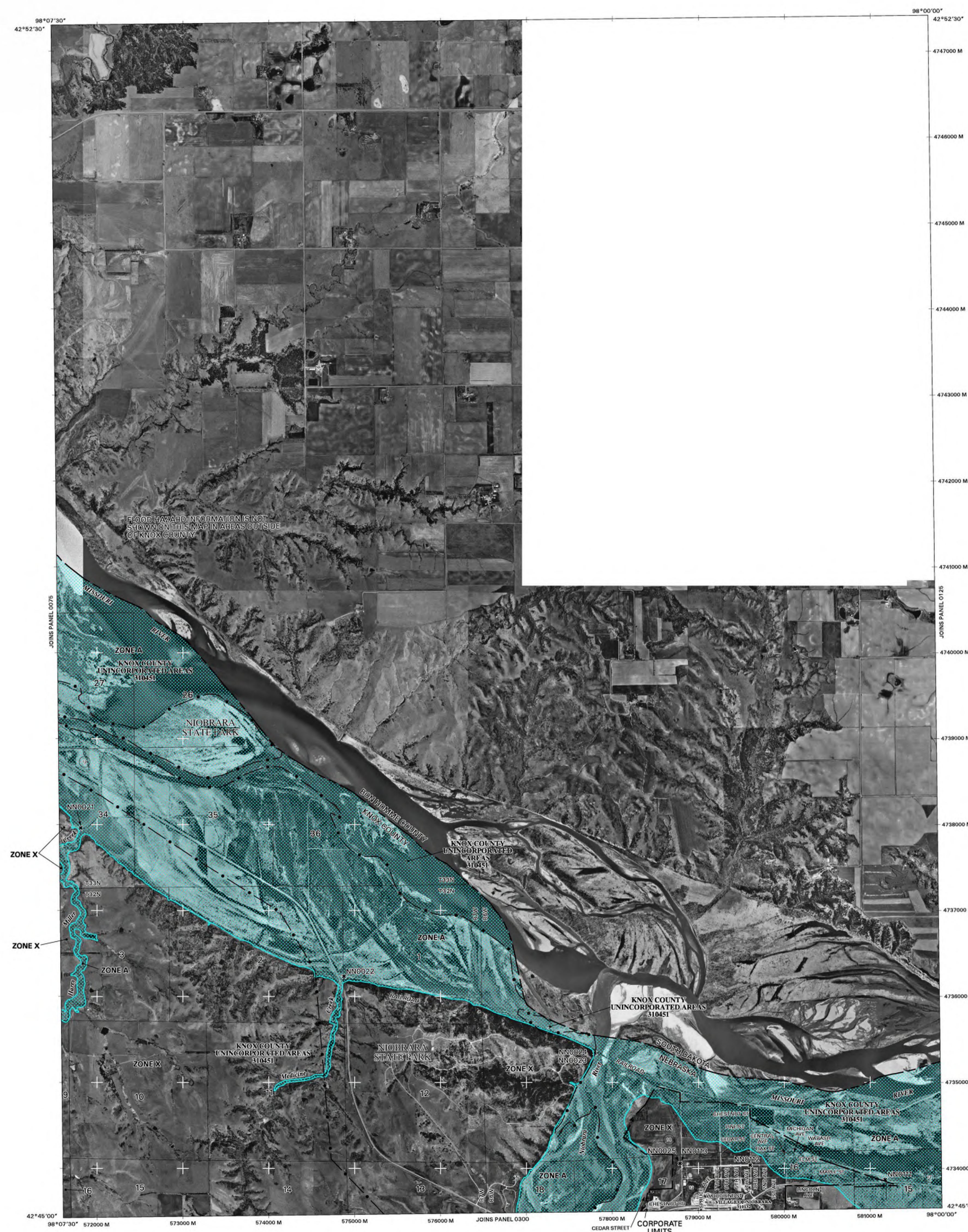
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LEGEND

- SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD EVENT**
The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AV, AO, AR, A99, V, and VE. The Base Flood Elevation is the water surface elevation of the 1% annual chance flood.
- ZONE A** No base flood elevations determined.
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- ZONE A99** Area to be protected from 1% annual chance flood event by a Federal flood protection system under construction; no base flood elevations determined.
- ZONE V** Coastal flood zone with velocity hazard (wave action); no base flood elevations determined.
- ZONE VE** Coastal flood zone with velocity hazard (wave action); base flood elevations determined.
- FLOODWAY AREAS IN ZONE AE**
The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.
- OTHER FLOOD AREAS**
- ZONE X** Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.
- OTHER AREAS**
- ZONE X** Areas determined to be outside the 0.2% annual chance floodplain.
- ZONE D** Areas in which flood hazards are undetermined, but possible.
- COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS**
- OTHERWISE PROTECTED AREAS (OPAs)**
CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% annual chance floodplain boundary
0.2% annual chance floodplain boundary
Floodway boundary
Zone D boundary
CBRS and OPA boundary
Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or velocities.
Base Flood Elevation line and value; elevation in feet*
Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

Cross Section Line
 Transect Line
 Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
4276000M 1000-meter Universal Transverse Mercator grid values, zone 14
600000 FT 5000-foot grid ticks
DX5510 X Bench mark (see explanation in Notes to Users section of this FIRM panel).
● M1.5 River Mile

MAP REPOSITORY
Refer to Repository Listing on Index Map
EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
AUGUST 18, 2005
EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

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MAP SCALE 1" = 2000'
1000 0 2000 4000 FEET
600 0 600 1200 METERS

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0100C

FIRM FLOOD INSURANCE RATE MAP
KNOX COUNTY, NEBRASKA AND INCORPORATED AREAS

PANEL 100 OF 825
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

| CONTAINS: | NUMBER | PANEL | SUFFIX |
|-----------------------------------|--------|-------|--------|
| KNOX COUNTY, UNINCORPORATED AREAS | 310451 | 0100 | C |
| NIORARA, VILLAGE OF | 310132 | 0100 | C |

Notice to User: The **Map Number** shown below should be used when obtaining map orders. The **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER 31107C0100C
EFFECTIVE DATE: AUGUST 18, 2005

Federal Emergency Management Agency



Section Three [Extreme Heat]

Extreme heat is defined as temperatures that hover ten degrees or more above the average high temperature for the region and last for several weeks. Humid or muggy conditions, which add to the discomfort of high temperatures, occur when a “dome” of high atmospheric pressure traps hazy, damp air near the ground.

SECTION THREE [EXTREME HEAT]

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HAZARD MITIGATION PLAN

ANTELOPE, HOLT, AND KNOX COUNTIES

SECTION THREE [EXTREME HEAT]

EXTREME HEAT

This sub-section outlines the risk assessment for the hazard event extreme heat, including hazard profile, previous occurrences of hazard events, location and extent, hazard impact and vulnerability to the hazard, estimate of potential losses, probability of future hazard events, and overall significance. Data on previous occurrences of hazard events from the National Climatic Data Center (NCDC) is summarized below, with full event details in Section Six: Participant Profiles. Geographic, demographic, assets inventory, capabilities assessment, and climate summaries are also provided in Section Six: Participant Profiles, with varying risks facing the planning area discussed in the appropriate sub-sections.

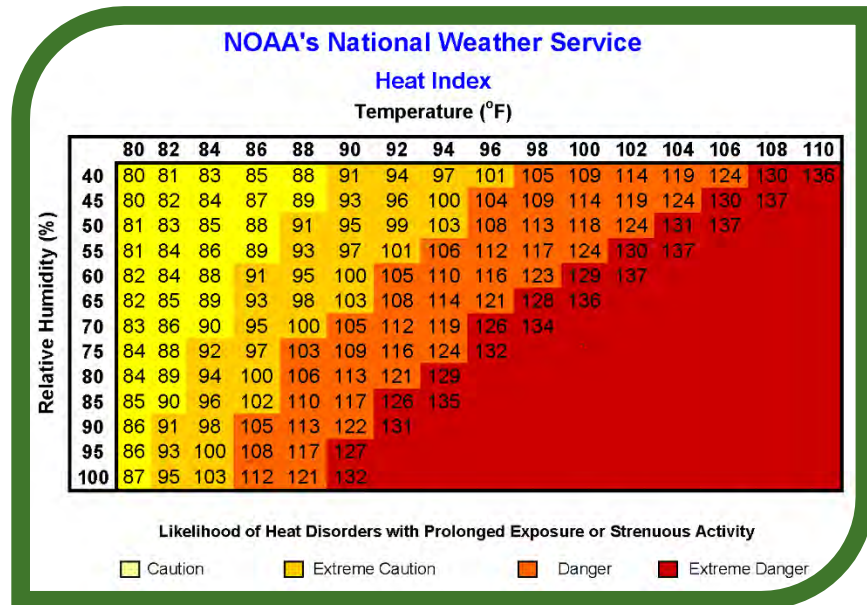
HAZARD PROFILE

The hazard profile provides a description of the hazard, associated issues, and details on the hazard specific to the planning area.

A heat wave is an extended period of extreme heat, and is often accompanied by high humidity. These conditions can be dangerous and even life-threatening for humans who don't take the proper precautions. Extreme heat is described as "Temperatures that hover ten degrees or more above the average high temperature for the region and last for several weeks."

In Nebraska, it is not unusual for temperatures to reach and exceed 90° Fahrenheit during July, August, and into September. On occasion, the temperature may approach or exceed 100° Fahrenheit. The Midwest Nebraska climate introduces humidity into the air and combined with the temperature, can result in dangerous conditions for strenuous outdoor activity. In weather terms, the combination of heat and humidity is referred to as heat index. Figure 3.12 below displays the National Weather Service's heat index of temperature and relative humidity with the likelihood of heat disorders with prolonged exposure or strenuous activity.

FIGURE 3.12 HEAT INDEX [NOAA] TEMPERATURE AND RELATIVE HUMIDITY



Source: National Oceanic and Atmospheric Administration Storm Prediction Center.

Section Three [Extreme Heat]

The NOAA National Weather Service has developed a guide for prediction of heat index or the “as felt” temperature that reveals the following:

- ❑ A temperature of 90° Fahrenheit with 50% humidity results in heat index or “as felt” temperature of 95° F triggering High Caution for heat related disorders with prolonged outdoor activity.
- ❑ A temperature of 90° Fahrenheit with 70% relative humidity results in heat index of 105° F, in the Danger level for heat disorders with prolonged exposure or strenuous activity.
- ❑ A temperature of 90° Fahrenheit and relative humidity of 95% results in heat index of 127° F, a temperature considered Extremely Dangerous for likelihood of heat disorders with prolonged exposure or strenuous activity.

PREVIOUS OCCURRENCES OF HAZARD EVENTS

Previous occurrences of hazard events give information on historical occurrences. Historical occurrence worksheets were used to capture information from participating jurisdictions on past occurrences.

Presidential disaster declarations are summarized in *Section Three: Hazard Identification and Risk Assessment – Severe Weather Events Summary*. Data from the NCDL is summarized in Table 3.23 below, with full event details in *Section Six: Participant Profiles*.

The NCDL reported three extreme heat events for Antelope, Holt, and Knox Counties from January 1, 1950 to January 31, 2016. Data from the NCDL is available in *Section Six: Participant Profiles*. None of the reported events recorded any deaths, injuries, property damage, or crop damage.

TABLE 3.23: NCDL EVENTS SUMMARY [EXTREME HEAT] JANUARY 1, 1950 – JANUARY 31, 2016

| | Antelope County | Holt County | Knox County | Totals |
|-----------------|-----------------|-------------|-------------|--------|
| Events | 1 | 1 | 1 | 3 |
| Deaths | 0 | 0 | 0 | 0 |
| Injuries | 0 | 0 | 0 | 0 |
| Property Damage | \$0 | \$0 | \$0 | \$0 |
| Crop Damage | \$0 | \$0 | \$0 | \$0 |

Source: United States Department of Commerce, National Oceanic Atmospheric Administration, National Environmental Satellite, Data, and Information Service, National Climatic Data Center.

LOCATION AND EXTENT

Location and extent contain information on hazard location and extent, magnitude/ strength, speed of onset/ duration, seasonal patterns, and/or secondary effects (when known).

LOCATION [GEOGRAPHIC AREA AFFECTED]

- ✓ [Extensive] 76 to 100 percent of planning area or consistent single-point occurrences.

MAXIMUM PROBABLE EXTENT [MAGNITUDE/ STRENGTH BASED ON HISTORIC EVENTS OR FUTURE PROBABILITY]

- ✓ [Severe] Severe classification on scientific scale, fast speed of onset or long duration of event, resulting in devastating damage and loss of services for weeks or months.

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 difficulties 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.

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, death of the animals, resulting in millions of dollars in losses to the cattle industry.

HAZARD IMPACT AND VULNERABILITY TO THE HAZARD

Impact and vulnerability assesses the planning areas' exposure to hazards; considering assets at risk, critical facilities, and future development trends. Vulnerability is measured in general, qualitative terms and is a summary of the potential impact based on past occurrences, spatial extent, and damage/ casualty potential.

- ✓ [High] Widespread potential impact. This ranking carries a high threat to the general population and/or built environment. The potential for damage is widespread. Hazards in this category may have occurred in the past.

Conditions that can induce heat-related illnesses include stagnant atmospheric conditions and poor air quality. Consequently, people living in urban areas may be at greater risk from the effects of a prolonged heat wave than those living in rural areas. Also, asphalt and concrete store heat longer and gradually release heat at night, which can produce higher nighttime temperatures known as the "urban heat island effect."

Most heat disorders occur because a person has been overexposed to heat or has over-exercised for his or her age and physical condition. Older adults, young children and those who are sick or overweight are more likely to succumb to extreme heat, especially during heat waves in areas where moderate climate usually prevails.

ESTIMATE OF THE POTENTIAL LOSSES

Vulnerability and potential losses can be quantified in locations where there is a known, identified hazard area, such as a mapped floodplain. In those locations, the numbers and types of buildings at risk to the identified hazard can be counted and their values calculated. Other data can be collected in regard to the hazard area, such as the location of critical facilities, historic structures, and valued natural resources. This information illustrates the impact and vulnerability of the area to the identified hazard. The vulnerability and potential losses from the other identified hazards, which do not have specific mapped areas or the data to support additional analysis, are discussed in more general, qualitative terms.

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.

According to the FEMA publication "What is a Benefit: Guidance on Benefit-Cost Analysis of Hazard Mitigation Project (June 2009)", if an extreme heat event occurred within the planning area, the table below assumes the event could potentially cause a loss of electricity for ten percent of the population at a cost of \$126 per person per day. In rural areas, the percent of the population affected and duration may increase during extreme events. The assumed damages do not consider physical damages to utility equipment and infrastructure.

Section Three [Extreme Heat]

PROBABILITY OF FUTURE HAZARD EVENTS

The frequency of historical occurrences was used to gauge the likelihood of future occurrences. Frequency was calculated based on existing data (when available). It was determined by dividing the number of events recorded by the number of years on record, and then multiplying by 100 to calculate a percent. This gives the percent chance of the event occurring in any given year.

- ✓ [Unlikely] Less than 1 percent probability of occurrence in the next year or a recurrence interval of greater than every 100 years.

OVERALL SIGNIFICANCE

Overall significance was determined based on criteria such as frequency and damage, including deaths and injuries, as well as property, crop, and economic damage. Hazards that occur infrequently or have little or no impact on the planning area were determined to be of low significance.

- ✓ [Medium] The criteria fall mostly in the middle ranges of classifications and the event's impacts on the planning area are noticeable but not devastating. This rating is sometimes used for hazards with a high extent rating but very low probability rating.



Section Three [Drought]

A drought is defined as a period of below-average precipitation in a given region, resulting in prolonged shortages in its water supply, whether atmospheric, surface, or groundwater. A drought can last for months or years, or may be declared after as few as fifteen days.

SECTION THREE [DROUGHT]

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HAZARD MITIGATION PLAN

ANTELOPE, HOLT, AND KNOX COUNTIES

SECTION THREE [DROUGHT]

DROUGHT

This sub-section outlines the risk assessment for the hazard event drought, including hazard profile, previous occurrences of hazard events, location and extent, hazard impact and vulnerability to the hazard, estimate of potential losses, probability of future hazard events, and overall significance. Data on previous occurrences of hazard events from the National Climatic Data Center (NCDC) is summarized below, with full event details in Section Six: Participant Profiles. Geographic, demographic, assets inventory, capabilities assessment, and climate summaries are also provided in Section Six: Participant Profiles, with varying risks facing the planning area discussed in the appropriate sub-sections.

HAZARD PROFILE

The hazard profile provides a description of the hazard, associated issues, and details on the hazard specific to the planning area.

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.

Drought is a gradual phenomenon. Although droughts are sometimes characterized as emergencies, they differ from typical emergency events. Most natural disasters, such as floods or forest fires, occur relatively rapidly and afford little time for preparing for disaster response. Droughts occur slowly, over a multi-year period, and it is often not obvious or easy to quantify when a drought begins and ends.

Drought is a natural part of most climatic areas, but the severity of drought differs based on duration, geographic extent, and intensity. In Nebraska, droughts can affect municipal and industrial water supply, surface water quality, recreation, power generation, agriculture, and natural resources. Droughts can increase the threat or likelihood of other disasters. Droughts can be accompanied by unusually hot weather, leading to heat-related illnesses and other hazards associated with extreme heat. Also, droughts can make the risk of wildfire greater, both by drying vegetation making it more susceptible to fire, and by depleting water supplies needed to fight the fire.

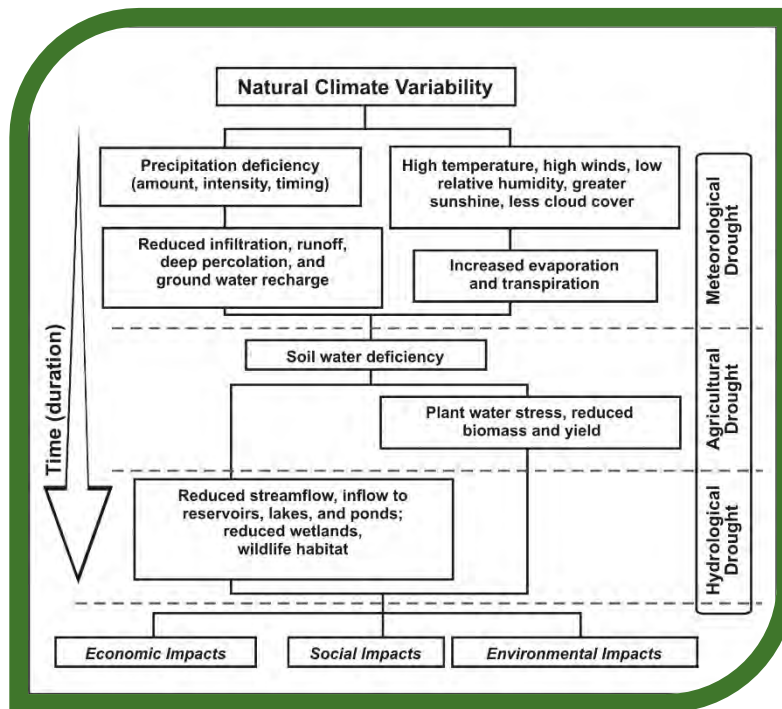
Drought is a complex issue involving many factors—it occurs when a normal amount of moisture is not available to satisfy an area’s usual water-consuming activities. Drought can often be defined regionally based on its effects metrological, agricultural, hydrologic, and socioeconomic, as outlined below. Figure 3.13 displays the causes (metrological, agricultural, hydrologic) and impacts (economic, social, environmental) of drought by increased time or duration.

- **[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 (deficiencies in surface and subsurface water supplies). 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. It is generally measured as streamflow, snowpack, and as lake, reservoir, and groundwater levels.

Section Three [Drought]

- **[Socioeconomic Drought]** 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. Socioeconomic drought occurs when a drought impacts health, well-being, and quality of life, or when a drought starts to have an adverse economic impact on a region.

FIGURE 3.13: CAUSES AND IMPACTS OF DROUGHT [NDMC] BY INCREASED DURATION



Source: National Drought Mitigation Center.

Drought in the United States is monitored by the National Integrated Drought Information System (NIDIS). A major component of this portal is the U.S. Drought Monitor. The Drought Monitor concept was developed jointly by the NOAA's Climate Prediction Center, the National Drought Mitigation Center (NDMC), and the United States Department of Agriculture's (USDA) Joint Agricultural Weather Facility in the late 1990s as a process that synthesizes multiple indices, outlooks and local impacts, into an assessment that best represents current drought conditions. The final outcome of each Drought Monitor is a consensus of federal, state, and academic scientists who are intimately familiar with the conditions in their respective regions.

Drought impacts are wide-reaching and may be economic, environmental, and/or societal. The most significant impacts associated with drought in Nebraska are those related to water intensive activities such as agriculture, wildfire protection, municipal usage, commerce, tourism, recreation, and wildlife preservation. Voluntary conservation measures are typically implemented during extended droughts. Water quality deterioration is also a potential problem. Drought conditions can also cause soil to compact and not absorb water well, potentially making an area more susceptible to flooding.

PREVIOUS OCCURRENCES OF HAZARD EVENTS

Previous occurrences of hazard events give information on historical occurrences. Historical occurrence worksheets were used to capture information from participating jurisdictions on past occurrences.

Presidential disaster declarations are summarized in *Section Three: Hazard Identification and Risk Assessment – Severe Weather Events Summary*. Data from the NCDIC is summarized in Table 3.28 below, with full event details in *Section Six: Participant Profiles*.

The NCDIC reported 45 drought events for Antelope, Holt, and Knox Counties from January 1, 1950 to January 31, 2016. Of the reported events, one event recorded damages, with \$50,000,000 in total property damages and \$10,000,000 in total

crop damages. However, 26 of these events took place across multiple counties and thus counted multiple times. This means that 19 separate drought events occurred in Antelope, Holt, and Knox Counties from January 1, 1950 to January 31, 2016.

TABLE 3.24: NCDC EVENTS SUMMARY [DROUGHT] JANUARY 1, 1950 – JANUARY 31, 2016

| | Antelope County | Holt County | Knox County | Totals |
|-----------------|-----------------|--------------|-------------|--------------|
| Events | 15 | 17 | 13 | 45 |
| Deaths | 0 | 0 | 0 | 0 |
| Injuries | 0 | 0 | 0 | 0 |
| Property Damage | \$0 | \$50,000,000 | \$0 | \$50,000,000 |
| Crop Damage | \$0 | \$10,000,000 | \$0 | \$10,000,000 |

Source: United States Department of Commerce, National Oceanic Atmospheric Administration, National Environmental Satellite, Data, and Information Service, National Climatic Data Center.

LOCATION AND EXTENT

Location and extent contain information on hazard location and extent, magnitude/ strength, speed of onset/ duration, seasonal patterns, and/or secondary effects (when known).

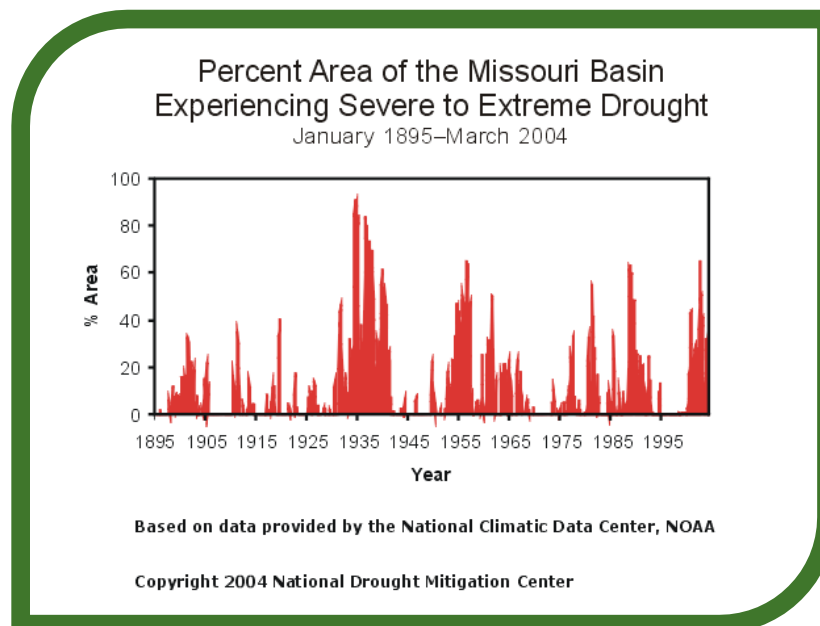
LOCATION [GEOGRAPHIC AREA AFFECTED]

- ✓ [Extensive] 76 to 100 percent of planning area or consistent single-point occurrences.

MAXIMUM PROBABLE EXTENT [MAGNITUDE/ STRENGTH BASED ON HISTORIC EVENTS OR FUTURE PROBABILITY]

- ✓ [Severe] Severe classification on scientific scale, fast speed of onset or long duration of event, resulting in devastating damage and loss of services for weeks or months.

FIGURE 3.14: PERCENT AREA SEVERE TO EXTREME DROUGHT [MISSOURI BASIN] JANUARY 1895 - MARCH 2004



Source: National Drought Mitigation Center.

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

Section Three [Drought]

warning of drought conditions, and assessment of impacts, more difficult than that of quick-onset natural hazards that result in more visible impacts. Figure 3.14 (above) displays the percent area of the Missouri Basin (including Nebraska) experiencing severe to extreme drought from January 1895 to March 2004.

HAZARD IMPACT AND VULNERABILITY TO THE HAZARD

Impact and vulnerability assesses the planning areas' exposure to hazards; considering assets at risk, critical facilities, and future development trends. Vulnerability is measured in general, qualitative terms and is a summary of the potential impact based on past occurrences, spatial extent, and damage/ casualty potential.

- ✓ [High] Widespread potential impact. This ranking carries a high threat to the general population and/or built environment. The potential for damage is widespread. Hazards in this category may have occurred in the past.

Depending on the severity, droughts can have major consequences that are wide spread. Droughts can cause environmental losses due to wildfires, disease, thirst and famine, and crop failure from insufficient moisture to support crop growth. In Nebraska, drought can also contribute to a reduced water supply for the irrigation of crops, a common practice throughout the plan area. In extreme cases, people may even migrate or relocate in search of more productive supplies of water. The National Drought Mitigation Center at the University of Nebraska – Lincoln identified the following potential social drought impacts by relevant sector:

- Health: mental and physical stress (e.g., anxiety, depression, loss of security, domestic violence), health-related low-flow problems (e.g., cross-connection contamination, diminished sewage flows, increased pollutant concentrations, reduced firefighting capability, etc.), reductions in nutrition (e.g., high-cost food limitations, stress-related dietary deficiencies), loss of human life (e.g., from heat stress, suicides), public safety from forest and range fires, increased respiratory ailments, increased disease caused by wildlife concentrations
- Increased conflicts: water user conflicts, political conflicts, management conflicts, other social conflicts (e.g., scientific, media-based)
- Reduced quality of life, changes in lifestyle: in rural areas, in specific urban areas, population migrations (rural to urban areas, migrants into the United States), loss of aesthetic values, disruption of cultural belief systems (e.g., religious and scientific views of natural hazards), reevaluation of social values (e.g., priorities, needs, rights), public dissatisfaction with government drought response, perceptions of inequity in relief, possibly related to socioeconomic status, ethnicity, age, gender, seniority, loss of cultural sites, increased data/information needs, coordination of dissemination activities, recognition of institutional restraints on water use

Environmental drought impacts include those on both human and animal habitats and hydrologic units. During periods of drought, the amount of available water decreases in lakes, streams, aquifers, soil, wetlands, springs, and other surface and subsurface water sources. This decrease in water availability can affect water quality by altering the salinity, bacteria, turbidity, temperature, and pH levels. Changes in any of these levels can have a significant effect on the aquatic habitat of numerous plants and animals found throughout the State. Low water flow may result in decreased sewage flows and subsequent increases in contaminants in the water supply. Decreased availability of water decreases the drinking water supply and the food supply. This disruption can work its way up the food chain within a habitat. Loss of biodiversity and increases in mortality can lead to increases in disease and endangered species. The National Drought Mitigation Center at the University of Nebraska – Lincoln identified the following potential environmental drought impacts by relevant sector:

- Damage to animal species: reduction and degradation of fish and wildlife habitat, lack of feed and drinking water, greater mortality due to increased contact with agricultural producers, as animals seek food from farms and producers are less tolerant of the intrusion, disease, increased vulnerability to predation (from species concentrated near water), migration and concentration (loss of wildlife in some areas and too many wildlife in other areas), increased stress to endangered species, loss of biodiversity

- ❑ Hydrological effects: lower water levels in reservoirs, lakes, and ponds, reduced flow from springs, reduced streamflow, loss of wetlands, estuarine impacts (e.g., changes in salinity levels), increased groundwater depletion, land subsidence, reduced recharge, water quality effects (e.g., salt concentration, increased water temperature, pH, dissolved, oxygen, turbidity)
- ❑ Damage to plant communities: loss of biodiversity, loss of trees from urban landscapes, shelterbelts, wooded conservation areas, increased number and severity of fires, wind and water erosion of soils, reduced soil quality, air quality effects (e.g., dust, pollutants), visual and landscape quality (e.g., dust, vegetative cover, etc.)

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. The National Drought Mitigation Center at the University of Nebraska – Lincoln identified the following potential economic drought impacts by relevant sector:

- ❑ Costs and losses to agricultural producers: annual and perennial crop losses, damage to crop quality, income loss for farmers due to reduced crop yields, reduced productivity of cropland (wind erosion, long-term loss of organic matter, etc.), insect infestation, plant disease, wildlife damage to crops, increased irrigation costs, cost of new or supplemental water resource development (wells, dams, pipelines)
- ❑ Costs and losses to livestock producers: reduced productivity of rangeland, reduced milk production, forced reduction of foundation stock, closure/limitation of public lands to grazing, high cost/unavailability of water for livestock, cost of new or supplemental water resource development (wells, dams, pipelines), high cost/unavailability of feed for livestock, increased feed transportation costs, high livestock mortality rates, disruption of reproduction cycles (delayed breeding, more miscarriages), decreased stock weights, increased predation, range fires
- ❑ Loss from timber production: wildland fires, tree disease, insect infestation, impaired productivity of forest land, direct loss of trees, especially young ones
- ❑ Loss from fishery production: damage to fish habitat, loss of fish and other aquatic organism's due to decreased flows
- ❑ General economic effects: decreased land prices, loss to industries directly dependent on agricultural production (e.g., machinery and fertilizer manufacturers, food processors, dairies, etc.), unemployment from drought-related declines in production, strain on financial institutions (foreclosures, more credit risk, capital shortfalls), revenue losses to federal, state, and local governments (from reduced tax base), reduction of economic development, fewer agricultural producers (due to bankruptcies, new occupations), rural population loss
- ❑ Loss to recreation and tourism industry: loss to manufacturers and sellers of recreational equipment, losses related to curtailed activities: hunting and fishing, bird watching, boating, etc.
- ❑ Energy-related effects: increased energy demand and reduced supply because of drought-related power curtailments, costs to energy industry and consumers associated with substituting more expensive fuels (oil) for hydroelectric power
- ❑ Water suppliers: revenue shortfalls and/or windfall profits, cost of water transport or transfer, cost of new or supplemental water resource development
- ❑ Transportation industry: loss from impaired navigability of streams, rivers, and canals
- ❑ Decline in food production/disrupted food supply: increase in food prices, increased importation of food (higher costs)

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

Section Three [Drought]

the sources of irrigation water becoming limited or unavailable. Drought can negatively impact the economy, social structure, and environment in and around the entire planning area.

ESTIMATE OF THE POTENTIAL LOSSES

Vulnerability and potential losses can be quantified in locations where there is a known, identified hazard area, such as a mapped floodplain. In those locations, the numbers and types of buildings at risk to the identified hazard can be counted and their values calculated. Other data can be collected in regard to the hazard area, such as the location of critical facilities, historic structures, and valued natural resources. This information illustrates the impact and vulnerability of the area to the identified hazard. The vulnerability and potential losses from the other identified hazards, which do not have specific mapped areas or the data to support additional analysis, are discussed in more general, qualitative terms.

The event damage and frequency estimate formulas were determined based upon recorded historical occurrences since 1950. 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 estimate (crop damages are not mitigated by FEMA).

If a drought occurred within the planning area, the table below assumes the event could potentially cause 0.02 percent damage to the total assessed value in an incorporated jurisdiction and throughout rural areas of the Counties. It should be noted that the structural valuation damage estimate is not realistic, as most of potential losses associated with drought are non-structural in nature.

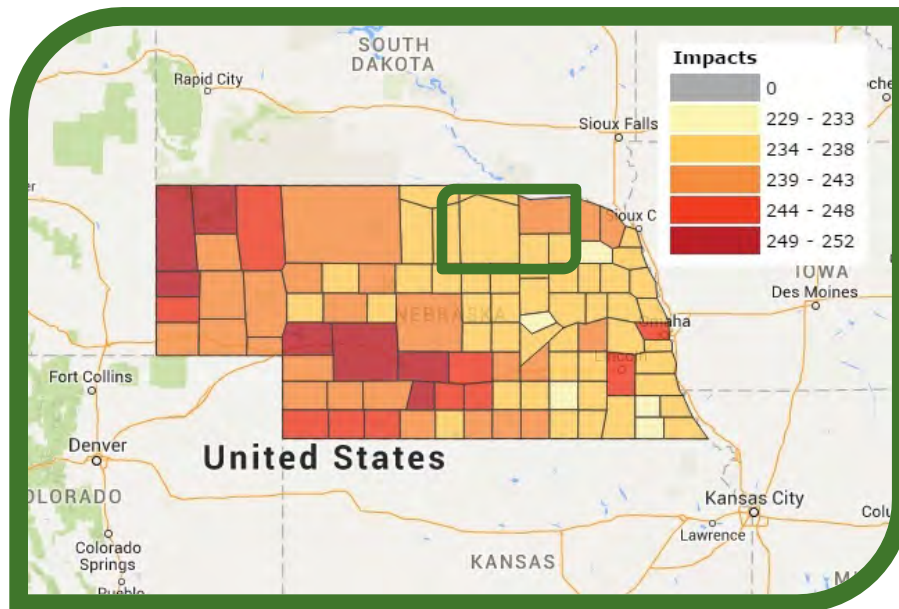
TABLE 3.25: EVENT DAMAGE AND FREQUENCY ESTIMATE [DROUGHT] HISTORICAL ANALYSIS

| Event Damage and Frequency Estimate Formulas | | |
|--|-------------|--|
| Average Annual Damage | \$769,231 | Total Damages Recorded [\$50,000,000] / Total Years on Record [65] |
| Average Damage per Event | \$2,631,579 | Total Damages Recorded [\$50,000,000] / Total Events Recorded [19] |
| Annual Event Frequency | 0.29/year | Total Events Recorded [19] / Total Years on Record [65] |

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 loss 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.

The National Drought Mitigation Center launched the Drought Impact Reporter (DIR) in July 2005 as the nation's first comprehensive database of drought impacts. Drought Impacts from January 1, 2006 to December 31, 2015 for Antelope, Holt, and Knox Counties are shown in Figure 3.15 and detailed in Table 3.30 below.

FIGURE 3.15: DROUGHT IMPACTS [NDMC] JANUARY 1, 2006 – DECEMBER 31, 2015



Source: National Drought Mitigation Center.

TABLE 3.26: DROUGHT IMPACTS [NDMC] JANUARY 1, 2006 – DECEMBER 31, 2015

| Category and Total Impacts | | | |
|----------------------------|----|-----------------------------------|----|
| Agriculture | 60 | Business and Industry | 2 |
| Energy | 1 | Fire | 17 |
| Plants and Wildlife | 14 | Relief, Response and Restrictions | 40 |
| Society and Public Health | 6 | Tourism and Recreation | 4 |
| Water Supply and Quality | 40 | -- | -- |

Source: National Drought Mitigation Center.

PROBABILITY OF FUTURE HAZARD EVENTS

The frequency of historical occurrences was used to gauge the likelihood of future occurrences. Frequency was calculated based on existing data (when available). It was determined by dividing the number of events recorded by the number of years on record, and then multiplying by 100 to calculate a percent. This gives the percent chance of the event occurring in any given year.

- ✓ [Likely] 11 to 90 percent probability of occurrence in the next year.

OVERALL SIGNIFICANCE

Overall significance was determined based on criteria such as frequency and damage, including deaths and injuries, as well as property, crop, and economic damage. Hazards that occur infrequently or have little or no impact on the planning area were determined to be of low significance.

- ✓ [High] The criteria consistently fall in the high classifications and the event is likely/highly likely to occur with severe strength over a significant to extensive portion of the planning area.

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Section Three [Dam Failure]

Dam failure is defined as the collapse, structural failure, or breach of a dam that causes a catastrophic event characterized by the sudden, rapid, and uncontrolled release of impounded water.

SECTION THREE [DAM FAILURE]

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HAZARD MITIGATION PLAN

ANTELOPE, HOLT, AND KNOX COUNTIES

SECTION THREE [DAM FAILURE]

DAM FAILURE

This sub-section outlines the risk assessment for the hazard event dam failure, including hazard profile, previous occurrences of hazard events, location and extent, hazard impact and vulnerability to the hazard, estimate of potential losses, probability of future hazard events, and overall significance. Data on previous occurrences of hazard events from the National Climatic Data Center (NCDC) is summarized below, with full event details in Section Six: Participant Profiles. Geographic, demographic, assets inventory, capabilities assessment, and climate summaries are also provided in Section Six: Participant Profiles, with varying risks facing the planning area discussed in the appropriate sub-sections.

HAZARD PROFILE

The hazard profile provides a description of the hazard, associated issues, and details on the hazard specific to the planning area.

A dam is a barrier constructed across flowing water that stores, controls, or diverts water. The water stored behind a dam is referred to as the reservoir, lake or impoundment, and is measured in acre-feet. One acre-foot is the volume of water that covers one acre of land to a depth of one foot. Most dams have a section called a spillway or weir over which, or through which, water flows, either intermittently or continuously. Dams can benefit farm land, provide recreation areas, generate electrical power, and help control erosion and flooding issues.

A dam failure is the collapse, structural failure, or breach of a dam that causes downstream flooding. Dam failures usually occur when the spillway capacity is inadequate and water overtops the dam, or when internal erosion, or piping, occurs in the dam foundation. If internal erosion or overtopping cause a full structural breach, a high-velocity, debris-laden wall of water is released downstream, damaging or destroying anything in its path. Due to the lack of advanced warning, failures resulting from natural events, such as earthquakes or landslides, may be quite severe.

Dam failures may be caused by natural events, human-caused events, or a combination. Overtopping, due to prolonged rainfall and subsequent flooding, is the most common cause of dam failure in the United States. Dam failures can also result from any one, or a combination, of the following:

- ❑ Prolonged periods of rainfall and flooding or excessive rainfall or snowmelt
- ❑ Inadequate spillway capacity, resulting in excess overtopping flows and large discharge through spillway
- ❑ Internal erosion caused by embankment or foundation leakage or piping
- ❑ Improper maintenance, especially of gates, valves, outlet pipes, and other operational components
- ❑ Improper design, including the use of sub-standard construction materials and construction practices
- ❑ Negligent operation, including failure to remove or open gates or valves during high flow periods
- ❑ Failure of upstream dams on the same waterway
- ❑ Extreme reservoir inflows in excess of design flows
- ❑ Natural disasters

Section Three [Dam Failure]

Dam failure may cause loss of life or serious damage to residential, industrial, or commercial buildings, public utilities, highways, or railroads. The classifications of high, significant, low, or minimal do not apply to the quality of the structure, but rather the potential for death or exposure to property damage according to what lies downstream, as well as the expected impact of a dam failure. Dams constructed in residential, commercial, or industrial areas are classified as high hazard, unless otherwise classified on a case-by-case basis. Dams constructed where there is potential for development receive a high hazard classification. The Nebraska Department of Natural Resources (NDNR) regulates dam safety and classifies dams by the potential hazard each pose to human life and economic loss.

Dams in Nebraska are categorized primarily by the potential for loss of life and damages to property if the dam were to fail. The hazard potential classification is not an assessment of the dam’s condition or its likelihood of failure. The four hazard potential classifications for dams are as follows:

TABLE 3.27: DAM FAILURE [CLASSIFICATIONS] DESCRIPTIONS

| Hazard Potential | Classification Description |
|--------------------|---|
| High Hazard | 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 | 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 | 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 | 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. |

Source: Nebraska Department of Natural Resources (NDNR).

Dams that are classified with high hazard potential require the development 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 if 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 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 involved 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.

PREVIOUS OCCURRENCES OF HAZARD EVENTS

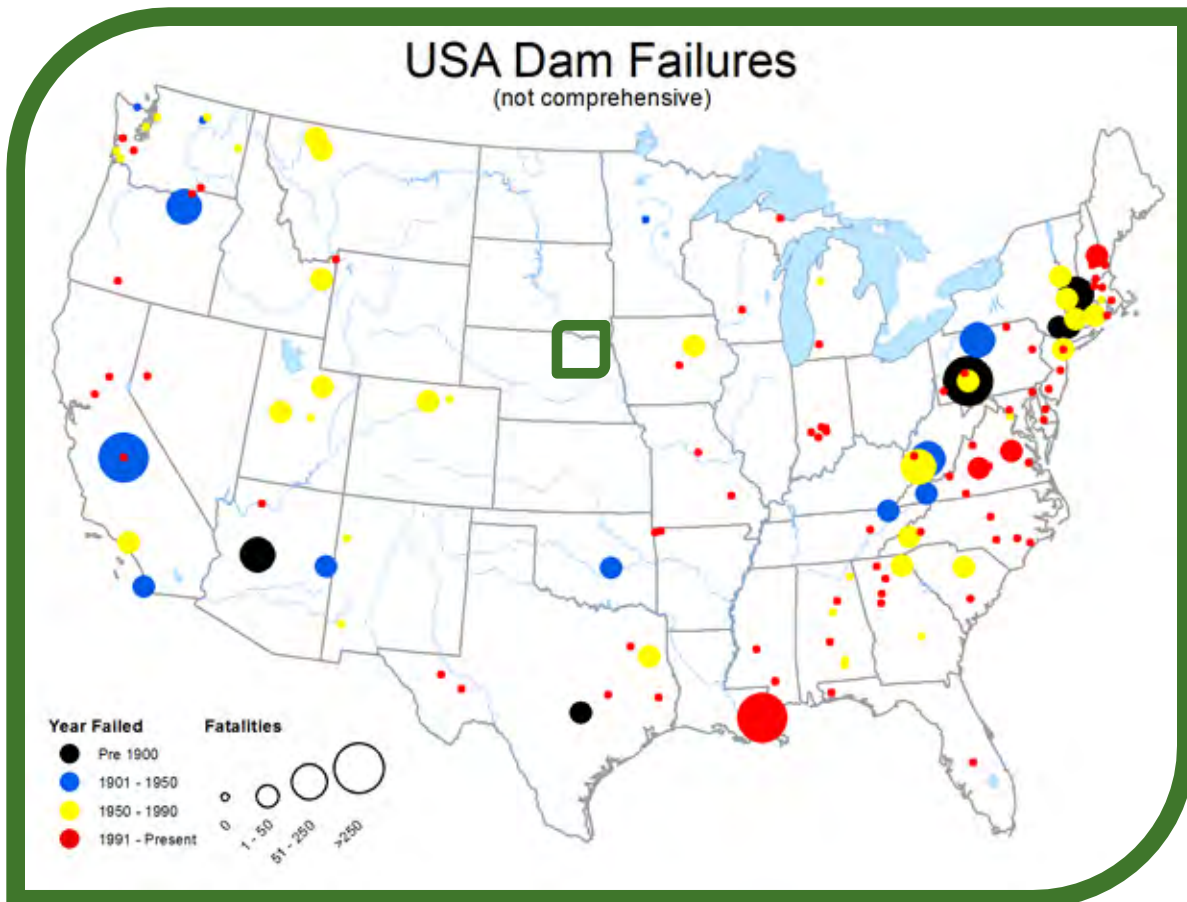
Previous occurrences of hazard events give information on historical occurrences. Historical occurrence worksheets were used to capture information from participating jurisdictions on past occurrences.

There have been no reports of public dam failure within the Antelope, Holt, and Knox Counties planning area; however, historical data from the NDNR indicates that three private dams have failed (Selting, Hanneman, and Waterman) in the planning area. The Selting Dam is located in Antelope County and was last inspected in 1978. The Hanneman Dam is also located in Antelope County and was last inspected 1992. The Waterman dam is in Holt County and was last inspected in 1999. All three of these private dams were breached by natural causes and limited information is available on the extent of damages resulting from the above listed dam failures. Each of the dams were in a rural area and were listed as a low hazard structure in the NDNR dam database, meaning there was low damage potential due to failure and minimal risk of loss of human life. Beyond the loss of the dam structures, there is no record of damages resulting from the failure of the Selting, Hanneman, and Waterman dams.

Hundreds of dam failures have occurred throughout U.S. history. These failures have caused immense property and environmental damages and have taken thousands of lives. As the nation's dams age and population increases, the potential for deadly dam failures grows. No one knows precisely how many dam failures have occurred in the U.S., but they have been documented in every state. From January 1, 2005 through June 2013, state dam safety programs reported 173 dam failures and 587 "incidents" – episodes that, without intervention, would likely have resulted in dam failure.

The map below is based on a non-comprehensive list of dam and levee failures compiled by the Association of State Dam Safety Officials (ASDSO). The map demonstrates that dam failures are not particularly common but they do continue to occur. Locations are approximate. The large red dot on the Gulf Coast represents the New Orleans levee failures resulting from Hurricane Katrina. A few other levee failures are included such as all of those indicated in Northern California. If levee failures from the 1993 floods were included, more failures would be indicated in the center of the map.

FIGURE 3.16: HISTORICAL DAM FAILURES [ASDSO] CONTINENTAL UNITED STATES



Source: Association of State Dam Safety Officials (ASDSO).

LOCATION AND EXTENT

Location and extent contain information on hazard location and extent, magnitude/ strength, speed of onset/ duration, seasonal patterns, and/or secondary effects (when known).

LOCATION [GEOGRAPHIC AREA AFFECTED]

- ✓ [Significant] 26 to 75 percent of planning area or frequent single-point occurrences.

Section Three [Dam Failure]

MAXIMUM PROBABLE EXTENT [MAGNITUDE/ STRENGTH BASED ON HISTORIC EVENTS OR FUTURE PROBABILITY]

- ✓ [Moderate] Moderate classification on scientific scale, moderate speed of onset or moderate duration of event, resulting in some damage and loss of services for days.

According to the NDNR Dam Inventory database, there are zero high hazard dams located within the planning area. The inundation maps for high hazard dams in Nebraska are not available for public viewing. More detailed information regarding inundation areas is available through the Nebraska Department of Natural Resources. Table 3.32 below summarizes the total number of dams located within the planning area by county and classification. Refer to Figure 3.17 also for a map showing the location of the dams in these three counties.

FIGURE 3.17: MAP OF DAM INVENTORY FOR ANTELOPE, HOLT AND KNOX COUNTIES

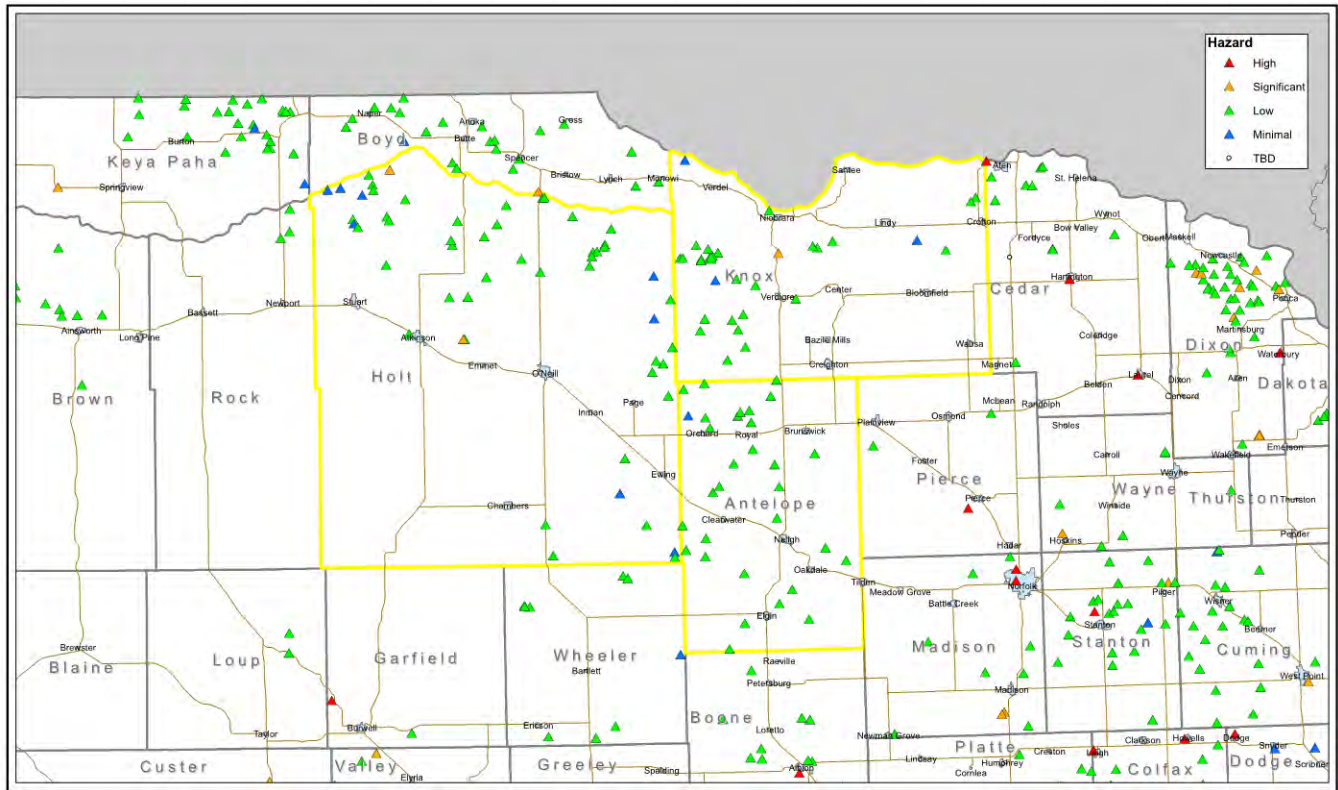


TABLE 3.28: TOTAL NUMBER OF DAMS [NDNR] COUNTY AND CLASSIFICATION

| County | Classification | | | | Total |
|-----------------|----------------|-------------|------------|-----------|------------|
| | High | Significant | Low | Minimal | |
| Antelope County | 0 | 0 | 30 | 1 | 31 |
| Holt County | 0 | 3 | 43 | 7 | 53 |
| Knox County | 0 | 1 | 28 | 3 | 32 |
| Total | 0 | 4 | 101 | 11 | 116 |

Source: Nebraska Department of Natural Resources (NDNR).

HAZARD IMPACT AND VULNERABILITY TO THE HAZARD

Impact and vulnerability assesses the planning areas' exposure to hazards; considering assets at risk, critical facilities, and future development trends. Vulnerability is measured in general, qualitative terms and is a summary of the potential impact based on past occurrences, spatial extent, and damage/ casualty potential.

- ✓ [Low] Minimal potential impact. The occurrence and potential cost of damage to life and property is minimal.

Water released by a failed dam generates tremendous energy and can cause a flood that is catastrophic to life and property. A catastrophic dam failure could challenge local response capabilities and require evacuations to save lives. Impacts to life safety will depend on the warning time and the resources available to notify and evacuate the public. Major casualties and loss of life could result, as well as water quality and health issues. Potentially catastrophic effects to roads, bridges, and homes are also of major concern. Associated water quality and health concerns could also be issues. Factors that influence the potential severity of a full or partial dam failure are the amount of water impounded; the density, type, and value of development and infrastructure located downstream; and the speed of failure.

ESTIMATE OF THE POTENTIAL LOSSES

Vulnerability and potential losses can be quantified in locations where there is a known, identified hazard area, such as a mapped floodplain. In those locations, the numbers and types of buildings at risk to the identified hazard can be counted and their values calculated. Other data can be collected in regard to the hazard area, such as the location of critical facilities, historic structures, and valued natural resources. This information illustrates the impact and vulnerability of the area to the identified hazard. The vulnerability and potential losses from the other identified hazards, which do not have specific mapped areas or the data to support additional analysis, are discussed in more general, qualitative terms.

Potential losses associated with a dam failure event vary greatly depending on the severity of the event. 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. If dam failure is imminent, the Emergency Action Plan (EAP) governs the course of action.

- ❑ Currently Antelope County does not have any dams that required an EAP.
- ❑ Currently Holt County does not have any dams that required an EAP.
- ❑ Currently Knox County does not have any dams that required an EAP.

PROBABILITY OF FUTURE HAZARD EVENTS

The frequency of historical occurrences was used to gauge the likelihood of future occurrences. Frequency was calculated based on existing data (when available). It was determined by dividing the number of events recorded by the number of years on record, and then multiplying by 100 to calculate a percent. This gives the percent chance of the event occurring in any given year.

- ✓ [Unlikely] Less than 1 percent probability of occurrence in the next.

OVERALL SIGNIFICANCE

Overall significance was determined based on criteria such as frequency and damage, including deaths and injuries, as well as property, crop, and economic damage. Hazards that occur infrequently or have little or no impact on the planning area were determined to be of low significance.

- ✓ [Low] Two or more criteria fall in lower classifications or the event has a minimal impact on the planning area. This rating is sometimes used for hazards with a minimal or unknown record of occurrences or for hazards with minimal mitigation potential.

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Section Four [Mitigation Strategy]

Section Four discusses the establishment of mitigation goals, objectives, actions, and the action plan for implementation. Goals provide the framework for identifying mitigation actions, the on-the-ground activities to reduce the effects of natural hazards. All actions were evaluated by participants utilizing the FEMA recommended process.

SECTION FOUR [MITIGATION STRATEGY]

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HAZARD MITIGATION PLAN

ANTELOPE, HOLT, AND KNOX COUNTIES

SECTION FOUR [MITIGATION STRATEGY]

FEDERAL PLANNING REGULATIONS

REGULATION CHECKLIST 44 CODE OF FEDERAL REGULATIONS (CFR) 201.6 LOCAL MITIGATION PLANS



§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.

- Does the plan document each jurisdiction's existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs? (Requirement §201.6(c)(3))
- Does the Plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards? (Requirement §201.6(c)(3)(i))



§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.

- Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? (Requirement §201.6(c)(3)(ii))
- Does the Plan describe a process by which local governments will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate? (Requirement §201.6(c)(4)(ii))



§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.

- Does the Plan address each jurisdiction's participation in the NFIP and continued compliance with NFIP requirements, as appropriate? (Requirement §201.6(c)(3)(ii))



§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.

- Does the Plan contain an action plan that describes how the actions identified will be prioritized (including cost benefit review), implemented, and administered by each jurisdiction? (Requirement §201.6(c)(3)(iv)); (Requirement §201.6(c)(3)(iii))



§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.

Source: Federal Emergency Management Agency.

INTRODUCTION

The heart of the mitigation plan is the mitigation strategy, which serves as the long-term blueprint for reducing the potential losses identified in the risk assessment. The mitigation strategy describes how the jurisdictions will accomplish the overall purpose, or mission, of the plan.

Mitigation focuses on breaking the cycle of disaster damage, reconstruction, and repeated damage. Mitigation efforts provide value to the American people by creating safer cities and reducing loss of life and property. Mitigation includes activities such as:

- ❑ Complying with, or exceeding, the National Floodplain Insurance Program (NFIP) floodplain management regulations
- ❑ Enforcing stringent building codes, flood-proofing requirements, seismic design standards, and wind-bracing requirements for new construction or repairing existing buildings
- ❑ Adopting zoning ordinances that steer development away from areas subject to flooding
- ❑ Retrofitting public buildings to withstand tornado-strength winds or ground shaking
- ❑ Acquiring damaged homes or businesses in flood-prone areas, relocating the structures, and returning the property to open space, wetlands, or recreational uses
- ❑ Building tornado shelters and safe rooms to help protect people in their homes, public buildings, and schools in tornado-prone areas

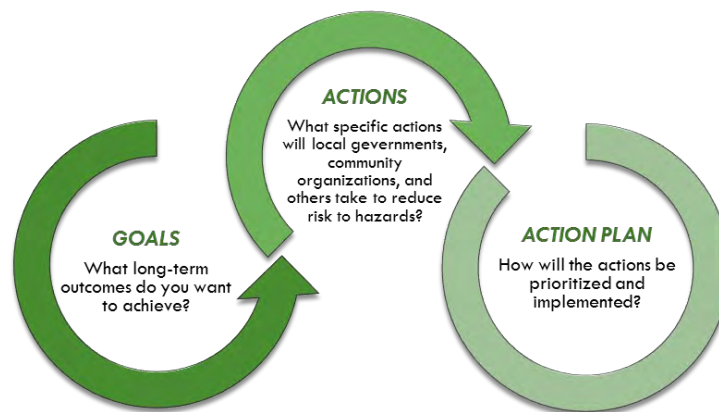
THE MITIGATION STRATEGY

The mitigation strategy is comprised of three main required components: mitigation goals, mitigation actions, and the action plan for implementation. These provide the framework to identify, prioritize, and implement actions to reduce risks to hazards. Mitigation goals are general guidelines that explain what the jurisdictions want to achieve with the plan. They are broad policy-type statements that are long-term, and represent visions for reducing or avoiding losses from the identified hazards.

Mitigation objectives are optional, but help better define or organize mitigation actions. Objectives define strategies to attain the goals and are more specific and measurable. Objectives connect goals with the actual mitigation actions.

Mitigation actions are specific projects and activities that help achieve the goals. The action plan describes how the mitigation actions will be implemented, including how those actions will be prioritized, administered, and incorporated into the jurisdictions' existing planning mechanisms.

FIGURE 4.1: MITIGATION STRATEGY [FEMA] GOALS, ACTIONS, AND ACTION PLAN



Source: Federal Emergency Management Agency.

MITIGATION GOALS

The hazard mitigation goals represent what the jurisdictions seek to achieve through plan implementation. Clear goals that were agreed upon by the planning team, elected officials, and public provided the basis for prioritizing mitigation actions. Mitigation goals are required to be consistent with hazards identified in the risk assessment.

Antelope, Holt, and Knox Counties reviewed the results of the hazard identification, vulnerability assessment, and capability assessment. This analysis of the risk assessment identified areas where improvements could be made and provided the framework to reevaluate and formulate goals, objectives, and actions, which ultimately led to the action plan and overall mitigation strategy.

Antelope, Holt, and Knox Counties were provided with the previous goals from the Antelope, Holt, and Knox Counties Multi-Jurisdictional All-Hazards Mitigation Plan, July 2010 plan to reaffirm or modify them based on current conditions and priorities. Goals were defined for the purpose of this mitigation plan as broad-based public policy statements that represent basic desires of the jurisdictions, encompass all aspects of the jurisdictions, public and private, refer to the quality (not the quantity) of the outcome, and are future-oriented.

Based on the risk assessment review and goal setting process, Antelope, Holt, and Knox Counties identified the following goals and objectives, which provide direction for reducing future hazard-related losses within the planning area.

FIGURE 4.2: MITIGATION GOALS AND OBJECTIVES [HMP] ANTELOPE, HOLT, AND KNOX COUNTIES



MITIGATION ACTIONS

Mitigation actions are a specific project, activity, or process taken to reduce or eliminate long-term risk to people and property from hazards. Implementing mitigation actions helps achieve the plan's mission and goals. The mitigation actions are a key outcome of the planning process and form the core of the plan. The primary types of actions include: Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, and Education and Awareness Programs.

The mitigation planning regulations require that each participating jurisdiction identify and analyze a comprehensive range of specific actions and projects to reduce the impacts of hazards identified in the risk assessment. The emphasis was on impacts or vulnerabilities identified, not the actual hazards themselves. Jurisdictions considered actions that would reduce risk to existing buildings and infrastructure, as well as limit risk to new development and redevelopment. In addition to reviewing the mitigation actions from the previous plans, Antelope, Holt, and Knox Counties also considered and defined several new actions.

Mitigation actions reduce or eliminate long-term risk and differ from actions taken to prepare for or respond to hazard events. Mitigation activities lessen or eliminate the need for preparedness or response resources in the future. After analyzing risks and identifying mitigation actions, the jurisdictions also considered emergency response or operational preparedness actions including:

- ❑ Creating mutual aid agreements with neighboring jurisdictions to meet emergency response needs
- ❑ Purchasing radio communications equipment
- ❑ Developing procedures for notifying citizens of available shelter locations during and following an event

For some hazards, such as tornados, including preparedness actions in the mitigation plan are necessary and practical. The mitigation plan is the best place for jurisdictions to capture and justify the need for these actions.

Funding and support may not be immediately available for every action in the plan, or the actions may lead to future opportunities for implementation. For example, some actions can be implemented following a disaster when additional funding, political, and public support are available, such as acquiring homes in a flood hazard area. Additionally, if actions are not included in the plan, securing funding may be more difficult once it becomes available.

The below is the list of hazard considered followed by potential Mitigation Strategies

- ❑ Severe Winter Storms – Design and Construction of Storm Shelters, Public education and awareness, Better Warning Systems
- ❑ Severe Thunderstorms – Design and Construction of Storm Shelters, Public education and awareness, Better Warning Systems
- ❑ Tornados – Design and Construction of Storm Shelters, Education, Better Warning Systems
- ❑ Floods – Limit or restrict development in flood-prone areas, participate in the NFIP, Acquire property or flood-proofing of structures in floodplain
- ❑ Extreme Heat – Public education, Increased monitoring and community awareness, Developing a vulnerable populations database within the community
- ❑ Drought – Identify and develop new/additional water sources, develop ground water/irrigation management plans, establish drought best management practices and develop an implementation plan, Upgrade rural water infrastructure
- ❑ Dam Failure – Evacuation plan, Dam failure exercise, Public education and awareness

PRIORITIES AND ACTIONS

Antelope, Holt, and Knox Counties analyzed viable mitigation options that supported the identified goals and objectives, then prioritized the actions for implementation by assessing the importance of each option relative to the risks and capabilities. The actions identified through the evaluation and prioritization process are the most acceptable and practical for addressing the hazards in the risk assessment.

Prioritization may vary over time in response to changes in the jurisdictions' characteristics, risks, or to take advantage of available resources. Addressing changes in priorities allowed jurisdictions to redirect actions to reflect current conditions, including financial and political realities, or any changes due to disaster events. Factors that may influence future changes in priorities include:

- ❑ Altered conditions due to disaster events and recovery priorities
- ❑ New or changing local partners, interests, resources, needs, and capabilities
- ❑ New State or Federal policies and funding resources
- ❑ New hazard impacts identified in the updated risk assessment
- ❑ Changes in development patterns that could influence the effects of hazards

The action items referenced in this plan are very similar to those that were identified in the 2010 plan. The reason for this is that there has been very little change in the area demographics, infrastructure, and critical facilities. For the most part, the participating jurisdictions' priorities have remained unchanged since 2010. Refer to *Section Six: Participant Profiles*, for additional details.

New actions were identified based on the updated risk and capability assessments, and prioritized in combination with the actions carried forward from the previous plans. Mitigation actions identified in the previous plans had yet to be completed, with no previous efforts noted, due to lack of political support, funding, or personnel availability. All previously identified actions were still deemed relevant and included as part of the updated plan, either as stand-alone actions or combined with similar goal-oriented actions.

Antelope, Holt, and Knox Counties considered the benefits that would result from a mitigation action versus the cost. A planning level benefit-cost assessment and review of whether the costs were reasonable, compared to the probable benefits, was a key part of the evaluation and prioritization process. Cost estimates are not exact, but based on experience and best judgment. Benefits included losses avoided such as the number and value of structures, infrastructure and critical facilities, and the population protected from serious injury or loss of life. Qualitative benefits, such as quality of life or natural and beneficial functions of ecosystems, were also included in the review.

For each action, jurisdictions evaluated the potential benefits and/or likelihood of successful implementation by ranking each criteria (outlined below) with a (-1) ineffective or not feasible, (0) neutral, or (+1) highly effective or feasible. Mitigation actions that received an overall ranking greater than zero are detailed in the action plan. The criteria and questions used to evaluate each mitigation action, as recommended by the Federal Emergency Management Agency (FEMA) included:

Section Four [Mitigation Strategy]

FIGURE 4.3: EVALUATION CRITERIA [FEMA] MITIGATION ACTIONS



Source: Federal Emergency Management Agency.

THE ACTION PLAN

The action plan lays the groundwork for implementation. The plan was developed to present the recommendations established by Antelope, Holt, and Knox Counties on how the participating jurisdictions can reduce risk and vulnerability of people, property, infrastructure, and natural resources to future disaster losses. The action plan identifies how mitigation actions will be implemented, including who is responsible for which actions, what funding mechanisms and other resources are available or will be pursued, when actions will be completed, and how they are prioritized.

Plan updates reflect progress in local mitigation efforts. The integration of the plan into existing planning mechanisms and the implementation of mitigation actions demonstrate progress in risk reduction. Details describing how the current mitigation strategy, including goals and actions, will be incorporated into existing mechanisms are discussed in *Section Five: Review, Evaluation, and Implementation* in more detail. However, in general each jurisdiction (county, city, or village) will need to take all the mitigation action items into account when local plans (comprehensive plans, zoning ordinance updates, subdivision regulations, capital improvement plans, etc.) are redone or revised. Each mitigation item will be looked at to see if the jurisdiction can add each individual mitigation item into a current plan so it can be accomplished. Also each jurisdiction will make sure all the local

plans do not contradict with the proposed mitigation action items but instead work in coordination with them. This process has been implemented on the local plans between the 2010 plan and this plan and is reflected in current mitigation action items that have been included in this plan.

Listed below are the current authorities, policies, programs and resources for the eight full participants. These existing documents or programs will be used along with the proposed mitigation action items as the action plan is completed.

TABLE 4.1: EXISTING AUTHORITIES, POLICIES, PROGRAMS AND RESOURCES

| Participating Jurisdiction | Authorities, Policies, Programs and Resources |
|----------------------------|---|
| Antelope County | Comprehensive Plan, Capital Improvements Plan, Local Emergency Operation Plan, Transportation Plan, Zoning/Subdivision Regulations, NFIP |
| Holt County | Comprehensive Plan, Economic Development Plan, Local emergency Operations Plan, Continuity of Operations Plan, Transportation Plan, Stormwater Management, Community Wildfire Protection Plan, Zoning/Subdivision Regulations |
| Ewing | Local emergency Operations Plan, Continuity of Operations Plan |
| Stuart | No current plans, a Comprehensive/Master Plan is currently being written |
| Knox County | Comprehensive Plan, Capital Improvements Plan, Economic Development Plan, Local emergency Operations Plan, Continuity of Operations Plan, Zoning/Subdivision Regulations |
| Center | Comprehensive Plan, Local emergency Operations Plan, Continuity of Operations Plan |
| Creighton | Comprehensive Plan, Capital Improvements Plan, Zoning/Subdivision Regulations |
| Niobrara | Comprehensive Plan |

The action plan detailed below contains both new actions developed for this plan update, as well as viable actions that had yet to be completed from the previous plans. Each action item is listed with a current status statement. The status will be one of the following three option:

- **New – Mitigation Action Items that are new in the 2016 plan**
- **Continued Action (Ongoing Action) – These 2010 action items have been completed to a certain point but require continued review and work on them**
- **Continued Action (Insufficient Funding) – These 2010 action items have not been completed due to insufficient funding. The jurisdictions still intend to complete these action items if funding becomes available.**

The action plan detailed below contains both new actions developed for this plan update, as well as viable actions that had yet to be completed from the previous plans. Each action item is listed with a current status statement. Mitigation Actions items that are new in this 2016 plan are listed as new. Many of the action items from the 2010 Plan are items that have been completed to a certain point but require continued review and/or work on them. Those items are shown as items that require an ongoing action. The remainder of the actions items are from the 2010 plan and have not yet been completed due to not enough funding to allow the jurisdictions to complete them. The jurisdictions still intend to complete these action items if funding becomes available.

The actions are also listed by Priority with High being listed first. Each jurisdiction ranked the chosen action items by priority during the planning process and that ranking will be utilized if and when funding becomes available. The selected action item will be determined from discussions between the individual jurisdiction, specific county and pertinent Emergency Manager. Priority rankings, available funding, local needs, and other specific criteria will be used to select which action items will be completed.

Section Four [Mitigation Strategy]

LOCAL PLANS AND REGULATIONS

These actions include government authorities, policies, or codes that influence the way land and buildings are developed and built.

The Emergency Managers for each county will ultimately be responsible for the implementation of each mitigation action.

Liz Doerr (Zoning Administrator) – Antelope County

Deb Hilker (Emergency Manager) – Holt County

Laura Hintz (Emergency Manager) – Knox County

MIGATION ACTION ITEMS

ANTELOPE COUNTY

ANTELOPE COUNTY

Antelope County determined that existing and future flooding potential was a high concern. They were concerned with areas that currently flood or have the potential to flood in the future. They also wanted to improve warning and safety systems. These concerns were discussed and used to create most of the Mitigation Action Items. These Mitigation Action Items are fairly similar to the items listed in the 2010 Plan.

PARTICIPATE OR MAINTAIN GOOD STANDING IN THE NATIONAL FLOOD INSURANCE PROGRAM

[Background] Participate in the National Flood Insurance Program (NFIP) or maintain good standing with the NFIP including floodplain management practices/requirements and regulation enforcements and updates.

[Benefits] Enable property owners to purchase insurance protection against flood losses. Good standing enables participants to apply for Pre-Disaster Mitigation Grant Program and Hazard Mitigation Grant Program cost-share.

[Responsible Agency & Partners] Antelope County Board of Commissioners and Planning and Zoning Commission

[Cost Estimate & Funding] \$5,000, Tax Revenue, grants, bequeaths

[Timeline] Continuous

[Priority] High

[Status] This a continued action from past plan that is an ongoing action.

DRAINAGE ASSESSMENT FOR BRIDGE AND CULVERT IMPROVEMENTS

[Background] Preliminary drainage studies and assessments can be conducted to identify and prioritize design improvements to address site specific localized flooding/drainage issues to reduce and/or alleviate flooding. Stormwater master plans can be conducted to perform a community-wide stormwater evaluation, identifying multiple problem areas and potential drainage improvements.

[Benefits] Proactive steps to identify all potential problems/issues can lead to effectively addressing improvements and prioritizing the projects to improve conditions. These improvements can serve to more effectively convey runoff within jurisdictions, preventing interior localized flooding resulting in damages. This ensures that the most beneficial projects are done first and could possibly eliminate the need for others.

[Responsible Agency & Partners] Antelope County Engineering, Roads Department, and Lower Niobrara Natural Resource District

[Cost Estimate & Funding] \$10,000 to \$100,000+; Hazard Mitigation Assistance Grant Programs, Community Development Block Grant, Natural Resources Districts

[Timeline] 1-3 years

[Priority] High

[Status] Continued Action from previous plan that requires ongoing action.

FLOODPLAIN DEVELOPMENT ORDINANCE ENFORCEMENT

[Background] Continue or improve floodplain management practices such as adoption and enforcement of floodplain management requirements (regulation of construction in significant flood hazard areas), floodplain identification and mapping (local requests for map updates), description of community assistance and monitoring activities, explanation for failure to participate in the National Flood Insurance Program, Community Rating System (CRS), and participation in Federal Emergency Management Agency's Cooperating Technical Partners Program (CTP) to increase local involvement in the flood mapping process. Continue to enforce local floodplain regulations for structures located in the 100-year floodplain. Strict enforcement of the type of development and elevations of structures should be considered through issuance of floodplain development permits by any community or County. Continue education of building inspectors or Certified Floodplain Managers. Encourage building regulations for storm resistance structures.

[Benefits] Continue compliance with the National Flood Insurance Program. Good standing enables participants to apply for Pre-Disaster Mitigation Grant Program and Hazard Mitigation Grant Program cost-share. Ensures that no new structures built will be vulnerable to flooding. Reducing damages and health risks associated with flooding.

[Responsible Agency & Partners] Antelope County Administration and/or Floodplain Management Departments, Nebraska Department of Natural Resources

[Cost Estimate & Funding] \$5,000+; Hazard Mitigation Assistance Grant Programs, Community Development Block Grant

[Timeline] 1-3 years

[Priority] High

[Status] Continued Action from previous plan that requires ongoing action.

STORM SHELTER AND SAFE ROOMS

[Background] Assess, design and construct fully supplied safe rooms in highly vulnerable urban and rural areas such as mobile home parks, campgrounds, schools, and other such areas throughout the planning area. Assess the adequacy of current public buildings to be used as safe rooms. Construct safe rooms in areas of greatest need, either as new construction or retrofitting.

[Benefits] Reduce the risk of death or injury in areas vulnerable to tornados, severe thunderstorms and other hazards.

[Responsible Agency & Partners] Antelope County Administration, Planning, and/or Emergency Management Departments

[Cost Estimate & Funding] \$400 to \$500/square foot (stand-alone), \$350 to 400/square foot (addition/retrofit); Hazard Mitigation Assistance Grant Programs

[Timeline] 1-3 years

[Priority] High

Section Four [Mitigation Strategy]

[Status] Continued Action from previous plan that has not been completed yet due to insufficient funding.

STREAM BANK STABILIZATION

[Background] Stream bank/bed degradation can occur along many rivers and creeks. Stabilization improvements including rock rip rap, vegetative cover, j-hooks, boulder vanes, etc. can be implemented to reestablish the channel banks. Grade control structures including sheet-pile weirs, rock weirs, ponds, road dams, etc. can be implemented and improved to maintain the channel bed. Channel stabilization can protect structures, increase conveyance and provide flooding benefits. Flood protection for critical and/or highly vulnerable facilities, areas, populations, and infrastructure is key.

[Benefits] Stream bed/grade stabilization improvements can serve to more effectively protect structures, increase conveyance, prevent down cutting, and provide flooding benefits.

[Responsible Agency & Partners] Antelope County, Public Works, Utility, and/or Floodplain Management Department, and Lower Niobrara Natural Resources District

[Cost Estimate & Funding] \$50,000 to \$100,000+; Hazard Mitigation Assistance Grant Programs, Natural Resources Districts

[Timeline] 1-3 years

[Priority] High

[Status] Continued Action from previous plan that requires ongoing action.

BACKUP GENERATORS

[Background] Provide a portable or stationary source of backup power to redundant power supplies and other critical facilities and shelters.

[Benefits] Reduce the danger to human life/health by keeping utilities operating. Reduce the economic downtime associated with utility loss.

[Responsible Agency & Partners] Antelope County, Individual City or Villages Public Works Departments and/or Emergency Management Department(s)

[Cost Estimate & Funding] \$20,000 to \$35,000/generator; Hazard Mitigation Assistance Grant Programs

[Timeline] 1-3 years

[Priority] High

[Status] Continued Action from previous plan that has not been completed yet due to insufficient funding.

TREE CITY U.S.A.

[Background] Work to become a Tree City U.S.A. through the National Arbor Day Foundation to receive direction, technical assistance, and public education on how to establish a hazardous tree identification and removal program to limit potential tree damage and damages caused by trees in a community when a storm event occurs. The four main requirements include: 1) Establish a tree board; 2) Enact a tree care ordinance; 3) Establish a forestry care program; 4) Enact an Arbor Day observance and proclamation.

[Benefits] Better maintained trees and hazardous tree removal will eliminate damages to power lines and personal property during hazards events. Participation in Tree City U.S.A. will support community actions to mitigate damages from trees.

[Responsible Agency & Partners] Antelope County Board of Commissioners and Planning and Zoning Commission

[Cost Estimate & Funding] \$5,000+; Arbor Day Foundation, United States/State Forest Service

[Timeline] 3-5 years

[Priority] Medium

[Status] Continued Action from previous plan that requires ongoing action.

PUBLIC AWARENESS AND EDUCATION CAMPAIGNS

[Background] Through activities such as outreach projects, distribution of maps and environmental education increase public awareness of natural hazards to both public and private property owners, renters, businesses, and local officials about hazards and ways to protect people and property from these hazards. In addition, educate citizens on erosion control and water conservation methods.

[Benefits] Public awareness reduces the risk of property loss and damage, injury and death. It increases knowledge on emergency procedures, facilities, conservation, and is key to preparedness.

[Responsible Agency & Partners] Antelope County, Individual City or Villages Public Works Departments and/or Emergency Management Department(s)), Antelope County

[Cost Estimate & Funding] \$1,000+; Hazard Mitigation Assistance Grant Programs

[Timeline] 4-5 years

[Priority] Medium

[Status] Continued Action from previous plan that requires ongoing action.

UNDERGROUND OR IDENTIFY AND RETROFIT POWER AND SERVICE LINES

[Background] Communities can work with their local Public Power District or Electricity Department to identify vulnerable transmission and distribution lines and plan to bury lines underground, upgrade, or retrofit existing structures to be less vulnerable to storm events. Electrical utilities shall be required to use underground construction methods where possible for future installation of power lines. Rural Water Districts can work with their County or Natural Resources District to identify vulnerable distribution lines near river crossings or creek beds and plan to place lines underground to reduce vulnerability from storm events and erosion.

[Benefits] To protect the power and water infrastructure and prevent lines from coming down or being washed out during storm events.

[Responsible Agency & Partners] Antelope County Individual City or Villages Public Works Departments and/or Emergency Management Departments, Public Power Districts, Rural Water Districts, Natural Resources Districts

[Cost Estimate & Funding] \$60,000 to \$80,000/mile (electrical); Hazard Mitigation Assistance Grant Programs, Public Power Districts, Rural Water Districts, Natural Resources Districts

[Timeline] 1-3 years

[Priority] Low

[Status] Continued Action from previous plan that requires ongoing action.

Section Four [Mitigation Strategy]

WEATHER RADIOS

[Background] Conduct an inventory of weather radios at schools and other critical facilities and provide new radios as needed. Potentially had a new weather tower constructed to increase radio service to larger coverage areas.

[Benefits] Reduces the risk of death/injury associated with severe weather conditions by communication.

[Responsible Agency & Partners] Antelope County Board Individual City or Villages Public Works Departments and/or Emergency Management Departments

[Cost Estimate & Funding] \$300,000; Hazard Mitigation Assistance Grant Programs, Tax Funding

[Timeline] 1-3 years

[Priority] Low

[Status] Continued Action from previous plan that has not been completed yet due to insufficient funding.

HOLT COUNTY

HOLT COUNTY

Holt County determined that existing or future flooding potential was a high concern. They were concerned with areas that currently flood or have the potential to flood in the future. They also wanted to improve warning and safety systems. These concerns were discussed and used to create most of the Mitigation Action Items. These Mitigation Action Items are fairly similar to the items listed in the 2010 Plan.

STREAM BANK STABILIZATION

[Background] Stream bank/bed degradation can occur along many rivers and creeks. Stabilization improvements including rock rip rap, vegetative cover, j-hooks, boulder vanes, etc. can be implemented to reestablish the channel banks. Grade control structures including sheet-pile weirs, rock weirs, ponds, road dams, etc. can be implemented and improved to maintain the channel bed. Channel stabilization can protect structures, increase conveyance and provide flooding benefits. Flood protection for critical and/or highly vulnerable facilities, areas, populations, and infrastructure is key.

[Benefits] Stream bed/grade stabilization improvements can serve to more effectively protect structures, increase conveyance, prevent down cutting, and provide flooding benefits.

[Responsible Agency & Partners] Holt County, Public Works, Utility, and/or Floodplain Management Department, and Lower Niobrara Natural Resources District

[Cost Estimate & Funding] \$50,000 to \$100,000+; Hazard Mitigation Assistance Grant Programs, Natural Resources Districts

[Timeline] 1-3 years

[Priority] High

[Status] Continued Action from previous plan that requires ongoing action.

ROAD AND EMBANKMENT IMPROVEMENTS

[Background] Identify, design, and construct road and embankment improvements as necessary for proper drainage and to adequately manage the traffic load.

[Benefits] Properly designed and constructed roads and embankments promote safer travel and allow for increased emergency response.

[Responsible Agency & Partners] Holt County Board of Commissioners and Planning and Zoning Commission

[Cost Estimate & Funding] \$50,000+; Hazard Mitigation Assistance Grant Programs

[Timeline] 1-3 years

[Priority] High

[Status] This a continued action from past plan that is an ongoing action.

WARNING SYSTEMS

[Background] Improve city cable TV interrupt warning system and implement telephone interrupt system such as Reverse 911.

[Benefits] Reduces the risk of death/injury associated with severe weather; promoting awareness and ensures people take shelter when needed.

[Responsible Agency & Partners] Holt County, Public Works, Utility, and/or Floodplain Management Department

[Cost Estimate & Funding] \$5,000+; Hazard Mitigation Assistance Grant Programs, Natural Resources Districts

[Timeline] 1-3 years

[Priority] High

[Status] Continued Action from previous plan that has not been completed yet due to insufficient funding.

EMERGENCY COMMUNICATIONS

[Background] Establish an action plan to improve communication between agencies to better assist residents and businesses during and following emergencies. Establish inner-operable communications.

[Benefits] Coordination and clear and efficient communications between agencies increases the capabilities to protect and rescue, increases safety, and reduces the risk of mistakes due to miscommunications.

[Responsible Agency & Partners] Holt County

[Cost Estimate & Funding] \$10,000+; Hazard Mitigation Assistance Grant Programs,

[Timeline] 1-3 years

[Priority] High

[Status] Continued Action from previous plan that has not been completed yet due to insufficient funding.

FLOOD-PRONE PROPERTY ACQUISITION

[Background] Voluntary acquisition and demolition of properties prone to flooding will reduce the general threat of flooding for communities. Additionally, this can provide flood insurance benefits to those communities within the National Flood Insurance Program. Repetitive loss structures are typically highest priority.

[Benefits] Voluntary acquisition and demolition of properties prone to flooding will reduce the damages associated with flooding for communities. Additionally, this can provide flood insurance benefits to those communities within the National Flood Insurance Program. Communities must be in good standing with National Flood Insurance Program to be eligible for Hazard Mitigation Grant Program.

Section Four [Mitigation Strategy]

[Responsible Agency & Partners] Holt County, Public Works, Utility, and/or Floodplain Management Department, and Middle Republican Natural Resources District

[Cost Estimate & Funding] \$10,000+; Hazard Mitigation Assistance Grant Programs, Community Development Block Grant, Natural Resources Districts

[Timeline] 1-3 years

[Priority] High

[Status] Continued Action from previous plan that requires ongoing action.

DRAINAGE ASSESSMENT FOR BRIDGE AND CULVERT IMPROVEMENTS

[Background] Preliminary drainage studies and assessments can be conducted to identify and prioritize design improvements to address site specific localized flooding/drainage issues to reduce and/or alleviate flooding. Stormwater master plans can be conducted to perform a community-wide stormwater evaluation, identifying multiple problem areas and potential drainage improvements.

[Benefits] Proactive steps to identify all potential problems/issues can lead to effectively addressing improvements and prioritizing the projects to improve conditions. These improvements can serve to more effectively convey runoff within jurisdictions, preventing interior localized flooding resulting in damages. This ensures that the most beneficial projects are done first and could possibly eliminate the need for others.

[Responsible Agency & Partners] Holt County Engineering, Roads Department, and Lower Niobrara Natural Resource Districts

[Cost Estimate & Funding] \$10,000 to \$100,000+; Hazard Mitigation Assistance Grant Programs, Community Development Block Grant, Natural Resources Districts

[Timeline] 1-3 years

[Priority] Medium

[Status] Continued Action from previous plan that requires ongoing action.

STORM SHELTER AND SAFE ROOMS

[Background] Assess, design and construct fully supplied safe rooms in highly vulnerable urban and rural areas such as mobile home parks, campgrounds, schools, and other such areas throughout the planning area. Assess the adequacy of current public buildings to be used as safe rooms. Construct safe rooms in areas of greatest need, either as new construction or retrofitting.

[Benefits] Reduce the risk of death or injury in areas vulnerable to tornados, severe thunderstorms and other hazards.

[Responsible Agency & Partners] Holt County, Individual City or Villages Public Works Departments and/or Emergency Management Departments

[Cost Estimate & Funding] \$400 to \$500/square foot (stand-alone), \$350 to 400/square foot (addition/retrofit); Hazard Mitigation Assistance Grant Programs

[Timeline] 1-3 years

[Priority] Medium

[Status] Continued Action from previous plan that has not been completed yet due to insufficient funding.

BACKUP GENERATORS

[Background] Provide a portable or stationary source of backup power to redundant power supplies, municipal wells, lift stations, and other critical facilities and shelters.

[Benefits] Reduce the danger to human life/health by keeping utilities operating. Reduce the economic downtime associated with utility loss.

[Responsible Agency & Partners] Holt County, Individual City or Villages Public Works Departments and/or Emergency Management Departments

[Cost Estimate & Funding] \$20,000 to \$35,000/generator; Hazard Mitigation Assistance Grant Programs

[Timeline] 1-3 years

[Priority] Medium

[Status] Continued Action from previous plan that has not been completed yet due to insufficient funding.

WEATHER RADIOS

[Background] Conduct an inventory of weather radios at schools and other critical facilities and provide new radios as needed.

[Benefits] Reduces the risk of death/injury associated with severe weather conditions by communication.

[Responsible Agency & Partners] Holt County, Individual City or Villages Public Works Departments and/or Emergency Management Departments

[Cost Estimate & Funding] \$75/radio; Hazard Mitigation Assistance Grant Programs

[Timeline] 1-3 years

[Priority] Medium

[Status] Continued Action from previous plan that has not been completed yet due to insufficient funding.

ALERT AND WARNING SIRENS

[Background] Perform an evaluation of existing alert sirens to determine sirens which should be replaced or upgraded. Install new sirens where lacking and remote activation.

[Benefits] Reduces the risk of death/injury associated with severe weather; promoting awareness and ensures people take shelter when needed.

[Responsible Agency & Partners] Holt County, Individual City or Villages Public Works Departments and/or Emergency Management Departments, Natural Resources Districts

[Cost Estimate & Funding] \$25,000+; Hazard Mitigation Assistance Grant Programs, Natural Resources Districts

[Timeline] 1-3 years

[Priority] Medium

[Status] Continued Action from previous plan that has not been completed yet due to insufficient funding.

Section Four [Mitigation Strategy]

CIVIL SERVICE IMPROVEMENTS

[Background] Improve emergency rescue and response equipment and facilities by providing additional, or updating existing emergency response equipment. This could include fire equipment, ATVs, water tanks/truck, snow removal equipment, pumps, etc. This would also include developing backup systems for emergency vehicles, identifying and training additional personnel for emergency response, or continuing educational opportunities for current personnel.

[Benefits] Having appropriate and up to date equipment along with adequately trained and numbered personnel increases safety and reduces the risk of damage.

[Responsible Agency & Partners] Holt County, Individual City or Villages Public Works Departments and/or Emergency Management Departments

[Cost Estimate & Funding] \$5,000+; Hazard Mitigation Assistance Grant Programs

[Timeline] 1-3 years

[Priority] Medium

[Status] Continued Action from previous plan that requires ongoing action.

PUBLIC AWARENESS AND EDUCATION CAMPAIGNS

[Background] Through activities such as outreach projects, distribution of maps and environmental education increase public awareness of natural hazards to both public and private property owners, renters, businesses, and local officials about hazards and ways to protect people and property from these hazards. In addition, educate citizens on erosion control and water conservation methods.

[Benefits] Public awareness reduces the risk of property loss and damage, injury and death. It increases knowledge on emergency procedures, facilities, conservation, and is key to preparedness.

[Responsible Agency & Partners] Holt County, Individual City or Villages Departments (Fire, Police, Administration, Public Works, Parks, Floodplain Management, Utility, Roads, and/or Emergency Management Department(s); School Boards; Neighborhood/Homeowner Associations), Natural Resources Districts, Nebraska Emergency Management Agency, Nebraska Department of Environmental Quality, Nebraska Department of Natural Resources

[Cost Estimate & Funding] \$1,000+; Hazard Mitigation Assistance Grant Programs

[Timeline] 1-3 years

[Priority] Medium

[Status] Continued Action from previous plan that requires ongoing action.

EWING

Ewing wanted to make sure their existing infrastructure were in good shape for the current conditions and future conditions. Ewing was also concerned with their current warning and safety systems. These concerns were discussed and used to create most of the Mitigation Action Items. Ewing listed similar Mitigation Action Items in the 2010 plan however their priorities changes slightly. Ewing listed existing infrastructure as higher than safety systems in this plan update which was a change from the 2010 plan.

DRAINAGE ASSESSMENT FOR BRIDGE AND CULVERT IMPROVEMENTS

[Background] Preliminary drainage studies and assessments can be conducted to identify and prioritize design improvements to address site specific localized flooding/drainage issues to reduce and/or alleviate flooding. Stormwater master plans can

be conducted to perform a community-wide stormwater evaluation, identifying multiple problem areas and potential drainage improvements.

[Benefits] Proactive steps to identify all potential problems/issues can lead to effectively addressing improvements and prioritizing the projects to improve conditions. These improvements can serve to more effectively convey runoff within jurisdictions, preventing interior localized flooding resulting in damages. This ensures that the most beneficial projects are done first and could possibly eliminate the need for others.

[Responsible Agency & Partners] Ewing Administration (Village Board)

[Cost Estimate & Funding] \$10,000 to \$100,000+; Hazard Mitigation Assistance Grant Programs, Community Development Block Grant, Natural Resources Districts

[Timeline] 1-3 years

[Priority] High

[Status] Continued Action from previous plan that requires ongoing action.

STREAM BANK STABILIZATION

[Background] Stream bank/bed degradation can occur along many rivers and creeks. Stabilization improvements including rock rip rap, vegetative cover, j-hooks, boulder vanes, etc. can be implemented to reestablish the channel banks. Grade control structures including sheet-pile weirs, rock weirs, ponds, road dams, etc. can be implemented and improved to maintain the channel bed. Channel stabilization can protect structures, increase conveyance and provide flooding benefits. Flood protection for critical and/or highly vulnerable facilities, areas, populations, and infrastructure is key.

[Benefits] Stream bed/grade stabilization improvements can serve to more effectively protect structures, increase conveyance, prevent down cutting, and provide flooding benefits.

[Responsible Agency & Partners] Ewing Administration (Village Board)

[Cost Estimate & Funding] \$50,000 to \$100,000+; Hazard Mitigation Assistance Grant Programs, Natural Resources Districts

[Timeline] 1-3 years

[Priority] High

[Status] Continued Action from previous plan that requires ongoing action.

BACKUP GENERATORS

[Background] Provide a portable or stationary source of backup power to redundant power supplies, municipal wells, lift stations, and other critical facilities and shelters.

[Benefits] Reduce the danger to human life/health by keeping utilities operating. Reduce the economic downtime associated with utility loss.

[Responsible Agency & Partners] Ewing Administration (Village Board), and/or Emergency Management Departments

[Cost Estimate & Funding] \$20,000 to \$35,000/generator; Hazard Mitigation Assistance Grant Programs

[Timeline] 1-3 years

[Priority] High

Section Four [Mitigation Strategy]

[Status] Continued Action from previous plan that has not been completed yet due to insufficient funding.

CIVIL SERVICE IMPROVEMENTS

[Background] Improve emergency rescue and response equipment and facilities by providing additional, or updating existing emergency response equipment. This could include fire equipment, ATVs, water tanks/truck, snow removal equipment, pumps, etc. This would also include developing backup systems for emergency vehicles, identifying and training additional personnel for emergency response, or continuing educational opportunities for current personnel.

[Benefits] Having appropriate and up to date equipment along with adequately trained and numbered personnel increases safety and reduces the risk of damage.

[Responsible Agency & Partners] Ewing Administration (Village Board), and/or Emergency Management Departments

[Cost Estimate & Funding] \$5,000+; Hazard Mitigation Assistance Grant Programs

[Timeline] 1-3 years

[Priority] High

[Status] Continued Action from previous plan that requires ongoing action.

STORM SHELTER AND SAFE ROOMS

[Background] Assess, design and construct fully supplied safe rooms in highly vulnerable urban and rural areas such as mobile home parks, campgrounds, schools, and other such areas throughout the planning area. Assess the adequacy of current public buildings to be used as safe rooms. Construct safe rooms in areas of greatest need, either as new construction or retrofitting.

[Benefits] Reduce the risk of death or injury in areas vulnerable to tornados, severe thunderstorms and other hazards.

[Responsible Agency & Partners] Ewing Administration (Village Board)

[Cost Estimate & Funding] \$400 to \$500/square foot (stand-alone), \$350 to 400/square foot (addition/retrofit); Hazard Mitigation Assistance Grant Programs

[Timeline] 1-3 years

[Priority] Medium

[Status] Continued Action from previous plan that has not been completed yet due to insufficient funding.

WEATHER RADIOS

[Background] Conduct an inventory of weather radios at schools and other critical facilities and provide new radios as needed.

[Benefits] Reduces the risk of death/injury associated with severe weather conditions by communication.

[Responsible Agency & Partners] Ewing Administration (Village Board), and/or Emergency Management Departments

[Cost Estimate & Funding] \$75/radio; Hazard Mitigation Assistance Grant Programs

[Timeline] 1-3 years

[Priority] Medium

[Status] Continued Action from previous plan that has not been completed yet due to insufficient funding.

PUBLIC AWARENESS AND EDUCATION CAMPAIGNS

[Background] Through activities such as outreach projects, distribution of maps and environmental education increase public awareness of natural hazards to both public and private property owners, renters, businesses, and local officials about hazards and ways to protect people and property from these hazards. In addition, educate citizens on erosion control and water conservation methods.

[Benefits] Public awareness reduces the risk of property loss and damage, injury and death. It increases knowledge on emergency procedures, facilities, conservation, and is key to preparedness.

[Responsible Agency & Partners] Ewing Administration (Village Board)

[Cost Estimate & Funding] \$1,000+; Hazard Mitigation Assistance Grant Programs

[Timeline] 1-3 years

[Priority] Medium

[Status] Continued Action from previous plan that requires ongoing action.

TREE CITY U.S.A.

[Background] Work to become a Tree City U.S.A. through the National Arbor Day Foundation to receive direction, technical assistance, and public education on how to establish a hazardous tree identification and removal program to limit potential tree damage and damages caused by trees in a community when a storm event occurs. The four main requirements include: 1) Establish a tree board; 2) Enact a tree care ordinance; 3) Establish a forestry care program; 4) Enact an Arbor Day observance and proclamation.

[Benefits] Better maintained trees and hazardous tree removal will eliminate damages to power lines and personal property during hazards events. Participation in Tree City U.S.A. will support community actions to mitigate damages from trees.

[Responsible Agency & Partners] Ewing Administration (Village Board) and Parks Department

[Cost Estimate & Funding] \$5,000+; Arbor Day Foundation, United States/State Forest Service

[Timeline] 3-5 years

[Priority] Low

[Status] Continued Action from previous plan that requires ongoing action.

STUART

Stuart's main concerns were their existing warning and safety systems. They were also concerned with infrastructure and flooding. These concerns were discussed and used to create most of the Mitigation Action Items. Ewing listed similar Mitigation Action Items in the 2010 plan with their priorities being the same.

PARTICIPATE OR MAINTAIN GOOD STANDING IN THE NATIONAL FLOOD INSURANCE PROGRAM

[Background] Participate in the National Flood Insurance Program (NFIP) or maintain good standing with the NFIP including floodplain management practices/requirements and regulation enforcements and updates.

[Benefits] Enable property owners to purchase insurance protection against flood losses. Good standing enables participants to apply for Pre-Disaster Mitigation Grant Program and Hazard Mitigation Grant Program cost-share.

[Responsible Agency & Partners] Stuart Administration (Village Board)

Section Four [Mitigation Strategy]

[Cost Estimate & Funding] \$5,000, Tax Revenue, grants, bequeaths

[Timeline] Continuous

[Priority] High

[Status] Continued Action from previous plan that requires ongoing action.

STORM SHELTER AND SAFE ROOMS

[Background] Assess, design and construct fully supplied safe rooms in highly vulnerable urban and rural areas such as mobile home parks, campgrounds, schools, and other such areas throughout the planning area. Assess the adequacy of current public buildings to be used as safe rooms. Construct safe rooms in areas of greatest need, either as new construction or retrofitting.

[Benefits] Reduce the risk of death or injury in areas vulnerable to tornados, severe thunderstorms and other hazards.

[Responsible Agency & Partners] Stuart Administration (Village Board)

[Cost Estimate & Funding] \$400 to \$500/square foot (stand-alone), \$350 to 400/square foot (addition/retrofit); Hazard Mitigation Assistance Grant Programs

[Timeline] 1-3 years

[Priority] Medium

[Status] Continued Action from previous plan that has not been completed yet due to insufficient funding.

WEATHER RADIOS

[Background] Conduct an inventory of weather radios at schools and other critical facilities and provide new radios as needed.

[Benefits] Reduces the risk of death/injury associated with severe weather conditions by communication.

[Responsible Agency & Partners] Stuart Administration (Village Board), and/or Emergency Management Departments

[Cost Estimate & Funding] \$75/radio; Hazard Mitigation Assistance Grant Programs

[Timeline] 1-3 years

[Priority] Medium

[Status] Continued Action from previous plan that has not been completed yet due to insufficient funding.

CIVIL SERVICE IMPROVEMENTS

[Background] Improve emergency rescue and response equipment and facilities by providing additional, or updating existing emergency response equipment. This could include fire equipment, ATVs, water tanks/truck, snow removal equipment, pumps, etc. This would also include developing backup systems for emergency vehicles, identifying and training additional personnel for emergency response, or continuing educational opportunities for current personnel.

[Benefits] Having appropriate and up to date equipment along with adequately trained and numbered personnel increases safety and reduces the risk of damage.

[Responsible Agency & Partners] Stuart Administration (Village Board), and/or Emergency Management Departments

[Cost Estimate & Funding] \$5,000+; Hazard Mitigation Assistance Grant Programs

[Timeline] 1-3 years

[Priority] Medium

[Status] Continued Action from previous plan that requires ongoing action.

ALERT AND WARNING SIRENS

[Background] Perform an evaluation of existing alert sirens to determine sirens which should be replaced or upgraded.

[Benefits] Reduces the risk of death/injury associated with severe weather; promoting awareness and ensures people take shelter when needed.

[Responsible Agency & Partners] Stuart Administration (Village Board)

[Cost Estimate & Funding] \$25,000+; Hazard Mitigation Assistance Grant Programs, Natural Resources Districts

[Timeline] 4-5 years

[Priority] Medium

[Status] Continued Action from previous plan that has not been completed yet due to insufficient funding.

DRAINAGE ASSESSMENT FOR BRIDGE AND CULVERT IMPROVEMENTS

[Background] Preliminary drainage studies and assessments can be conducted to identify and prioritize design improvements to address site specific localized flooding/drainage issues to reduce and/or alleviate flooding. Stormwater master plans can be conducted to perform a community-wide stormwater evaluation, identifying multiple problem areas and potential drainage improvements.

[Benefits] Proactive steps to identify all potential problems/issues can lead to effectively addressing improvements and prioritizing the projects to improve conditions. These improvements can serve to more effectively convey runoff within jurisdictions, preventing interior localized flooding resulting in damages. This ensures that the most beneficial projects are done first and could possibly eliminate the need for others.

[Responsible Agency & Partners] Stuart Administration (Village Board)

[Cost Estimate & Funding] \$10,000 to \$100,000+; Hazard Mitigation Assistance Grant Programs, Community Development Block Grant, Natural Resources Districts

[Timeline] 1-3 years

[Priority] Low

[Status] Continued Action from previous plan that requires ongoing action.

Section Four [Mitigation Strategy]

STREAM BANK STABILIZATION

[Background] Stream bank/bed degradation can occur along many rivers and creeks. Stabilization improvements including rock rip rap, vegetative cover, j-hooks, boulder vanes, etc. can be implemented to reestablish the channel banks. Grade control structures including sheet-pile weirs, rock weirs, ponds, road dams, etc. can be implemented and improved to maintain the channel bed. Channel stabilization can protect structures, increase conveyance and provide flooding benefits. Flood protection for critical and/or highly vulnerable facilities, areas, populations, and infrastructure is key.

[Benefits] Stream bed/grade stabilization improvements can serve to more effectively protect structures, increase conveyance, prevent down cutting, and provide flooding benefits.

[Responsible Agency & Partners] Stuart Administration (Village Board)

[Cost Estimate & Funding] \$50,000 to \$100,000+; Hazard Mitigation Assistance Grant Programs, Natural Resources Districts

[Timeline] 1-3 years

[Priority] Low

[Status] Continued Action from previous plan that requires ongoing action.

BACKUP GENERATORS

[Background] Provide a portable or stationary source of backup power to redundant power supplies, municipal wells, lift stations, and other critical facilities and shelters.

[Benefits] Reduce the danger to human life/health by keeping utilities operating. Reduce the economic downtime associated with utility loss.

[Responsible Agency & Partners] Stuart Administration (Village Board), and/or Emergency Management Departments

[Cost Estimate & Funding] \$20,000 to \$35,000/generator; Hazard Mitigation Assistance Grant Programs

[Timeline] 1-3 years

[Priority] Low

[Status] Continued Action from previous plan that has not been completed yet due to insufficient funding.

PUBLIC AWARENESS AND EDUCATION CAMPAIGNS

[Background] Through activities such as outreach projects, distribution of maps and environmental education increase public awareness of natural hazards to both public and private property owners, renters, businesses, and local officials about hazards and ways to protect people and property from these hazards. In addition, educate citizens on erosion control and water conservation methods.

[Benefits] Public awareness reduces the risk of property loss and damage, injury and death. It increases knowledge on emergency procedures, facilities, conservation, and is key to preparedness.

[Responsible Agency & Partners] Stuart Administration (Village Board)

[Cost Estimate & Funding] \$1,000+; Hazard Mitigation Assistance Grant Programs

[Timeline] 1-3 years

[Priority] Low

[Status] Continued Action from previous plan that requires ongoing action.

KNOX COUNTY

KNOX COUNTY

Knox County determined that existing or future flooding potential was a high concern. They wanted to make sure properties in flood prone areas were reduced or removed. They also wanted to improve warning and safety systems as well backup systems such as generators. These concerns were discussed and used to create most of the Mitigation Action Items. These Mitigation Action Items are fairly similar to the items listed in the 2010 Plan for Knox County.

PARTICIPATE OR MAINTAIN GOOD STANDING IN THE NATIONAL FLOOD INSURANCE PROGRAM

[Background] Participate in the National Flood Insurance Program (NFIP) or maintain good standing with the NFIP including floodplain management practices/requirements and regulation enforcements and updates.

[Benefits] Enable property owners to purchase insurance protection against flood losses. Good standing enables participants to apply for Pre-Disaster Mitigation Grant Program and Hazard Mitigation Grant Program cost-share.

[Responsible Agency & Partners] Knox County Staff

[Cost Estimate & Funding] \$5,000, Tax Revenue, grants, bequeaths

[Timeline] Continuous

[Priority] High

[Status] Continued Action from previous plan that requires ongoing action.

FLOOD-PRONE PROPERTY ACQUISITION

[Background] Voluntary acquisition and demolition of properties prone to flooding will reduce the general threat of flooding for communities. Additionally, this can provide flood insurance benefits to those communities within the National Flood Insurance Program. Repetitive loss structures are typically highest priority.

[Benefits] Voluntary acquisition and demolition of properties prone to flooding will reduce the damages associated with flooding for communities. Additionally, this can provide flood insurance benefits to those communities within the National Flood Insurance Program. Communities must be in good standing with National Flood Insurance Program to be eligible for Hazard Mitigation Grant Program.

[Responsible Agency & Partners] Knox County, Public Works, Utility, and/or Floodplain Management Department

[Cost Estimate & Funding] \$10,000+; Hazard Mitigation Assistance Grant Programs, Community Development Block Grant, Natural Resources Districts

[Timeline] 1-3 years

[Priority] High

[Status] Continued Action from previous plan that requires ongoing action.

Section Four [Mitigation Strategy]

STORM SHELTER AND SAFE ROOMS

[Background] Assess, design and construct fully supplied safe rooms in highly vulnerable urban and rural areas such as mobile home parks, campgrounds, schools, and other such areas throughout the planning area. Assess the adequacy of current public buildings to be used as safe rooms. Construct safe rooms in areas of greatest need, either as new construction or retrofitting.

[Benefits] Reduce the risk of death or injury in areas vulnerable to tornados, severe thunderstorms and other hazards.

[Responsible Agency & Partners] Knox County Administration, Planning, and/or Emergency Management Departments

[Cost Estimate & Funding] \$400 to \$500/square foot (stand-alone), \$350 to 400/square foot (addition/retrofit); Hazard Mitigation Assistance Grant Programs

[Timeline] 1-3 years

[Priority] High

[Status] Continued Action from previous plan that has not been completed yet due to insufficient funding.

BACKUP GENERATORS

[Background] Provide a portable or stationary source of backup power to redundant power supplies, municipal wells, lift stations, and other critical facilities and shelters.

[Benefits] Reduce the danger to human life/health by keeping utilities operating. Reduce the economic downtime associated with utility loss.

[Responsible Agency & Partners] Knox County Administration

[Cost Estimate & Funding] \$20,000 to \$35,000/generator; Hazard Mitigation Assistance Grant Programs

[Timeline] 1-3 years

[Priority] High

[Status] Continued Action from previous plan that has not been completed yet due to insufficient funding.

NEW WATER WELL, TOWER, AND STAND PIPE

[Background] Evaluate the need to expand water storage capacity through a new water tower, stand pipe, etc. to provide a safe water supply for the community and additional water for fire protection. Communities can evaluate the need to install a new well to provide a safe backup water supply for the community, replace existing wells affected by drought, and additional water for fire protection.

[Benefits] Establish back-up supplies of municipal water to supply the needs of citizens. Identify adequate water sources to mitigate potential damages or expenses due to drought. Provide a dependable and ready supply of water so fire districts don't have to rely on equipment and personnel to move water from local water sources to the fire.

[Responsible Agency & Partners] Knox County

[Cost Estimate & Funding] \$150,000 to \$450,000; Hazard Mitigation Assistance Grant Programs, Community Development Block Grant, State Revolving Loan Fund

[Timeline] 3-5 years

[Priority] Medium

[Status] Continued Action from previous plan that has not been completed yet due to insufficient funding.

ROAD AND EMBANKMENT IMPROVEMENTS

[Background] Identify, design, and construct road and embankment improvements as necessary for proper drainage and to adequately manage the traffic load.

[Benefits] Properly designed and constructed roads and embankments promote safer travel and allow for increased emergency response.

[Responsible Agency & Partners] Knox County Board of Commissioners and Planning and Zoning Commission

[Cost Estimate & Funding] \$50,000+; Hazard Mitigation Assistance Grant Programs

[Timeline] 1-3 years

[Priority] Medium

[Status] This a continued action from past plan that is an ongoing action.

ALERT AND WARNING SIRENS

[Background] Perform an evaluation of existing alert sirens to determine sirens which should be replaced or upgraded. Install new sirens where lacking and remote activation.

[Benefits] Reduces the risk of death/injury associated with severe weather; promoting awareness and ensures people take shelter when needed.

[Responsible Agency & Partners] Knox County, Individual City or Villages Public Works Departments and/or Emergency Management Departments, Natural Resources Districts

[Cost Estimate & Funding] \$25,000+; Hazard Mitigation Assistance Grant Programs, Natural Resources Districts

[Timeline] 1-3 years

[Priority] Medium

[Status] Continued Action from previous plan that has not been completed yet due to insufficient funding.

CIVIL SERVICE IMPROVEMENTS

[Background] Improve emergency rescue and response equipment and facilities by providing additional, or updating existing emergency response equipment. This could include fire equipment, ATVs, water tanks/truck, snow removal equipment, pumps, etc. This would also include developing backup systems for emergency vehicles, identifying and training additional personnel for emergency response, or continuing educational opportunities for current personnel.

[Benefits] Having appropriate and up to date equipment along with adequately trained and numbered personnel increases safety and reduces the risk of damage.

[Responsible Agency & Partners] Knox County, Individual City or Villages Public Works Departments and/or Emergency Management Departments

[Cost Estimate & Funding] \$5,000+; Hazard Mitigation Assistance Grant Programs

[Timeline] 1-3 years

[Priority] Medium

Section Four [Mitigation Strategy]

[Status] Continued Action from previous plan that requires ongoing action.

PUBLIC AWARENESS AND EDUCATION CAMPAIGNS

[Background] Through activities such as outreach projects, distribution of maps and environmental education increase public awareness of natural hazards to both public and private property owners, renters, businesses, and local officials about hazards and ways to protect people and property from these hazards. In addition, educate citizens on erosion control and water conservation methods.

[Benefits] Public awareness reduces the risk of property loss and damage, injury and death. It increases knowledge on emergency procedures, facilities, conservation, and is key to preparedness.

[Responsible Agency & Partners] Knox County, Individual City or Villages Departments (Fire, Police, Administration, Public Works, Parks, Floodplain Management, Utility, Roads, and/or Emergency Management Department(s); School Boards; Neighborhood/Homeowner Associations), Natural Resources Districts, Nebraska Emergency Management Agency, Nebraska Department of Environmental Quality, Nebraska Department of Natural Resources

[Cost Estimate & Funding] \$1,000+; Hazard Mitigation Assistance Grant Programs

[Timeline] 1-3 years

[Priority] Medium

[Status] Continued Action from previous plan that requires ongoing action.

DRAINAGE ASSESSMENT FOR BRIDGE AND CULVERT IMPROVEMENTS

[Background] Preliminary drainage studies and assessments can be conducted to identify and prioritize design improvements to address site specific localized flooding/drainage issues to reduce and/or alleviate flooding. Stormwater master plans can be conducted to perform a community-wide stormwater evaluation, identifying multiple problem areas and potential drainage improvements.

[Benefits] Proactive steps to identify all potential problems/issues can lead to effectively addressing improvements and prioritizing the projects to improve conditions. These improvements can serve to more effectively convey runoff within jurisdictions, preventing interior localized flooding resulting in damages. This ensures that the most beneficial projects are done first and could possibly eliminate the need for others.

[Responsible Agency & Partners] Knox County, Public Works, Utility, and/or Floodplain Management Department

[Cost Estimate & Funding] \$10,000 to \$100,000+; Hazard Mitigation Assistance Grant Programs, Community Development Block Grant, Natural Resources Districts

[Timeline] 1-3 years

[Priority] Low

[Status] Continued Action from previous plan that requires ongoing action.

FLOODPLAIN DEVELOPMENT ORDINANCE ENFORCEMENT

[Background] Continue or improve floodplain management practices such as adoption and enforcement of floodplain management requirements (regulation of construction in significant flood hazard areas), floodplain identification and mapping (local requests for map updates), description of community assistance and monitoring activities, explanation for failure to participate in the National Flood Insurance Program, Community Rating System (CRS), and participation in Federal Emergency Management Agency's Cooperating Technical Partners Program (CTP) to increase local involvement in the flood mapping process. Continue to enforce local floodplain regulations for structures located in the 100-year floodplain. Strict enforcement of

the type of development and elevations of structures should be considered through issuance of floodplain development permits by any community or County. Continue education of building inspectors or Certified Floodplain Managers. Encourage building regulations for storm resistance structures.

[Benefits] Continue compliance with the National Flood Insurance Program. Good standing enables participants to apply for Pre-Disaster Mitigation Grant Program and Hazard Mitigation Grant Program cost-share. Ensures that no new structures built will be vulnerable to flooding. Reducing damages and health risks associated with flooding.

[Responsible Agency & Partners] Knox County Administration and/or Floodplain Management Departments, Nebraska Department of Natural Resources

[Cost Estimate & Funding] \$5,000+; Hazard Mitigation Assistance Grant Programs, Community Development Block Grant

[Timeline] 1-3 years

[Priority] Low

[Status] Continued Action from previous plan that requires ongoing action.

STREAM BANK STABILIZATION

[Background] Stream bank/bed degradation can occur along many rivers and creeks. Stabilization improvements including rock rip rap, vegetative cover, j-hooks, boulder vanes, etc. can be implemented to reestablish the channel banks. Grade control structures including sheet-pile weirs, rock weirs, ponds, road dams, etc. can be implemented and improved to maintain the channel bed. Channel stabilization can protect structures, increase conveyance and provide flooding benefits. Flood protection for critical and/or highly vulnerable facilities, areas, populations, and infrastructure is key.

[Benefits] Stream bed/grade stabilization improvements can serve to more effectively protect structures, increase conveyance, prevent down cutting, and provide flooding benefits.

[Responsible Agency & Partners] Knox County, Public Works, Utility, and/or Floodplain Management Department

[Cost Estimate & Funding] \$50,000 to \$100,000+; Hazard Mitigation Assistance Grant Programs, Natural Resources Districts

[Timeline] 1-3 years

[Priority] Low

[Status] Continued Action from previous plan that requires ongoing action.

WARNING SYSTEMS

[Background] Improve city cable TV interrupt warning system and implement telephone interrupt system such as Reverse 911.

[Benefits] Reduces the risk of death/injury associated with severe weather; promoting awareness and ensures people take shelter when needed.

[Responsible Agency & Partners] Knox County, Public Works, Utility, and/or Floodplain Management Department,

[Cost Estimate & Funding] \$5,000+; Hazard Mitigation Assistance Grant Programs, Natural Resources Districts

[Timeline] 1-3 years

[Priority] Low

Section Four [Mitigation Strategy]

[Status] Continued Action from previous plan that has not been completed yet due to insufficient funding.

WEATHER RADIOS

[Background] Conduct an inventory of weather radios at schools and other critical facilities and provide new radios as needed.

[Benefits] Reduces the risk of death/injury associated with severe weather conditions by communication.

[Responsible Agency & Partners] Knox County, Individual City or Villages Public Works Departments and/or Emergency Management Departments

[Cost Estimate & Funding] \$75/radio; Hazard Mitigation Assistance Grant Programs

[Timeline] 1-3 years

[Priority] Low

[Status] Continued Action from previous plan that has not been completed yet due to insufficient funding.

FLOOD-PRONE PROPERTY ACQUISITION

[Background] Voluntary acquisition and demolition of properties prone to flooding will reduce the general threat of flooding for communities. Additionally, this can provide flood insurance benefits to those communities within the National Flood Insurance Program. Repetitive loss structures are typically highest priority.

[Benefits] Voluntary acquisition and demolition of properties prone to flooding will reduce the damages associated with flooding for communities. Additionally, this can provide flood insurance benefits to those communities within the National Flood Insurance Program. Communities must be in good standing with National Flood Insurance Program to be eligible for Hazard Mitigation Grant Program.

[Responsible Agency & Partners] Knox County, Public Works, Utility, and/or Floodplain Management Department

[Cost Estimate & Funding] \$10,000+; Hazard Mitigation Assistance Grant Programs, Community Development Block Grant, Natural Resources Districts

[Timeline] 1-3 years

[Priority] Low

[Status] Continued Action from previous plan that requires ongoing action.

CENTER

Center's main concerns were their existing warning and safety systems. They were also concerned with infrastructure and flooding. These concerns were discussed and used to create most of the Mitigation Action Items. Center listed similar Mitigation Action Items in the 2010 plan with similar priorities.

PARTICIPATE OR MAINTAIN GOOD STANDING IN THE NATIONAL FLOOD INSURANCE PROGRAM

[Background] Participate in the National Flood Insurance Program (NFIP) or maintain good standing with the NFIP including floodplain management practices/requirements and regulation enforcements and updates.

[Benefits] Enable property owners to purchase insurance protection against flood losses. Good standing enables participants to apply for Pre-Disaster Mitigation Grant Program and Hazard Mitigation Grant Program cost-share.

[Responsible Agency & Partners] Center Administration (Village Board)

[Cost Estimate & Funding] \$5,000, Tax Revenue, grants, bequeaths

[Timeline] Continuous

[Priority] High

[Status] Continued Action from previous plan that requires ongoing action.

STORM SHELTER AND SAFE ROOMS

[Background] Assess, design and construct fully supplied safe rooms in highly vulnerable urban and rural areas such as mobile home parks, campgrounds, schools, and other such areas throughout the planning area. Assess the adequacy of current public buildings to be used as safe rooms. Construct safe rooms in areas of greatest need, either as new construction or retrofitting.

[Benefits] Reduce the risk of death or injury in areas vulnerable to tornados, severe thunderstorms and other hazards.

[Responsible Agency & Partners] Center Administration, Planning, and/or Emergency Management Departments

[Cost Estimate & Funding] \$400 to \$500/square foot (stand-alone), \$350 to 400/square foot (addition/retrofit); Hazard Mitigation Assistance Grant Programs

[Timeline] 1-3 years

[Priority] High

[Status] Continued Action from previous plan that has not been completed yet due to insufficient funding.

DRAINAGE ASSESSMENT FOR BRIDGE AND CULVERT IMPROVEMENTS

[Background] Preliminary drainage studies and assessments can be conducted to identify and prioritize design improvements to address site specific localized flooding/drainage issues to reduce and/or alleviate flooding. Stormwater master plans can be conducted to perform a community-wide stormwater evaluation, identifying multiple problem areas and potential drainage improvements.

[Benefits] Proactive steps to identify all potential problems/issues can lead to effectively addressing improvements and prioritizing the projects to improve conditions. These improvements can serve to more effectively convey runoff within jurisdictions, preventing interior localized flooding resulting in damages. This ensures that the most beneficial projects are done first and could possibly eliminate the need for others.

[Responsible Agency & Partners] Center Administration (Village Board)

[Cost Estimate & Funding] \$10,000 to \$100,000+; Hazard Mitigation Assistance Grant Programs, Community Development Block Grant, Natural Resources Districts

[Timeline] 1-3 years

[Priority] Medium

[Status] Continued Action from previous plan that requires ongoing action.

STREAM BANK STABILIZATION

[Background] Stream bank/bed degradation can occur along many rivers and creeks. Stabilization improvements including rock rip rap, vegetative cover, j-hooks, boulder vanes, etc. can be implemented to reestablish the channel banks. Grade control structures including sheet-pile weirs, rock weirs, ponds, road dams, etc. can be implemented and improved to maintain the channel

Section Four [Mitigation Strategy]

bed. Channel stabilization can protect structures, increase conveyance and provide flooding benefits. Flood protection for critical and/or highly vulnerable facilities, areas, populations, and infrastructure is key.

[Benefits] Stream bed/grade stabilization improvements can serve to more effectively protect structures, increase conveyance, prevent down cutting, and provide flooding benefits.

[Responsible Agency & Partners] Center Public Works, Utility, and/or Floodplain Management Department, and Lower Niobrara Natural Resources District

[Cost Estimate & Funding] \$50,000 to \$100,000+; Hazard Mitigation Assistance Grant Programs, Natural Resources Districts

[Timeline] 1-3 years

[Priority] Medium

[Status] Continued Action from previous plan that requires ongoing action.

WEATHER RADIOS

[Background] Conduct an inventory of weather radios at schools and other critical facilities and provide new radios as needed.

[Benefits] Reduces the risk of death/injury associated with severe weather conditions by communication.

[Responsible Agency & Partners] Center Administration (Village Board), Public Works, and/or Emergency Management Departments

[Cost Estimate & Funding] \$75/radio; Hazard Mitigation Assistance Grant Programs

[Timeline] 1-3 years

[Priority] Medium

[Status] Continued Action from previous plan that has not been completed yet due to insufficient funding.

BACKUP GENERATORS

[Background] Provide a portable or stationary source of backup power to redundant power supplies and other critical facilities and shelters.

[Benefits] Reduce the danger to human life/health by keeping utilities operating. Reduce the economic downtime associated with utility loss.

[Responsible Agency & Partners] Center Administration (Village Board), Public Works, and/or Emergency Management Departments

[Cost Estimate & Funding] \$20,000 to \$35,000/generator; Hazard Mitigation Assistance Grant Programs

[Timeline] 1-3 years

[Priority] Medium

[Status] Continued Action from previous plan that has not been completed yet due to insufficient funding.

ALERT AND WARNING SIRENS

[Background] Perform an evaluation of existing alert sirens to determine sirens which should be replaced or upgraded. Install new sirens where lacking and remote activation.

[Benefits] Reduces the risk of death/injury associated with severe weather; promoting awareness and ensures people take shelter when needed.

[Responsible Agency & Partners] Center Administration (Village Board), Public Works, and/or Emergency Management Departments, Lower Niobrara Natural Resources District

[Cost Estimate & Funding] \$25,000+; Hazard Mitigation Assistance Grant Programs, Middle Republican Natural Resources District

[Timeline] 1-3 years

[Priority] Medium

[Status] Continued Action from previous plan that has not been completed yet due to insufficient funding.

CREIGHTON

Creighton's main concerns were flooding areas and their existing warning and safety systems. They were also concerned with infrastructure and potential flooding hazards. These concerns were discussed and used to create the majority of their Mitigation Action Items. Ewing listed similar Mitigation Action Items in the 2010 plan with priorities also being similar.

PARTICIPATE OR MAINTAIN GOOD STANDING IN THE NATIONAL FLOOD INSURANCE PROGRAM

[Background] Participate in the National Flood Insurance Program (NFIP) or maintain good standing with the NFIP including floodplain management practices/requirements and regulation enforcements and updates.

[Benefits] Enable property owners to purchase insurance protection against flood losses. Good standing enables participants to apply for Pre-Disaster Mitigation Grant Program and Hazard Mitigation Grant Program cost-share.

[Responsible Agency & Partners] Creighton Administration (City Board)

[Cost Estimate & Funding] \$5,000, Tax Revenue, grants, bequeaths

[Timeline] Continuous

[Priority] High

[Status] Continued Action from previous plan that requires ongoing action.

FLOODPLAIN DEVELOPMENT ORDINANCE ENFORCEMENT

[Background] Continue or improve floodplain management practices such as adoption and enforcement of floodplain management requirements (regulation of construction in significant flood hazard areas), floodplain identification and mapping (local requests for map updates), description of community assistance and monitoring activities, explanation for failure to participate in the National Flood Insurance Program, Community Rating System (CRS), and participation in Federal Emergency Management Agency's Cooperating Technical Partners Program (CTP) to increase local involvement in the flood mapping process. Continue to enforce local floodplain regulations for structures located in the 100-year floodplain. Strict enforcement of the type of development and elevations of structures should be considered through issuance of floodplain development permits by any community or County. Continue education of building inspectors or Certified Floodplain Managers. Encourage building regulations for storm resistance structures.

[Benefits] Continue compliance with the National Flood Insurance Program. Good standing enables participants to apply for Pre-Disaster Mitigation Grant Program and Hazard Mitigation Grant Program cost-share. Ensures that no new structures built will be vulnerable to flooding. Reducing damages and health risks associated with flooding.

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[Responsible Agency & Partners] Creighton Administration and/or Floodplain Management Departments, Nebraska Department of Natural Resources

[Cost Estimate & Funding] \$5,000+; Hazard Mitigation Assistance Grant Programs, Community Development Block Grant

[Timeline] 1-3 years

[Priority] High

[Status] Continued Action from previous plan that requires ongoing action.

STORM SHELTER AND SAFE ROOMS

[Background] Assess, design and construct fully supplied safe rooms in highly vulnerable urban and rural areas such as mobile home parks, campgrounds, schools, and other such areas throughout the planning area. Assess the adequacy of current public buildings to be used as safe rooms. Construct safe rooms in areas of greatest need, either as new construction or retrofitting.

[Benefits] Reduce the risk of death or injury in areas vulnerable to tornados, severe thunderstorms and other hazards.

[Responsible Agency & Partners] Creighton Administration, Planning, and/or Emergency Management Departments

[Cost Estimate & Funding] \$400 to \$500/square foot (stand-alone), \$350 to 400/square foot (addition/retrofit); Hazard Mitigation Assistance Grant Programs

[Timeline] 1-3 years

[Priority] High

[Status] Continued Action from previous plan that has not been completed yet due to insufficient funding.

ALERT AND WARNING SIRENS

[Background] Perform an evaluation of existing alert sirens to determine sirens which should be replaced or upgraded. Install new sirens where lacking and remote activation.

[Benefits] Reduces the risk of death/injury associated with severe weather; promoting awareness and ensures people take shelter when needed.

[Responsible Agency & Partners] Creighton Administration (City Board), Public Works, and/or Emergency Management Departments,

[Cost Estimate & Funding] \$25,000+; Hazard Mitigation Assistance Grant Programs, Middle Republican Natural Resources District

[Timeline] 1-3 years

[Priority] High

[Status] Continued Action from previous plan that has not been completed yet due to insufficient funding.

DRAINAGE ASSESSMENT FOR BRIDGE AND CULVERT IMPROVEMENTS

[Background] Preliminary drainage studies and assessments can be conducted to identify and prioritize design improvements to address site specific localized flooding/drainage issues to reduce and/or alleviate flooding. Stormwater master plans can be conducted to perform a community-wide stormwater evaluation, identifying multiple problem areas and potential drainage improvements.

[Benefits] Proactive steps to identify all potential problems/issues can lead to effectively addressing improvements and prioritizing the projects to improve conditions. These improvements can serve to more effectively convey runoff within jurisdictions, preventing interior localized flooding resulting in damages. This ensures that the most beneficial projects are done first and could possibly eliminate the need for others.

[Responsible Agency & Partners] Creighton Administration (City Board)

[Cost Estimate & Funding] \$10,000 to \$100,000+; Hazard Mitigation Assistance Grant Programs, Community Development Block Grant, Natural Resources Districts

[Timeline] 1-3 years

[Priority] Medium

[Status] Continued Action from previous plan that requires ongoing action.

STREAM BANK STABILIZATION

[Background] Stream bank/bed degradation can occur along many rivers and creeks. Stabilization improvements including rock rip rap, vegetative cover, j-hooks, boulder vanes, etc. can be implemented to reestablish the channel banks. Grade control structures including sheet-pile weirs, rock weirs, ponds, road dams, etc. can be implemented and improved to maintain the channel bed. Channel stabilization can protect structures, increase conveyance and provide flooding benefits. Flood protection for critical and/or highly vulnerable facilities, areas, populations, and infrastructure is key.

[Benefits] Stream bed/grade stabilization improvements can serve to more effectively protect structures, increase conveyance, prevent down cutting, and provide flooding benefits.

[Responsible Agency & Partners] Creighton Public Works, Utility, and/or Floodplain Management Department, and Lower Niobrara Natural Resources District

[Cost Estimate & Funding] \$50,000 to \$100,000+; Hazard Mitigation Assistance Grant Programs, Natural Resources Districts

[Timeline] 1-3 years

[Priority] Medium

[Status] Continued Action from previous plan that requires ongoing action.

BACKUP GENERATORS

[Background] Provide a portable or stationary source of backup power to redundant power supplies for existing wells and Village office.

[Benefits] Reduce the danger to human life/health by keeping utilities operating. Reduce the economic downtime associated with utility loss.

[Responsible Agency & Partners] City of Creighton (City Board)

[Cost Estimate & Funding] \$20,000 to \$35,000/generator; Hazard Mitigation Assistance Grant Programs, Tax Revenue

[Timeline] 1 year

[Priority] Medium

[Status] Continued Action from previous plan that has not been completed yet due to insufficient funding.

Section Four [Mitigation Strategy]

PUBLIC AWARENESS AND EDUCATION CAMPAIGNS

[Background] Through activities such as outreach projects, distribution of maps and environmental education increase public awareness of natural hazards to both public and private property owners, renters, businesses, and local officials about hazards and ways to protect people and property from these hazards. In addition, educate citizens on erosion control and water conservation methods.

[Benefits] Public awareness reduces the risk of property loss and damage, injury and death. It increases knowledge on emergency procedures, facilities, conservation, and is key to preparedness.

[Responsible Agency & Partners] Creighton Fire, Police, Administration (City Board), Public Works, Parks, Floodplain Management, Utility, Roads, and/or Emergency Management Departments; School Boards; Neighborhood/Homeowner Associations), Lower Niobrara Natural Resources District, Nebraska Emergency Management Agency, Nebraska Department of Environmental Quality, Nebraska Department of Natural Resources

[Cost Estimate & Funding] \$1,000+; Hazard Mitigation Assistance Grant Programs

[Timeline] 1-3 years

[Priority] Medium

[Status] Continued Action from previous plan that requires ongoing action.

NIOBRARA

Niobrara's main concerns were their existing warning and safety systems as well as maintain their NFIP program. These concerns were discussed and used to create most of the Mitigation Action Items. Niobrara listed similar Mitigation Action Items in the 2010 plan.

PARTICIPATE OR MAINTAIN GOOD STANDING IN THE NATIONAL FLOOD INSURANCE PROGRAM

[Background] Participate in the National Flood Insurance Program (NFIP) or maintain good standing with the NFIP including floodplain management practices/requirements and regulation enforcements and updates.

[Benefits] Enable property owners to purchase insurance protection against flood losses. Good standing enables participants to apply for Pre-Disaster Mitigation Grant Program and Hazard Mitigation Grant Program cost-share.

[Responsible Agency & Partners] Niobrara Administration (Village Board)

[Cost Estimate & Funding] \$5,000, Tax Revenue, grants, bequeaths

[Timeline] Continuous

[Priority] High

[Status] Continued Action from previous plan that requires ongoing action.

ALERT AND WARNING SIRENS

[Background] Perform an evaluation of existing alert sirens to determine sirens which should be replaced or upgraded. Install new sirens where lacking and remote activation.

[Benefits] Reduces the risk of death/injury associated with severe weather; promoting awareness and ensures people take shelter when needed.

[Responsible Agency & Partners] Niobrara Administration (Village Board), Public Works, and/or Emergency Management Departments, Lower Niobrara Natural Resources District

[Cost Estimate & Funding] \$25,000+; Hazard Mitigation Assistance Grant Programs, Middle Republican Natural Resources District

[Timeline] 1-3 years

[Priority] Medium

[Status] Continued Action from previous plan that has not been completed yet due to insufficient funding.

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Section Five [Review, Evaluation, and Implementation]

Section Five contains recommendations for plan implementation and maintenance, including monitoring and evaluating the hazard identification and risk assessment, integration into existing planning mechanisms, continued public involvement and participation, annual review of mitigation actions, and the process for the five-year update.

SECTION FIVE [REVIEW, EVALUATION, AND IMPLEMENTATION]

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HAZARD MITIGATION PLAN

ANTELOPE, HOLT, AND KNOX COUNTIES

SECTION FIVE [REVIEW, EVALUATION, AND IMPLEMENTATION]

FEDERAL PLANNING REGULATIONS

REGULATION CHECKLIST 44 CODE OF FEDERAL REGULATIONS (CFR) 201.6 LOCAL MITIGATION PLANS



§§201.6(d)(3) A local jurisdiction must review and revise its plan to reflect changes in development, progress in local mitigation efforts, and changes in priorities, and resubmit if for approval within five years in order to continue to be eligible for mitigation project grant funding.

- Was the plan revised to reflect changes in development? (Requirement §201.6(d)(3))
- Was the plan revised to reflect progress in local mitigation efforts? (Requirement §201.6(d)(3))
- Was the plan revised to reflect changes in priorities? (Requirement §201.6(d)(3))

INTRODUCTION

The Federal Emergency Management Agency (FEMA) Mitigation Directorate states “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”.

The mitigation plan is a living document that guides action over time. As conditions change, new information becomes available, or actions progress over the life of the plan, plan adjustments may be necessary to maintain its relevance. Mitigation is the effort to reduce loss of life and property by lessening the impact of disasters. Mitigation is taking action now—before the next disaster—to reduce human and financial consequences later (analyzing risk, reducing risk, insuring against risk). Effective mitigation requires that everyone understands local risks, addresses the hard choices, and invests in long-term community well-being. Without mitigation actions, communities jeopardize their safety, financial security, and self-reliance.

- ❑ Disasters can happen at anytime and anyplace; their human and financial consequences are hard to predict.
- ❑ The number of disasters each year is increasing, but only 50% of events trigger Federal assistance.
- ❑ FEMA’s mitigation programs help reduce the impact of events—and our dependence on taxpayers and the Treasury for disaster relief. Disasters can cause loss of life; damage buildings and infrastructure; and have devastating consequences for a jurisdiction’s economic, social, and environmental well-being.

The goal of the mitigation plan is to reduce the risk to life and property, which includes existing structures and future construction, in the pre and post-disaster environments. This is achieved through regulations, local ordinances, land use and building practices, and mitigation projects that reduce or eliminate long-term risk from hazards and their effects. Outreach programs that increase risk awareness, projects to protect critical facilities, and the removal of structures from flood hazard areas are all examples of mitigation actions. Local mitigation actions and concepts can also be incorporated into land use plans and building codes. Mitigation is valuable to society in these ways:

- ❑ It creates safer communities by reducing loss of life and property damage. For example, the rigorous building standards adopted by 20,000 communities across the country are saving the nation more than \$1.1 billion a year in prevented flood damages.

Section Five [Review, Evaluation, and Implementation]

- It allows individuals to minimize post-flood disaster disruptions and recover more rapidly. For example, homes built to NFIP standards incur less damage from floods. When floods cause damage, flood insurance protects the homeowner's investment, as it did for the more than 200,000 Gulf Coast residents who received more than \$23 billion in payments following the 2005 hurricanes.
- It lessens the financial impact on individuals, communities, and society as a whole. For example, a recent study by the Multi-hazard Mitigation Council shows that each dollar spent on mitigation saves society an average of four dollars.

PLAN MAINTENANCE PROCESS

The plan contains many worthwhile actions, Antelope, Holt, and Knox Counties will need to decide which action(s) to undertake first. Two factors will help with making that decision: the priority assigned the actions in the planning process and funding availability. Low or no-cost actions most easily demonstrate progress toward successful plan implementation.

An important implementation mechanism that is highly effective and low-cost is incorporation of the hazard mitigation plan recommendations and their underlying principles into other plans and mechanisms, such as the comprehensive plans. Antelope, Knox and Holt Counties already implements policies and programs to reduce losses to life and property from hazards. Those policies and programs are included in current local plans (comprehensive plans, zoning ordinance updates, subdivision regulations, capital improvement plans, etc.) and those local plans will be updated or revised based off information in this plan. This plan builds upon the momentum developed through previous and related planning efforts and mitigation programs and recommends implementing actions, where possible, through these other program mechanisms. Each mitigation item will be looked at to see if the jurisdictions can add individual mitigation items into a current plan so it can be accomplished. Also each jurisdiction will make sure all the local plans do not contradict with the proposed mitigation action items but instead work in coordination with them. This process has been done on the local plans between the 2008 plan and this current 2016 plan and is reflected in which current mitigation action items have been included in this plan.

Plan maintenance is a process the planning team established to track the plan's implementation progress and to inform the plan update, including a description of the method and schedule for monitoring, evaluating, and updating within a five-year cycle. The Hazard Mitigation Planning Committee is responsible for initiating plan reviews. In order to monitor progress and update the mitigation strategies identified in the action plan, the committee will revisit the plan annually and following a hazard event. Those listed in Section Two, Table 2.2 will generally be responsible for ensuring plan maintenance is occurring. Also the designated Emergency Managers will ultimately responsible for ensuring review, evaluation, and implementation is taking place. The committee will submit a five year written update to the State and FEMA Region VII, unless disaster or other circumstances (e.g., changing regulations) require a change to this schedule. These procedures help to:

- Ensure that the mitigation strategy is implemented according to the plan.
- Provide the foundation for an ongoing mitigation program in your community.
- Standardize long-term monitoring of hazard-related activities.
- Integrate mitigation principles into community officials' daily job responsibilities and department roles.
- Maintain momentum through continued engagement and accountability in the plan's progress.

HAZARD MITIGATION PLANNING COMMITTEE

With adoption of the plan, Antelope, Holt, and Knox Counties will be responsible for the plan implementation and maintenance. The Counties agree to continue their relationships with the Federal Emergency Management Agency (FEMA), Nebraska Emergency Management Agency (NEMA), and to promote hazard mitigation through the follow efforts:

- Act as a forum for hazard mitigation issues
- Disseminate hazard mitigation ideas and activities to all participants

- ❑ Pursue the implementation of high-priority, low/no-cost recommended actions
- ❑ Ensure hazard mitigation remains a consideration for community decision makers
- ❑ Maintain a vigilant monitoring of multi-objective cost-share opportunities to help the community implement the plan's recommended actions for which no current funding exists
- ❑ Monitor and assist in implementation and update of this plan
- ❑ Report on plan progress and recommended changes to the various governing boards or councils of all participating jurisdictions
- ❑ Inform and solicit input from the public

The primary duty is to see the plan successfully carried out and report to Antelope, Holt, and Knox Counties, FEMA, NEMA, and the public on the status of plan implementation and mitigation opportunities. Other duties include reviewing and promoting mitigation proposals, considering stakeholder concerns about hazard mitigation, passing concerns on to appropriate entities, and posting relevant information on applicable websites (and others as deemed pertinent). The Emergency Managers for each county, listed below, will ultimately be responsible for the implementation of each mitigation action and maintenance of the plan.

Liz Doerr (Zoning Administrator) – Antelope County

Deb Hilker (Emergency Manager) – Holt County

Laura Hintz (Emergency Manager) – Knox County

MONITORING IMPLEMENTATION AND EVALUATING EFFECTIVENESS

Each participant's governing body, (City Council, Village Board, County Board, School Board, or other governing bodies) will be responsible for the monitoring, implementation and evaluating of the recommended projects. The responsible bodies for each implementation action will provide reports on the status of all projects and include implementation processes that worked well, which caused issues, how coordination efforts are progressing, and which strategies could/should be revised. Each participant's governing body will work to incorporate each mitigation action into their existing planning guidelines according to their current voting process.

Plan monitoring means tracking the implementation of the plan over time, and implies an ongoing effort to monitor and evaluate plan implementation and to update the plan as progress, roadblocks, or changing circumstances are recognized. Evaluating means assessing the effectiveness of the plan at achieving its stated purpose and goals. Plan evaluation may not occur as frequently as plan monitoring, but it is an important step to ensure that the plan continues to serve a purpose. Evaluation of progress can be achieved by monitoring changes in vulnerabilities identified in the plan. Changes in vulnerability can be identified by noting:

- ❑ Decreased vulnerability as a result of implementing recommended actions
- ❑ Increased vulnerability as a result of failed or ineffective mitigation actions
- ❑ Increased vulnerability as a result of new development (and/or further annexation)

In order to best evaluate any changes in vulnerability as a result of plan implementation, the Hazard Mitigation Planning Committee will adhere to the following process:

- ❑ A representative from the responsible office identified in each mitigation measure will be responsible for tracking and reporting on an annual basis to the committee lead on action status and provide input on whether the action as implemented meets the defined objectives and is likely to be successful in reducing vulnerabilities.

Section Five [Review, Evaluation, and Implementation]

- ❑ If the action does not meet identified objectives, the action lead will determine what additional measures may be implemented, and an assigned individual will be responsible for defining action scope, implementing the action, monitoring success of the action, and making any required modifications to the plan.

Mitigation is most successful when it is incorporated into the day-to-day functions and priorities of government. Implementation will be accomplished by adhering to the schedules identified for each action and through constant, pervasive, and energetic efforts to network and highlight the multi-objective, win-win benefits to each program and the planning area. This effort is achieved through the routine actions of monitoring agendas, attending meetings, and promoting safe, sustainable communities. Additional mitigation strategies could include consistent and ongoing enforcement of existing policies and vigilant review of programs for coordination and multi-objective opportunities. Simultaneous to these efforts, it is important to maintain a constant monitoring of funding opportunities that can be leveraged to implement some of the more costly recommended actions.

This would include creating and maintaining a bank of ideas on how to meet local match or participation requirements. When funding does become available, Antelope, Holt, and Knox Counties will be in a position to capitalize on the opportunity. Funding opportunities to be monitored include special pre- and post-disaster funds, state and federal earmarked funds, and other grant programs, including those that can serve or support multi-objective applications.

Changes will be made to the plan to accommodate for actions that have failed or are not considered feasible after a review of their consistency with established criteria, time frame, community priorities, and/or funding resources. Actions that were not ranked high but were identified as potential mitigation activities will be reviewed as well during the monitoring and update of this plan to determine feasibility of future implementation. Updating of the plan will be done by written changes and submissions, as is appropriate and necessary, and as approved by the Hazard Mitigation Planning Committee. In keeping with the five-year update process, the committee will convene public meetings to solicit public input on the plan and its routine maintenance and the final product will be adopted by the local entities.

UPDATING THE PLAN

Updating means reviewing and revising the plan at least once every five years to reflect changes in development, progress in local mitigation efforts, and changes in priorities. Vulnerabilities and mitigation priorities often change following a disaster, and additional funding sources may become available, such as FEMA's Hazard Mitigation Grant Program or Public Assistance. Generally, public awareness increases, and the demand and support for mitigation frequently increases following a disaster. Updating the current is vital to ensure the correct mitigation action items are included in the plan. This process was completed between the 2010 plan and this plan and is reflected in what mitigation items were included in this plan. Prior mitigation items were analyzed to determine if the communities wanted to change priorities, timelines, budgets, responsible parties, remove current items or add new items.

As this plan is an update to the Antelope, Holt, and Knox Counties Multi-Jurisdictional All-Hazards Mitigation Plan, July 2010, the previous plan was heavily reviewed. Much of the specific demographics for each jurisdiction remained the same as they were in the original 2010 plan. The jurisdiction's priorities for hazard mitigation actions reflect the fact that there has been minimal change in the risk and vulnerabilities present for each jurisdiction since 2010. It is also important to understand that no new substantial infrastructure has been built in the planning area since the 2010 plan, as indicated by the public input gathered and compiled in Appendices B and C. The communities perceived that their risk and vulnerabilities have remained very similar to what was identified in 2010, and prioritized their mitigation actions accordingly. Plan updates provide the opportunity to consider how well the procedures established in the previously approved plan worked and revise them as needed. Updates to this plan will:

- ❑ Consider changes in vulnerability due to action implementation
- ❑ Document success stories where mitigation efforts have proven effective
- ❑ Document areas where mitigation actions were not effective
- ❑ Document any new hazards that may arise or were previously overlooked

- ❑ Incorporate new data or studies on hazards and risks
- ❑ Incorporate new capabilities or changes in capabilities
- ❑ Incorporate growth and development-related changes to infrastructure inventories
- ❑ Incorporate new action recommendations or changes in action prioritization

The below table is a comparison between the original 2010 and this plan update. The status updates in Section 4: Mitigation Strategy also detail changes in mitigation action priorities for participating jurisdictions.

TABLE 5.1: MITIGATION ACTION ITEMS PRIORITIES

| Participating Jurisdiction | 2010 Priorities | Current Priorities |
|----------------------------|--|--|
| Antelope County | Backup Generators, Tree City USA, Utility Lines, Drainage Assessments, Stream bank Stabilization, Weather Radios | NFIP, Drainage Assessments, Floodplain Development Ordinance Enforcement, Storm Shelter and Safe Rooms, Stream bank Stabilization, Backup Generators, Tree City USA, Public Awareness and Education Campaigns, Utility Lines, Weather Radios |
| Holt County | Stream bank Stabilization, Road and Embankment Improvements, Warning Systems, Emergency Communications, Flood-prone Property Acquisition, Drainage Assessments, Storm Shelter and Safe Rooms, Backup Generators, Weather Radios, Alert and Warning Sirens, Civil Service Improvements, Public Awareness and Education Campaigns | Stream bank Stabilization, Road and Embankment Improvements, Warning Systems, Emergency Communications, Flood-prone Property Acquisition, Drainage Assessments, Storm Shelter and Safe Rooms, Backup Generators, Weather Radios, Alert and Warning Sirens, Civil Service Improvements, Public Awareness and Education Campaigns |
| Ewing | Backup Generators, Tree City USA, Safe Rooms, Drainage Assessments, Stream bank Stabilization, NFIP, Public Awareness, Emergency Plans, Weather Radios | Drainage Assessments, Stream Bank Stabilization, Backup Generators, Civil Service Improvements, Storm Shelter and Safe Rooms, Weather Radios, Public Awareness and Education Campaigns, Tree City USA |
| Stuart | NFIP, Storm Shelter and Safe Rooms, Weather Radios, Alert and Warning Sirens, Tree City USA, Drainage Assessments, Floodplain Development Ordinance Enforcement, Stream Bank Stabilization, Backup Generators, Flood-prone Property Acquisition, Public Awareness and Education Campaigns | NFIP, Storm Shelter and Safe Rooms, Weather Radios, Civil Service Improvements, Alert and Warning Sirens, Drainage Assessments, Stream Bank Stabilization, Backup Generators, Public Awareness and Education Campaigns |
| Knox County | NFIP, Flood-prone Property Acquisition, Storm Shelter and Safe Rooms, Backup Generators, New Water Well, Tower, and Stand Pipe, Road and Embankment Improvements, Alert and Warning Sirens, Civil Service Improvements, Public Awareness and Education Campaigns, Drainage Assessments, Floodplain Development Ordinance Enforcement, Stream Bank Stabilization, Warning Systems, Weather Radios, Flood-prone Property Acquisition | NFIP, Flood-prone Property Acquisition, Storm Shelter and Safe Rooms, Backup Generators, New Water Well, Tower, and Stand Pipe, Road and Embankment Improvements, Alert and Warning Sirens, Civil Service Improvements, Public Awareness and Education Campaigns, Drainage Assessments, Floodplain Development Ordinance Enforcement, Stream Bank Stabilization, Warning Systems, Weather Radios, Flood-prone Property Acquisition |
| Center | NFIP, Safe Rooms, Drainage Improvements, Stream Bank Stabilization, Flood-prone Property Acquisition, Floodplain Development Ordinance Enforcement, Tree City USA, Public Awareness and Education Campaigns, Weather Radios | NFIP, Storm Shelter and Safe Rooms, Drainage Assessments, Stream Bank Stabilization, Weather Radios, Backup Generators, Alert and Warning Sirens |

Section Five [Review, Evaluation, and Implementation]

| Participating Jurisdiction | 2010 Priorities | Current Priorities |
|----------------------------|--|--|
| | | |
| Creighton | Backup Generators, Safe Rooms, Drainage Improvements, Stream Bank Stabilization, Floodplain Development Ordinance Enforcement, Tree City USA, Public Awareness and Education Campaigns | NFIP, Floodplain Development Ordinance Enforcement, Storm Shelter and Safe Rooms, Alert and Warning Sirens, Drainage Assessments, Stream Bank Stabilization, Backup Generators, Public Awareness and Education Campaigns |
| Niobrara | NFIP, Alert and Warning Sirens | NFIP, Alert and Warning Sirens |

CONTINUED PUBLIC INVOLVEMENT AND PARTICIPATION

Keeping the plan current also means continuing to provide opportunities for public involvement in the plan and its implementation. Continued public involvement is imperative to the overall success of the plan’s implementation. The update process provides an opportunity to solicit participation from new and existing stakeholders and to publicize success stories from the plan implementation and seek additional public comment. The plan maintenance and update process will include continued public and stakeholder involvement and input through attendance at designated committee meetings, web postings, press releases to local media, and through public hearings.

The Hazard Mitigation Planning Committee also may identify specific procedures for keeping elected officials involved, either through the monitoring and evaluation procedures and/or through the process for continuing public participation. The local governing body usually adopts the plan, so reporting back to them annually or at other regular intervals can help maintain support and provide accountability for those responsible for the plan’s maintenance and implementation.

When the Hazard Mitigation Planning Committee reconvenes for the update, they will coordinate with all stakeholders participating in the planning process—including those that joined the committee since the planning process began—to update and revise the plan. In reconvening, the committee may identify a public outreach subcommittee, which would be responsible for coordinating the activities necessary to involve the greater public. The subcommittee would develop a plan for public involvement and be responsible for disseminating information through a variety of media channels detailing the plan update process. As part of this effort, public hearings would be held and public comments would be solicited on the plan update draft.

INCORPORATION INTO EXISTING PLANNING MECHANISMS

Another important implementation mechanism that is highly effective and low-cost is incorporation of the hazard mitigation plan recommendations and their underlying principles into other plans and mechanisms. Where possible, plan participants will use existing plans and/or programs to implement hazard mitigation actions. Mitigation is most successful when it is incorporated into the day-to-day functions and priorities of government and development.

As described in *Section Four: Mitigation Strategy* and *Section Six: Participant Profiles*, Antelope, Holt, and Knox Counties already implements policies and programs to reduce losses to life and property from hazards. The plan builds upon the momentum developed through previous and related planning efforts and mitigation programs and recommends implementing actions, where possible, through these other program mechanisms. These existing mechanisms include:

- Comprehensive Plans
- Emergency Operations Plans
- Emergency Response Plans
- Ordinances

- ❑ Capital improvement plans and budgets
- ❑ Other plans, regulations, and practices with a mitigation focus

As mentioned in *Section Four: Mitigation Strategy* and *Section Six: Participant Profiles*, each of the eight full participants have existing authorities, policies, programs, and resources that need to be reviewed and used along with this plan to complete any mitigation action item.

Those involved in these other planning mechanisms will be responsible for integrating the findings and recommendations of the plan with these other plans, programs, etc., as appropriate. Incorporation into existing planning mechanisms will be done through the routine actions of:

- ❑ Monitoring other planning/program agendas
- ❑ Attending other planning/program meetings
- ❑ Participating in other planning processes
- ❑ Monitoring community budget meetings for other community program opportunities

The successful implementation of this mitigation strategy will require constant and vigilant review of existing plans and programs for coordination and multi-objective opportunities that promote a safe, sustainable community. Efforts should continuously be made to monitor the progress of mitigation actions implemented through other planning mechanisms and, where appropriate, their priority actions should be incorporated into updates of this hazard mitigation plan. In general, each jurisdiction (county, city, or village) will need to take all the mitigation action items into account when local plans (comprehensive plans, zoning ordinance updates, subdivision regulations, capital improvement plans, etc.) are redone or revised. Each mitigation item will be looked at to see if the jurisdiction can add each individual mitigation item into a current plan so it can be accomplished. Also, each jurisdiction will need to make sure all the local plans do not contradict with the proposed mitigation action items but instead work in coordination with them.

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Section Six [Participant Profiles – Antelope County]

Section Six provides an overall profile of the plan area including geography, demographics, assets inventory, capabilities assessment, and climate as well as hazard identification and risk assessment analysis specific to each individual participant.

SECTION SIX [ANTELOPE COUNTY]

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HAZARD MITIGATION PLAN

ANTELOPE, HOLT, AND KNOX COUNTIES

SECTION SIX [PARTICIPANT PROFILES]

ANTELOPE COUNTY

Local governments have the responsibility to protect the health, safety, and welfare of citizens. Proactive mitigation policies and actions help reduce risk and create safer, more disaster resilient jurisdictions. Mitigation is an investment in the jurisdiction's future safety and sustainability. Consider the critical importance of mitigation to:

- ❑ Protect public safety and prevent loss of life and injury.
- ❑ Reduce harm to existing and future development.
- ❑ Prevent damage to a jurisdiction's unique economic, cultural, and environmental assets.
- ❑ Minimize operational downtime and accelerate recovery of government and business after disasters.
- ❑ Reduce the costs of disaster response and recovery and the exposure to risk for first responders.
- ❑ Help accomplish other jurisdiction objectives, such as leveraging capital improvements, infrastructure protection, open space preservation, and economic resiliency.

Demographics, assets, and capabilities information can be used to determine differing levels of vulnerability by analyzing data on population and housing, structural inventories and valuations, critical facilities, highly vulnerable areas and populations, as well as future land use and development for each participating jurisdiction. These analyses directly impact the hazard identification and risk assessment, which ultimately are reflected in the jurisdiction's priorities and mitigation alternatives.

HISTORY

Antelope County was formed in 1871 and its county seat in Neligh. It is named for the Pronghorn Antelope. Settlement into the area was slow through the 1870s but eventually began to establish steadily.

Section Six [Participant Profiles | Antelope County]

GEOGRAPHIC SUMMARY

Geographic information, including topographic and soils data, play key roles in land planning and heavily influence land use and development. Understanding the unique, local land composition and characteristics will reduce harm to existing and future development by deterring growth into hazard prone areas.

Antelope County is located in northeast region of Nebraska. The county seat and largest community is Neligh. Table 6.1, below, summarizes the County’s total area composition and elevation.

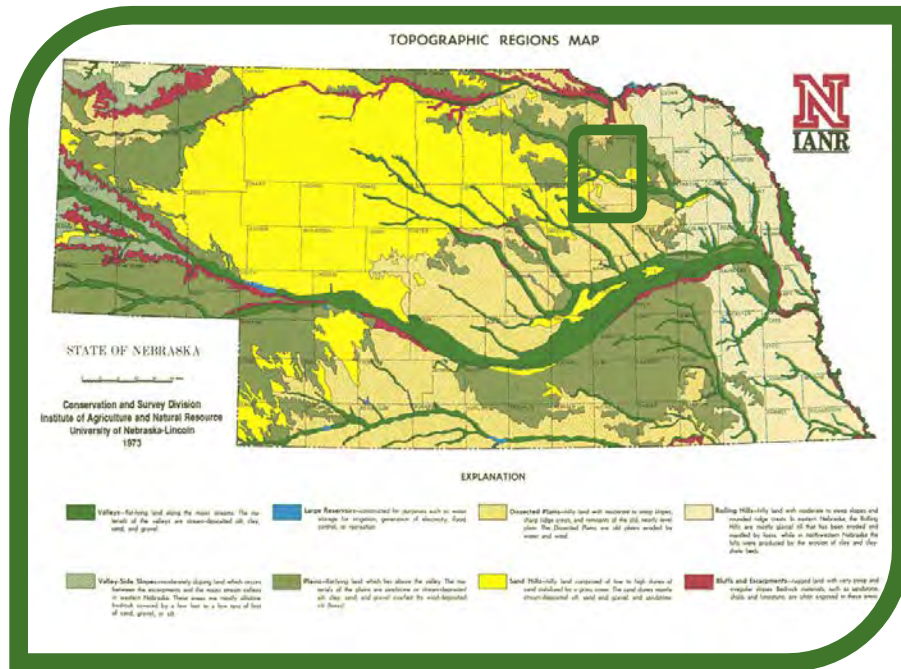
TABLE 6.1: GENERAL GEOGRAPHIC SUMMARY [CASDE] ANTELOPE COUNTY

| Jurisdiction | Area [sq. mi.] | | | Elevation [ft.] |
|-----------------|----------------|------|-------|-----------------|
| | Total | Land | Water | |
| Antelope County | 859 | 857 | 1.4 | 1,782 |

Source: University of Nebraska – Lincoln. Virtual Nebraska. www.casde.unl.edu.

Antelope County contains four primary topographic regions according to the Conservation and Survey Division of the University of Nebraska- Lincoln. These include ‘valleys’, ‘plains’, ‘dissected plains’, and ‘sand hills’. The County is also comprised of four main soil series, including Brunswick-Paka-Simeon, Thurman-Boelus-Nora, Hord-Boel-Inavale, and Coly-Uly-Holdrege. The figures and tables below display topographic and soils data, with Antelope County outlined.

FIGURE 6.1: GENERAL TOPOGRAPHIC REGIONS [IANR] STATE OF NEBRASKA – ANTELOPE COUNTY



Source: University of Nebraska – Lincoln. Institute of Agriculture and Natural Resources. Conservation and Survey Division.

TABLE 6.2: GENERAL TOPOGRAPHIC DESCRIPTIONS [IANR] STATE OF NEBRASKA – ANTELOPE COUNTY

| Topographic Region | Description |
|--------------------|--|
| Valleys | Flat-lying land along the major streams. The materials of the valleys are stream-deposited silt, clay, sand, and gravel. |
| Plains | Flat-lying land which lies above the valley. The materials of the plains are sandstone or stream-deposited silt, clay, sand, and gravel overlain by wind-deposited silt (loess). |
| Dissected Plains | Hilly land with moderate to steep slopes, sharp ridge crests, and remnants of the old, nearly level plains. The Dissected Plains are old plains eroded by water or wind. |
| Sand Hills | Hilly land comprised of low to high dunes of sand stabilized by a grass cover. The sand dunes meet stream-deposited silt, sand and gravel, and sandstone. |

Source: University of Nebraska – Lincoln. Institute of Agriculture and Natural Resources. Conservation and Survey Division.

FIGURE 6.2: GENERAL SOILS [IANR] STATE OF NEBRASKA – ANTELOPE COUNTY



Source: University of Nebraska – Lincoln. Institute of Agriculture and Natural Resources. Conservation and Survey Division.

DEMOGRAPHICS SUMMARY

Demographic statistics aid decision-makers by developing a picture of Antelope County. This picture tells the County and communities where they’ve been and where they’re now, helping decision-makers orient themselves to the most appropriate path to reduce risk and create safer, more disaster resilient jurisdictions. A jurisdiction’s population is the driving force behind its housing, employment, economic stability, and potential for change. Proactive mitigation by decision-makers will help prevent future damage to these unique assets.

Tables 6.3-6.4 and Figure 6.3 below summarize various population and housing characteristics such as population trends, population by age, housing occupancy and tenure, and age of structures.

Section Six [Participant Profiles | Antelope County]

POPULATION

TABLE 6.3: POPULATION TRENDS [CENSUS] ANTELOPE COUNTY 1985 – 2015

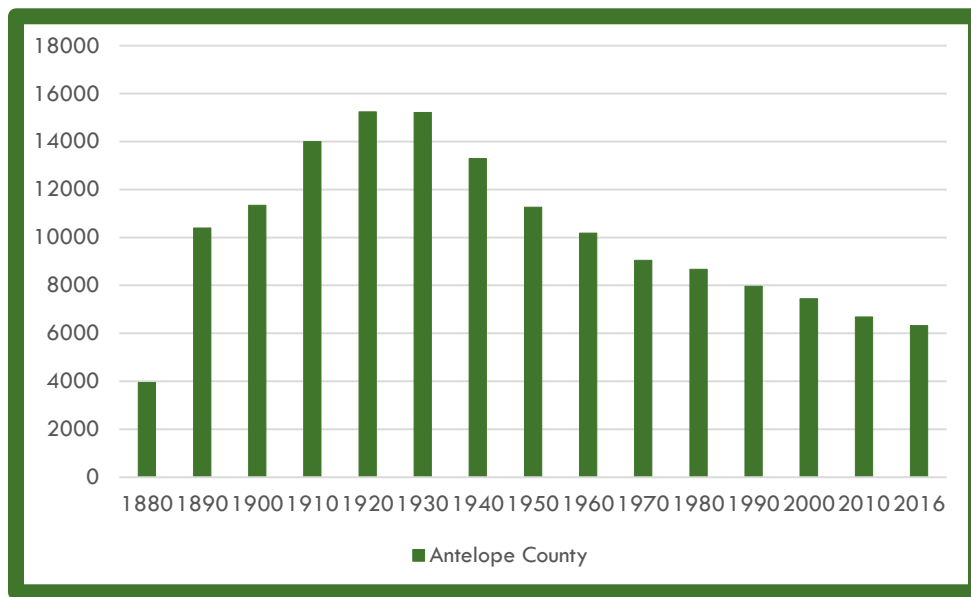
| Jurisdiction | 1980 Population | 1990 Population | 2000 Population | 2010 Population | Change '80 - '10 |
|-----------------|-----------------|-----------------|-----------------|-----------------|------------------|
| Antelope County | 8,675 | 7,965 | 7,452 | 6,685 | -22.9% |

Source: United States Census Bureau.

Overall, Antelope County’s population was 8,675 persons in 1980 and 6,685 persons in 2010. This is a decrease of 1,990 people or 22.9 percent in 30 years. This is the result of a decrease in both the urban and rural populations. For this plan, the term urban is equal to the population within an incorporated jurisdiction.

FIGURE 6.3: HISTORICAL POPULATION AND TRENDS [CENSUS] ANTELOPE COUNTY 1880 – 2016*

* 2016 data is an estimation



Source: United States Census Bureau.

TABLE 6.4: POPULATION BY AGE [CENSUS] ANTELOPE COUNTY

| Jurisdiction | < 5 – 9 | 10 – 19 | 20 – 34 | 35 – 54 | 55 – 64 | 65 – 84 | 85 < | 18 < | 21 < | 65 < | Median | Total |
|-----------------|---------|---------|---------|---------|---------|---------|------|-------|-------|-------|--------|-------|
| Antelope County | 859 | 841 | 888 | 1,680 | 1,013 | 1,154 | 250 | 5,111 | 4,951 | 1,404 | 46.6 | 6,685 |
| | 32.0% | 12.6% | 13.3% | 25.1% | 15.2% | 17.3% | 3.7% | 76.5% | 74.1% | 21.0% | | 100% |

Source: United States Census Bureau.

Overall, Antelope County’s median age is 46.6. The largest age cohort of 35-54 represents 25.1 percent of the total population or 1,680 persons. The smallest age cohort of 85 and greater represents 3.7 percent or 250 persons.

HOUSING

TABLE 6.5: HOUSING OCCUPANCY AND TENURE [CENSUS] ANTELOPE COUNTY

| Jurisdiction | Total Housing Units | | | | | Occupied Housing Units | | | |
|-----------------|---------------------|---------|--------|---------|--|------------------------|---------|--------|---------|
| | Occupied | | Vacant | | | Owner | | Renter | |
| | Number | Percent | Number | Percent | | Number | Percent | Number | Percent |
| Antelope County | 2,841 | 86.5% | 443 | 13.5% | | 2,159 | 76.0% | 682 | 24.0% |

Source: United States Census Bureau.

Overall, the housing occupancy and tenure in Antelope County is owner-occupied units. Of the total housing units, 2,841 units or 86.5 percent are occupied units and 2,159 units or 76.0 percent are owner-occupied units.

ASSETS INVENTORY

Each jurisdiction has a unique set of assets and capabilities available. By reviewing the existing assets and capabilities, each jurisdiction can identify assets and capabilities that currently reduce disaster losses or could be used to reduce losses in the future, as well as capabilities that inadvertently increase risks. This is especially useful for multi-jurisdictional plans where local capability varies widely. Assessing the jurisdictions’ existing assets and capabilities available is a critical step to accomplish mitigation, and how to leverage resources for long-term vulnerability reduction in the mitigation strategy.

CRITICAL FACILITIES AND INFRASTRUCTURE

Critical facilities are structures and institutions necessary for a community’s response to and recovery from emergencies. Critical facilities must continue to operate during and following a disaster to reduce the severity of impacts and accelerate recovery. When identifying vulnerabilities, consider both the structural integrity and content value of critical facilities and the effects of interrupting their services to the community.

Infrastructure systems are critical for life, safety, and economic viability and include transportation, power, communication, and water and wastewater systems. Many critical facilities depend on infrastructure to function. For example, hospitals need electricity, water, and sewer to continue helping patients. As with critical facilities, the continued operations of infrastructure systems during and following a disaster are key factors in the severity of impacts and the speed of recovery.

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.

Each participating jurisdiction identified critical facilities vital for disaster response, providing shelter to the public, and essential for returning the jurisdiction’s functions to normal during and after a disaster. Critical facilities were identified at the ‘mitigation alternative’ public meetings through the meeting worksheets (refer to Appendix C). Table 6.6 below summarizes the critical facilities and infrastructure identified by participants. This is a total summary list and not broken into individual counties or jurisdictions.

TABLE 6.6: CRITICAL FACILITIES AND INFRASTRUCTURE [FEMA] SUMMARY

| CRITICAL FACILITY | TYPE | NUMBER IDENTIFIED | CRITICAL FACILITY | TYPE | NUMBER IDENTIFIED |
|-------------------------|----------------|-------------------|-------------------|----------|-------------------|
| Communication Towers | Infrastructure | 8 | Elevator | Facility | 1 |
| Gas Pipeline Connection | Infrastructure | 1 | Fairgrounds | Facility | 1 |
| Internet Provider | Infrastructure | 1 | Fire Department | Facility | 9 |
| Lift Station | Infrastructure | 9 | Fuel Station | Facility | 2 |
| Light Plant Generator | Infrastructure | 1 | Golf Club | Facility | 1 |

Section Six [Participant Profiles | Antelope County]

| | | | | | |
|-----------------------------|----------------|----|----------------------------|----------|----|
| NPPD Substation | Infrastructure | 5 | Hospital | Facility | 11 |
| Phone Exchange | Infrastructure | 1 | Knox County District 9 | Facility | 1 |
| Waste Processing Facility | Infrastructure | 1 | Library/Museum | Facility | 7 |
| Waste Water Treatment | Infrastructure | 11 | Main Shop | Facility | 6 |
| Water Storage Facility | Infrastructure | 1 | Motel | Facility | 1 |
| Water Tower | Infrastructure | 10 | Mr. S's | Facility | 1 |
| Well | Infrastructure | 16 | NeDOT | Facility | 1 |
| Agronomy Center | Facility | 1 | Newspaper | Facility | 1 |
| Arboretum | Facility | 1 | Nursing Home/Senior Center | Facility | 9 |
| Ball Field | Facility | 9 | Nutrition Center | Facility | 1 |
| Bank | Facility | 3 | Park | Facility | 9 |
| Campground | Facility | 1 | Police Station | Facility | 2 |
| Church | Facility | 34 | Pool | Facility | 3 |
| City/Village/Tribal Office | Facility | 8 | Post Office | Facility | 11 |
| Community Center/Hub | Facility | 23 | Road Department | Facility | 2 |
| County Bard | Facility | 1 | School/Day Care | Facility | 39 |
| County Maintenance Building | Facility | 2 | Siren | Facility | 1 |
| Courthouse | Facility | 3 | Tribal Building | Facility | 1 |
| Eastern Township Building | Facility | 1 | -- | -- | -- |

VULNERABLE AREAS AND POPULATIONS

People are your most important asset. The risk assessment can identify areas of greater population density, as well as populations that may have unique vulnerabilities or be less able to respond and recover during a disaster. These include visiting populations and access and functional needs populations. In addition, the risk assessment can identify locations that provide health or social services that are critical to post-disaster response or recovery capabilities.

Visiting populations include students, second home owners, migrant farm workers, and visitors for special events. Special events could include large sporting events and festivals where large numbers of people are concentrated and vulnerable to hazards and threats. Visiting populations may be less familiar with the local environment and hazards and less prepared to protect themselves during an event.

The term “access and functional needs populations” describes groups that may not comfortably or safely access the standard resources offered in emergencies. These populations may include children, the elderly, the physically or mentally disabled, non-English speakers, or the medically or chemically dependent. Facility locations and support service operations for these populations (e.g., hospitals, dependent care facilities, oxygen delivery, and accessible transportation) also need to be considered.

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

Each participating jurisdiction identified highly vulnerable areas and populations where residents and visitors to the plan area may be more open or exposed to hazards both during and after an event and require additional response. Highly vulnerable areas and populations were identified at the ‘mitigation alternative’ public meetings through the meeting worksheets (Appendix C).

NATIONAL HISTORIC REGISTRY

The National Register of Historic Places is the official list of the Nation’s historic places worthy of preservation. Authorized by the National Historic Preservation Act of 1966, the National Park Service’s National Register of Historic Places is part of a

national program to coordinate and support public and private efforts to identify, evaluate, and protect America's historic and archeological resources.

The historic sites located within Antelope County, according to the National Historic Registry, are listed in Table 6.7 below. These sites were not evaluated for proximity to hazard prone areas.

TABLE 6.7: NATIONAL HISTORIC REGISTRY [NPS] ANTELOPE COUNTY

| Site Name | Date Listed | Location | Site Name | Date Listed | Location |
|----------------------------|-------------|----------------------------|------------------------------|-------------|-----------------------|
| Antelope County Courthouse | 12/03/1980 | Neligh | Neligh Mill | 06/29/1992 | Neligh |
| Bridge | 06/29/1992 | 6.8 miles NE of Royal) | Neligh Mill Bridge | 06/29/1992 | Neligh |
| Elkhorn River Bridge | 06/29/1992 | 3 miles East of Clearwater | Neligh Mill Elevators | 12/15/1983 | Neligh |
| Gates College Gymnasium | 04/20/1981 | Neligh | St. Peter's Episcopal Church | 12/03/1980 | Neligh |
| Kester Planing Mill | 07/28/2014 | Neligh | Verdigris Creek Bridge | 06/29/1992 | 1.9 miles NE of Royal |
| Maybury-McPherson House | 03/14/1996 | Neligh | | | |

Source: National Park Service.

CAPABILITIES ASSESSMENT

Local mitigation capabilities are existing resources that reduce hazard impacts or that could be used to implement hazard mitigation activities. Each participating jurisdiction completed a capabilities assessment at the 'hazard identification' public meetings through the meeting worksheets (refer to Appendix C). The sections below summarize the primary types of capabilities for reducing long-term vulnerability through mitigation planning including planning and regulatory, administrative and technical, financial, and education and outreach identified by participants.

PLANNING AND REGULATORY

Planning and regulatory capabilities are based on the implementation of ordinances, policies, local laws and State statutes, and plans and programs that relate to guiding and managing growth and development. Examples of planning capabilities that can either enable or inhibit mitigation include comprehensive land use plans, capital improvements programs, transportation plans, small area development plans, disaster recovery and reconstruction plans, and emergency preparedness and response plans. Plans describe specific actions or policies that support goals and drive decisions. Likewise, examples of regulatory capabilities include the enforcement of zoning ordinances, subdivision regulations, and building codes that regulate how and where land is developed and structures are built. Planning and regulatory capabilities refer not only to the current plans and regulations, but also to the jurisdictions' ability to change and improve those plans and regulations as needed.

Tables 6.08-6.10 below summarize the planning and regulatory capabilities currently available in the participating jurisdictions to help prevent and reduce the impacts of hazards.

Section Six [Participant Profiles | Antelope County]

TABLE 6.08: PLANNING AND REGULATORY [CAPABILITY ASSESSMENT] ANTELOPE COUNTY

| Plans | Antelope County |
|---|-----------------|
| Comprehensive/ Master Plan | Yes |
| Capital Improvements Plan | Yes |
| Economic Development Plan | No |
| Local Emergency Operations Plan | Yes |
| Continuity of Operations Plan | No |
| Transportation Plan | Yes |
| Stormwater Management Plan | No |
| Community Wildfire Protection Plan | No |
| Other special plans (e.g., brownfields redevelopment, disaster recovery, climate change adaption, etc.) | No |

Questions to consider for future updates: Does the plan address hazards? Does the plan identify projects to include in the mitigation strategy? Can the plan be used to implement mitigation actions?

TABLE 6.09: BUILDING CODE, PERMITTING, AND INSPECTIONS [CAPABILITY ASSESSMENT] ANTELOPE COUNTY

| Building Code, Permitting, and Inspections | Antelope County |
|--|-----------------|
| Building Code | No |
| Building Code Effectiveness Grading Schedule (BCEGS) Score | No |
| Fire Department ISO Rating | No |
| Site Plan Review Requirements | Yes |

Questions to consider for future updates: Are codes adequately enforced?

TABLE 6.10: LAND USE PLANNING AND ORDINANCES [CAPABILITY ASSESSMENT] ANTELOPE COUNTY

| Land Use Planning and Ordinances | Antelope County |
|---|-----------------|
| Zoning Ordinance | Yes |
| Subdivision Ordinance | No |
| Floodplain Ordinance | Yes |
| Natural hazard specific ordinance (stormwater, steep slope, wildfire) | No |
| Flood Insurance Rate Maps | Yes |
| Acquisition of land for open space and public recreation uses | No |
| Other | No |

Questions to consider for future updates: Is the ordinance an effective measure for reducing hazard impacts? Is the ordinance adequately administered and enforced? How can these capabilities be expanded and improved to reduce risk?

ADMINISTRATIVE AND TECHNICAL

Administrative and technical capability refers to the jurisdictions' staff and their skills and tools that can be used for mitigation planning and to implement specific mitigation actions. It also refers to the ability to access and coordinate these resources effectively. These include engineers, planners, emergency managers, GIS analysts, building inspectors, grant writers, floodplain managers, and more. The level of knowledge and technical expertise from personnel employed by each jurisdiction, the public and private sector, or resources available through other government entities, such as counties or special districts, may be accessed to implement mitigation activities in the jurisdiction or provide assistance with limited resources. The degree of intergovernmental coordination among departments also affects administrative capability.

Tables 6.11-6.17 below summarize the administrative and technical capabilities currently available in the participating jurisdictions, including staff and their skills and tools, that can be used for mitigation planning and to implement specific mitigation actions. For smaller jurisdictions without local staff resources, there may be public resources at the next higher-level government that can provide technical assistance.

TABLE 6.11: ADMINISTRATION [CAPABILITY ASSESSMENT] ANTELOPE COUNTY

| Administration | Antelope County |
|--|-----------------|
| Planning Commission | Yes |
| Mitigation Planning Committee | Yes |
| Maintenance programs to reduce risk (e.g., tree trimming, clearing drainage systems, etc.) | Yes |
| Mutual Aid Agreements | Yes |

Questions to consider for future updates: Describe capability. Is coordination effective?

TABLE 6.12: STAFF [CAPABILITY ASSESSMENT] ANTELOPE COUNTY

| Staff | Antelope County |
|--------------------------|-----------------|
| Chief Building Official | No |
| Floodplain Administrator | Yes |
| Emergency Manager | Yes |
| Community Planner | No |
| Civil Engineer | No |
| GIS Coordinator | Yes |
| Other | No |

Questions to consider for future updates: Is staffing adequate to enforce regulations? Is staff trained on hazards and mitigation? Is coordination between agencies and staff effective?

Section Six [Participant Profiles | Antelope County]

TABLE 6.13: TECHNICAL [CAPABILITY ASSESSMENT] ANTELOPE COUNTY

| Technical | Antelope County |
|--|-----------------|
| Warning systems/ services (Reverse 911, outdoor warning signals) | Yes |
| Hazard Data and Information | Yes |
| Grant Writing | No |
| HAZUS Analysis | No |
| Other | No |

Questions to consider for future updates: Describe capability. Has capability been used to assess/ mitigate risk in the past? How can these capabilities be expanded and improved to reduce risk?

FINANCIAL

Financial capabilities are the resources that a jurisdiction has access to or is eligible to use to fund mitigation actions. The costs associated with implementing mitigation activities vary. Some mitigation actions such as building assessment or outreach efforts require little to no costs other than staff time and existing operating budgets. Other actions, such as the acquisition of flood-prone properties, could require a substantial monetary commitment from local, State, and Federal funding sources.

Local governments may have access to a recurring source of revenue beyond property, sales, and income taxes, such as stormwater utility or development impact fees. These jurisdictions may be able to use the funds to support local mitigation efforts independently or as the local match or cost-share often required for grant funding.

Table 6.14 below summarizes the financial capabilities currently available in the participating jurisdictions to help fund hazard mitigation activities.

TABLE 6.14: FUNDING RESOURCE [CAPABILITY ASSESSMENT] ANTELOPE COUNTY

| Funding Resource | Antelope County |
|---|-----------------|
| Capital improvements project funding | Yes |
| Authority to levy taxes for specific purposes | Yes |
| Fees for water, sewer, gas, or electric services | No |
| Impact fees for new development | No |
| Storm water utility fee | No |
| Incur debt through general obligation bonds and/ or special tax bonds | Yes |
| Incur debt through private activities | No |
| Community Development Block Grant | No |
| Other federal funding programs | No |
| State funding programs | No |
| Other | No |

Questions to consider for future updates: Has the funding resource been used in the past and for what type of activities? Could the resource be used to fund future mitigation actions? How can these capabilities be expanded and improved to reduce risk?

EDUCATION AND OUTREACH

This type of capability refers to education and outreach programs, methods, and initiatives already in place to implement mitigation activities and communicate hazard-related information. Examples include fire safety programs that fire departments deliver to students at local schools; participation in community programs, such as Firewise or StormReady; and activities conducted as part of hazard awareness campaigns, such as Tornado or Flood Awareness Month.

Table 6.15 below identifies the education and outreach capabilities currently available in the participating jurisdictions to increase hazard mitigation awareness.

TABLE 6.15: EDUCATION AND OUTREACH [CAPABILITY ASSESSMENT] ANTELOPE COUNTY

| Program/ Organization | Antelope County |
|---|-----------------|
| Local citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc. | Yes |
| Ongoing public education or information program (e.g., responsible water use, fire safety, household preparedness, environmental education, etc.) | Yes |
| Natural disaster or safety related school programs | No |
| Storm Ready Certification | No |
| Fire Wise Communities Certification | No |
| Public-private partnership initiatives addressing disaster-related issues | No |
| Other | No |

Questions to consider for future updates: Describe the program/ organization and how it relates to disaster resilience and mitigation. Could the program/ organization help implement future mitigation activities? How can these capabilities be expanded and improved to reduce risk?

SAFE GROWTH

One way to assess the impact of planning and regulatory capabilities is to complete a safe growth audit. The purpose of the safe growth audit is to analyze the impacts of current policies, ordinances, and plans on community safety from hazard risks due to growth. A safe growth audit helps identify gaps in jurisdictions’ growth guidance instruments and improvements that could be made to reduce vulnerability to future development.

Tables 6.16-6.23 below summarize the safe growth audit in terms of land use, transportation, environmental management, public safety, zoning ordinances, subdivision regulations, and capital improvements currently available in the participating jurisdictions to help prevent and reduce the impacts of hazards.

TABLE 6.16: LAND USE [SAFE GROWTH] ANTELOPE COUNTY

| Comprehensive Plan (Land Use) | Antelope County |
|--|-----------------|
| Does the Future Land Use Map clearly identify natural hazard areas? | No |
| Do the land-use policies discourage development or redevelopment within natural hazard areas? | No |
| Does the plan provide adequate space for expected future growth in areas located outside natural hazard areas? | No |

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TABLE 6.17: TRANSPORTATION [SAFE GROWTH] ANTELOPE COUNTY

| Comprehensive Plan (Transportation) | Antelope County |
|---|-----------------|
| Does the Transportation Plan limit access to hazard areas? | No |
| Is transportation policy used to guide growth to safe locations? | No |
| Are movement systems designed to function under disaster conditions (e.g., evacuation)? | No |

TABLE 6.18: ENVIRONMENTAL MANAGEMENT [SAFE GROWTH] ANTELOPE COUNTY

| Comprehensive Plan (Environmental Management) | Antelope County |
|--|-----------------|
| Are environmental systems that protect development from hazards identified and mapped? | No |
| Do environmental policies maintain and restore protective ecosystems? | No |
| Do environmental policies provide incentives to development that is located outside protective ecosystems? | No |

TABLE 6.19: PUBLIC SAFETY [SAFE GROWTH] ANTELOPE COUNTY

| Comprehensive Plan (Public Safety) | Antelope County |
|---|-----------------|
| Are the goals and policies of the Comprehensive Plan related to those of the FEMA Local Hazard Mitigation Plan? | No |
| Is safety explicitly included in the plan’s growth and development policies? | No |
| Does the monitoring and implementation section of the plan cover safe growth objectives? | No |

TABLE 6.20: ZONING ORDINANCE [SAFE GROWTH] ANTELOPE COUNTY

| Zoning Ordinance | Antelope County |
|--|-----------------|
| Does the Zoning Ordinance conform to the Comprehensive Plan in terms of discouraging development or redevelopment within natural hazard areas? | No |
| Does the ordinance contain natural hazard overlay zones that set conditions for land uses within such zones? | No |
| Do rezoning procedures recognize natural hazard areas as limits on zoning changes that allow greater intensity or density of use? | No |
| Does the ordinance prohibit development within, or filling of, wetlands, floodways, and floodplains? | No |

TABLE 6.21: SUBDIVISION REGULATIONS [SAFE GROWTH] ANTELOPE COUNTY

| Subdivision Regulations | Antelope County |
|---|-----------------|
| Do the Subdivision Regulations restrict the subdivision of land within or adjacent to natural hazard areas? | No |
| Do the regulations provide for conservation subdivisions or cluster subdivisions to conserve environmental resources? | No |
| Do the regulations allow density transfers where hazard areas exist? | No |

TABLE 6.22: CAPITAL IMPROVEMENTS [SAFE GROWTH] ANTELOPE COUNTY

| Capital Improvement Program and Infrastructure Policies | Antelope County |
|---|-----------------|
| Does the Capital Improvement Program limit expenditures on projects that would encourage development in areas vulnerable to natural hazards? | No |
| Do Infrastructure Policies limit extension of existing facilities and services that would encourage development in areas vulnerable to natural hazards? | No |
| Does the Capital Improvement Program provide funding for hazard mitigation projects identified in the FEMA Mitigation Plan? | No |

TABLE 6.23: ADDITIONAL PLANNING MECHANISMS [SAFE GROWTH] ANTELOPE COUNTY

| Additional Planning Mechanisms | Antelope County |
|---|-----------------|
| Do small area or corridor plans recognize the need to avoid or mitigate natural hazards? | No |
| Does the Building Code contain provisions to strengthen or elevate construction to withstand hazard forces? | No |
| Do economic development or redevelopment strategies include provisions for mitigating natural hazards? | No |
| Is there an adopted evacuation and shelter plan to deal with emergencies from natural hazards? | No |

CLIMATE SUMMARY

The monthly climate normals information displayed in the figures and table below is taken from weather station 255830, near Neligh. The data from this station is provided by the High Plains Regional Climate Center.

Normals are produced by the National Climatic Data Center (NCDC). Climate normals are an arithmetic average of a variable such as temperature over a prescribed 30-year period. This base period changes every 10 years to reflect the previous 30 years of data. The current period is 1985-2015. Note that NCDC normals may not be the same as a straight average over the 30-year period, due to adjustments for discontinuities such as station moves or changes in observation time.

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TABLE 6.24: GENERAL CLIMATE STATISTICS [HPRCC] MONTHLY COMPARISONS

| Month | Mean Maximum Temperature (F) | Mean Minimum Temperature (F) | Mean Average Temperature (F) | Total Precipitation (in.) | Total Snowfall (in.) |
|-----------|------------------------------|------------------------------|------------------------------|---------------------------|----------------------|
| January | 44.8 | 2.1 | 34.0 | 0.50 | 5.4 |
| February | 46.2 | 3.4 | 37.3 | 0.74 | 5.0 |
| March | 57.7 | 13.4 | 48.8 | 1.53 | 4.0 |
| April | 66.3 | 31.2 | 60.5 | 2.75 | 2.5 |
| May | 73.9 | 43.4 | 71.0 | 3.75 | 0.1 |
| June | 80.3 | 55.3 | 80.1 | 3.94 | 0 |
| July | 83.1 | 61.9 | 84.5 | 3.10 | 0 |
| August | 81.1 | 60.6 | 82.8 | 4.17 | 0 |
| September | 76.8 | 47.1 | 76.3 | 2.56 | 0 |
| October | 68.2 | 32.9 | 64.0 | 2.15 | 0.6 |
| November | 55.5 | 17.0 | 47.8 | 1.10 | 4.1 |
| December | 45.0 | 3.0 | 35.2 | 0.70 | 5.6 |

Source: High Plains Regional Climate Center.

HAZARD IDENTIFICATION AND RISK ASSESSMENT SUMMARY

The hazard identification was conducted to determine the hazards that threaten Antelope, Holt, and Knox Counties. It was established through public input and information provided by elected officials, key stakeholders, and residents throughout the planning area, as well as conducting research on each hazard type identified in the State of Nebraska Hazard Mitigation Plan. For this plan update, nine natural hazards were initially considered, including severe winter storms (including extreme cold and severe winter weather), tornados, severe thunderstorms (including hail, lightning, and severe wind), 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 exceptions of dam failure and levee failure, were not included in this plan. Using existing hazards data and input gained through planning and public meetings, Antelope, Holt, and Knox Counties identified the hazards that could affect the planning area.

To best describe the hazards that affect the jurisdictions, Antelope, Holt, and Knox Counties utilized the following activities for identifying hazards in the planning area:

- ❑ Reviewed the State Hazard Mitigation Plan for information on hazards affecting the planning area.
- ❑ Documented the disaster declaration history.
- ❑ Downloaded weather-related events from online resources, such as the National Climatic Data Center.
- ❑ Reviewed existing studies, reports, and plans related to hazards in the planning area.
- ❑ Used flood insurance rate maps (FIRM) and non-regulatory flood risk assessment products developed for the planning area by FEMA as part of the National Flood Insurance Program (NFIP) and the RiskMAP program.
- ❑ Contacted colleges or universities that have hazard-related academic programs or extension services.
- ❑ Interviewed the planning team and stakeholders about which hazards affect the planning area and should be described in the mitigation plan.

- ❑ Consulted local resources such as the newspaper, chamber of commerce, local historical society, or other resources with records of past occurrences.
- ❑ Referenced hazards previously identified to determine if they were still relevant.

Hazards data from the Nebraska Emergency Management Agency (NEMA) State of Nebraska Mitigation Plan, Federal Emergency Management Agency (FEMA), National Oceanic and Atmospheric Administration (NOAA), National Climatic Data Center (NCDC), as well as other sources were analyzed to gauge the overall significance of the hazards to Antelope, Holt, and Knox Counties. Overall significance was calculated based on risk assessment criteria such as frequency and damage, including deaths and injuries, as well as property, crop, and economic damage. Hazards that occur relatively infrequent or have minimal to no impact on the planning area were deemed to be of low significance. This evaluation was used by Antelope, Holt, and Knox Counties to identify the hazards of greatest overall significance, allowing the Counties to concentrate resources where they are needed most.

The mitigation plan update focuses on how risk has changed since the previous plans were completed, particularly changes related to land use development and new hazard information. New development in hazard-prone areas, areas affected by recent disasters, and new data and reports were incorporated into the plan to analyze the current risk and update mitigation actions. The Nebraska State Hazard Mitigation Plan was consulted to assess the potential of new hazards for Antelope, Holt, and Knox Counties. The previous Antelope County Plan was also reevaluated, and the comments in Table 6.29 detail how hazards were updated.

TABLE 6.25: ANTELOPE COUNTY HAZARD IDENTIFICATION [COMPARISON] 2010-2016

| 2016 Hazards | 2010 Hazards* | 2016 Comment |
|-----------------------|--|---|
| Dam Failure | Hazard identified and evaluated. | Hazard identified and evaluated with updated data, analysis, and risk assessment. |
| Drought | Hazard identified and evaluated. | Hazard identified and evaluated with updated data, analysis, and risk assessment. |
| Earthquake | Hazard identified and evaluated. | Hazard identified but not evaluated. |
| Extreme Cold | Hazard identified and evaluated (included under Severe Winter Storms). | Hazard identified and evaluated with updated data, analysis, and risk assessment (included under Severe Winter Storms). |
| Extreme Heat | Hazard identified and evaluated. | Hazard identified and evaluated with updated data, analysis, and risk assessment. |
| Flood | Hazard identified and evaluated. | Hazard identified and evaluated with updated data, analysis, and risk assessment. |
| Hail | Hazard identified and evaluated (included under Severe Thunderstorms). | Hazard identified and evaluated with updated data, analysis, and risk assessment (included under Severe Thunderstorms). |
| Landslide | Hazard identified and evaluated. | Hazard identified but not evaluated. |
| Lightning | Hazard identified and evaluated (included under Severe Thunderstorms). | Hazard identified and evaluated with updated data, analysis, and risk assessment (included under Severe Thunderstorms). |
| Severe Wind | Hazard identified and evaluated (included under Tornadoes and High Winds). | Hazard identified and evaluated with updated data, analysis, and risk assessment (included under Severe Thunderstorms). |
| Severe Winter Weather | Hazard identified and evaluated. | Hazard identified and evaluated with updated data, analysis, and risk assessment. |
| Tornado | Hazard identified and evaluated. | Hazard identified and evaluated with updated data, analysis, and risk assessment. |

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| 2016 Hazards | 2010 Hazards* | 2016 Comment |
|---------------|--------------------------------------|--------------------------------------|
| Wildfire | Hazard identified and evaluated. | Hazard identified but not evaluated. |
| Levee Failure | Hazard identified but not evaluated. | Hazard identified but not evaluated. |

Source: Antelope, Holt, and Knox Counties Hazard Mitigation Plan, 2010.

The Disaster Mitigation Act requires that Antelope, Holt, and Knox Counties evaluate the risks associated with each hazard identified in the planning process. Refer to Section Three for additional explanations on which hazards were evaluated and why certain hazards were not evaluated in this plan. The overall risk assessment for the identified hazard types represents the presence and vulnerability to each hazard type throughout the planning area. The individual hazard identification tables, based on the public input and information received, identify those hazard types which have occurred, have a significant likelihood to occur again, or have reason to potentially occur in Antelope, Holt, and Knox Counties. These tables were compiled after receiving responses from the public, discussing the public responses with the State Hazard Mitigation Officer, and conducting detailed research on the presence and risk of each hazard type. The individual participant hazard identification tables and responses may or may not reflect the consensus for risk and vulnerability to each hazard type for the planning area.

Table 6.26 summarizes the results of the hazard identification and risk assessment for Antelope County, based on the hazard data and input from the public. For each hazard identified, this table includes the location, maximum probable extent, probability of future events, and overall significance for the County and incorporated jurisdictions.

TABLE 6.26: HAZARD IDENTIFICATION & RISK ASSESSMENT [ANTELOPE COUNTY] 2016

| Hazard | Location | Maximum Probable Extent | Overall Significance |
|----------------------|-------------|-------------------------|----------------------|
| Severe Winter Storms | Extensive | Moderate | Medium |
| Severe Thunderstorms | Significant | Moderate | Medium |
| Tornados | Negligible | Severe | Medium |
| Floods | Significant | Moderate | Medium |
| Extreme Heat | Extensive | Severe | Medium |
| Drought | Extensive | Severe | High |
| Dam Failure | Significant | Severe | Low |

THE ACTION PLAN – ANTELOPE COUNTY

The action plan lays the groundwork for implementation. The plan was developed to present the recommendations established by Antelope, Holt, and Knox Counties on how the participating jurisdictions can reduce risk and vulnerability of people, property, infrastructure, and natural resources to future disaster losses. The action plan identifies how mitigation actions will be implemented, including who is responsible for which actions, what funding mechanisms and other resources are available or will be pursued, when actions will be completed, and how they are prioritized.

Plan updates reflect progress in local mitigation efforts. The integration of the plan into existing planning mechanisms and the implementation of mitigation actions demonstrate progress in risk reduction. Details describing how the current mitigation strategy, including goals and actions, will be incorporated into existing mechanisms are discussed in *Section Five: Review, Evaluation, and Implementation* in more detail. However, in general each jurisdiction (county, city, or village) will need to take all the mitigation action items into account when local plans (comprehensive plans, zoning ordinance updates, subdivision regulations, capital improvement plans, etc.) are redone or revised. Each mitigation item will be looked at to see if the jurisdiction can add each individual mitigation item into a current plan so it can be accomplished. Also, each jurisdiction will make sure all the local plans do not contradict with the proposed mitigation action items but instead work in coordination with them. This process has been done on the local plans between the 2010 plan and this current 2016 plan and is reflected in which current mitigation action items have been included in this plan.

The action plan detailed below contains both new actions developed for this plan update, as well as viable actions that had yet to be completed from the previous plans. Each action item is listed with a current status statement. The status will be one of the following three options:

- **New – Mitigation Action Items that are new in the 2016 plan**
- **Continued Action (Ongoing Action) – These 2010 action items have been completed to a certain point but require continued review and work on them**
- **Continued Action (Insufficient Funding) – These 2010 action items have not been completed due to insufficient funding. The jurisdictions still intend to complete these action items if funding becomes available.**

The actions are also listed by Priority with High being listed first. Each jurisdiction ranked the chosen action items by priority during the planning process and that ranking will be utilized if and when funding becomes available. The selected action item will be determined from discussions between the individual jurisdiction, specific county and pertinent Emergency Manager. Priority rankings, available funding, local needs, and other specific criteria will be used to select which action items will be completed.

LOCAL PLANS AND REGULATIONS

These actions include government authorities, policies, or codes that influence the way land and buildings are developed and built.

The Emergency Managers for each county will ultimately be responsible for the implementation of each mitigation action.

Liz Doerr (Zoning Administrator) – Antelope County
Deb Hilker (Emergency Manager) – Holt County
Laura Hintz (Emergency Manager) – Knox County

MITIGATION ACTION ITEMS

ANTELOPE COUNTY

ANTELOPE COUNTY

Antelope County determined that existing or future flooding potential was a high concern. They were concerned with areas that currently flood or have the potential to flood in the future. They also wanted to improve warning and safety systems. These concerns were discussed and used to create most of the Mitigation Action Items. These Mitigation Action Items are fairly similar to the items listed in the 2010 Plan.

PARTICIPATE OR MAINTAIN GOOD STANDING IN THE NATIONAL FLOOD INSURANCE PROGRAM

[Background] Participate in the National Flood Insurance Program (NFIP) or maintain good standing with the NFIP including floodplain management practices/requirements and regulation enforcements and updates.

[Benefits] Enable property owners to purchase insurance protection against flood losses. Good standing enables participants to apply for Pre-Disaster Mitigation Grant Program and Hazard Mitigation Grant Program cost-share.

[Responsible Agency & Partners] Antelope County Board of Commissioners and Planning and Zoning Commission

[Cost Estimate & Funding] \$5,000, Tax Revenue, grants, bequeaths

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[Timeline] Continuous

[Priority] High

[Status] This a continued action from past plan that is an ongoing action.

DRAINAGE ASSESSMENT FOR BRIDGE AND CULVERT IMPROVEMENTS

[Background] Preliminary drainage studies and assessments can be conducted to identify and prioritize design improvements to address site specific localized flooding/drainage issues to reduce and/or alleviate flooding. Stormwater master plans can be conducted to perform a community-wide stormwater evaluation, identifying multiple problem areas and potential drainage improvements.

[Benefits] Proactive steps to identify all potential problems/issues can lead to effectively addressing improvements and prioritizing the projects to improve conditions. These improvements can serve to more effectively convey runoff within jurisdictions, preventing interior localized flooding resulting in damages. This ensures that the most beneficial projects are done first and could possibly eliminate the need for others.

[Responsible Agency & Partners] Antelope County Engineering, Roads Department, and Lower Niobrara Natural Resource District

[Cost Estimate & Funding] \$10,000 to \$100,000+; Hazard Mitigation Assistance Grant Programs, Community Development Block Grant, Natural Resources Districts

[Timeline] 1-3 years

[Priority] High

[Status] Continued Action from previous plan that requires ongoing action.

FLOODPLAIN DEVELOPMENT ORDINANCE ENFORCEMENT

[Background] Continue or improve floodplain management practices such as adoption and enforcement of floodplain management requirements (regulation of construction in significant flood hazard areas), floodplain identification and mapping (local requests for map updates), description of community assistance and monitoring activities, explanation for failure to participate in the National Flood Insurance Program, Community Rating System (CRS), and participation in Federal Emergency Management Agency's Cooperating Technical Partners Program (CTP) to increase local involvement in the flood mapping process. Continue to enforce local floodplain regulations for structures located in the 100-year floodplain. Strict enforcement of the type of development and elevations of structures should be considered through issuance of floodplain development permits by any community or County. Continue education of building inspectors or Certified Floodplain Managers. Encourage building regulations for storm resistance structures.

[Benefits] Continue compliance with the National Flood Insurance Program. Good standing enables participants to apply for Pre-Disaster Mitigation Grant Program and Hazard Mitigation Grant Program cost-share. Ensures that no new structures built will be vulnerable to flooding. Reducing damages and health risks associated with flooding.

[Responsible Agency & Partners] Antelope County Administration and/or Floodplain Management Departments, Nebraska Department of Natural Resources

[Cost Estimate & Funding] \$5,000+; Hazard Mitigation Assistance Grant Programs, Community Development Block Grant

[Timeline] 1-3 years

[Priority] High

[Status] Continued Action from previous plan that requires ongoing action.

STORM SHELTER AND SAFE ROOMS

[Background] Assess, design and construct fully supplied safe rooms in highly vulnerable urban and rural areas such as mobile home parks, campgrounds, schools, and other such areas throughout the planning area. Assess the adequacy of current public buildings to be used as safe rooms. Construct safe rooms in areas of greatest need, either as new construction or retrofitting.

[Benefits] Reduce the risk of death or injury in areas vulnerable to tornados, severe thunderstorms and other hazards.

[Responsible Agency & Partners] Antelope County Administration, Planning, and/or Emergency Management Departments

[Cost Estimate & Funding] \$400 to \$500/square foot (stand-alone), \$350 to 400/square foot (addition/retrofit); Hazard Mitigation Assistance Grant Programs

[Timeline] 1-3 years

[Priority] High

[Status] Continued Action from previous plan that has not been completed yet due to insufficient funding.

STREAM BANK STABILIZATION

[Background] Stream bank/bed degradation can occur along many rivers and creeks. Stabilization improvements including rock rip rap, vegetative cover, j-hooks, boulder vanes, etc. can be implemented to reestablish the channel banks. Grade control structures including sheet-pile weirs, rock weirs, ponds, road dams, etc. can be implemented and improved to maintain the channel bed. Channel stabilization can protect structures, increase conveyance and provide flooding benefits. Flood protection for critical and/or highly vulnerable facilities, areas, populations, and infrastructure is key.

[Benefits] Stream bed/grade stabilization improvements can serve to more effectively protect structures, increase conveyance, prevent down cutting, and provide flooding benefits.

[Responsible Agency & Partners] Antelope County, Public Works, Utility, and/or Floodplain Management Department, and Lower Niobrara Natural Resources District

[Cost Estimate & Funding] \$50,000 to \$100,000+; Hazard Mitigation Assistance Grant Programs, Natural Resources Districts

[Timeline] 1-3 years

[Priority] High

[Status] Continued Action from previous plan that requires ongoing action.

BACKUP GENERATORS

[Background] Provide a portable or stationary source of backup power to redundant power supplies and other critical facilities and shelters.

[Benefits] Reduce the danger to human life/health by keeping utilities operating. Reduce the economic downtime associated with utility loss.

[Responsible Agency & Partners] Antelope County, Individual City or Villages Public Works Departments and/or Emergency Management Department(s)

[Cost Estimate & Funding] \$20,000 to \$35,000/generator; Hazard Mitigation Assistance Grant Programs

[Timeline] 1-3 years

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[Priority] High

[Status] Continued Action from previous plan that has not been completed yet due to insufficient funding.

TREE CITY U.S.A.

[Background] Work to become a Tree City U.S.A. through the National Arbor Day Foundation to receive direction, technical assistance, and public education on how to establish a hazardous tree identification and removal program to limit potential tree damage and damages caused by trees in a community when a storm event occurs. The four main requirements include: 1) Establish a tree board; 2) Enact a tree care ordinance; 3) Establish a forestry care program; 4) Enact an Arbor Day observance and proclamation.

[Benefits] Better maintained trees and hazardous tree removal will eliminate damages to power lines and personal property during hazards events. Participation in Tree City U.S.A. will support community actions to mitigate damages from trees.

[Responsible Agency & Partners] Antelope County Board of Commissioners and Planning and Zoning Commission

[Cost Estimate & Funding] \$5,000+; Arbor Day Foundation, United States/State Forest Service

[Timeline] 3-5 years

[Priority] Medium

[Status] Continued Action from previous plan that requires ongoing action.

PUBLIC AWARENESS AND EDUCATION CAMPAIGNS

[Background] Through activities such as outreach projects, distribution of maps and environmental education increase public awareness of natural hazards to both public and private property owners, renters, businesses, and local officials about hazards and ways to protect people and property from these hazards. In addition, educate citizens on erosion control and water conservation methods.

[Benefits] Public awareness reduces the risk of property loss and damage, injury and death. It increases knowledge on emergency procedures, facilities, conservation, and is key to preparedness.

[Responsible Agency & Partners] Antelope County, Individual City or Villages Public Works Departments and/or Emergency Management Department(s)), Antelope County

[Cost Estimate & Funding] \$1,000+; Hazard Mitigation Assistance Grant Programs

[Timeline] 4-5 years

[Priority] Medium

[Status] Continued Action from previous plan that requires ongoing action.

UNDERGROUND OR IDENTIFY AND RETROFIT POWER AND SERVICE LINES

[Background] Communities can work with their local Public Power District or Electricity Department to identify vulnerable transmission and distribution lines and plan to bury lines underground, upgrade, or retrofit existing structures to be less vulnerable to storm events. Electrical utilities shall be required to use underground construction methods where possible for future installation of power lines. Rural Water Districts can work with their County or Natural Resources District to identify vulnerable distribution lines near river crossings or creek beds and plan to place lines underground to reduce vulnerability from storm events and erosion.

[Benefits] To protect the power and water infrastructure and prevent lines from coming down or being washed out during storm events.

[Responsible Agency & Partners] Antelope County Individual City or Villages Public Works Departments and/or Emergency Management Departments, Public Power Districts, Rural Water Districts, Natural Resources Districts

[Cost Estimate & Funding] \$60,000 to \$80,000/mile (electrical); Hazard Mitigation Assistance Grant Programs, Public Power Districts, Rural Water Districts, Natural Resources Districts

[Timeline] 1-3 years

[Priority] Low

[Status] Continued Action from previous plan that requires ongoing action.

WEATHER RADIOS

[Background] Conduct an inventory of weather radios at schools and other critical facilities and provide new radios as needed. Potentially had a new weather tower constructed to increase radio service to larger coverage areas.

[Benefits] Reduces the risk of death/injury associated with severe weather conditions by communication.

[Responsible Agency & Partners] Antelope County Board Individual City or Villages Public Works Departments and/or Emergency Management Departments

[Cost Estimate & Funding] \$300,000; Hazard Mitigation Assistance Grant Programs, Tax Funding

[Timeline] 1-3 years

[Priority] Low

[Status] Continued Action from previous plan that has not been completed yet due to insufficient funding.

NATIONAL CLIMATIC DATA CENTER [NCDC]

HAZARD EVENT DETAILS

TABLE 6.27: NCDC EVENTS [SEVERE WINTER STORMS] JANUARY 1, 1950 – JANUARY 31, 2016

| Location | County/ Zone | Date | Type | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|-----------------|-----------------|------------|-------------------------|-----------|--------|----------|-----------------|-------------|
| ANTELOPE (ZONE) | ANTELOPE (ZONE) | 1/26/1996 | Winter Storm | | 0 | 0 | 0.00K | 0.00K |
| ANTELOPE (ZONE) | ANTELOPE (ZONE) | 3/24/1996 | Blizzard | | 0 | 0 | 0.00K | 0.00K |
| ANTELOPE (ZONE) | ANTELOPE (ZONE) | 11/14/1996 | Winter Storm | | 0 | 0 | 0.00K | 0.00K |
| ANTELOPE (ZONE) | ANTELOPE (ZONE) | 12/25/1996 | Winter Storm | | 0 | 0 | 0.00K | 0.00K |
| ANTELOPE (ZONE) | ANTELOPE (ZONE) | 2/3/1997 | Winter Storm | | 0 | 0 | 0.00K | 0.00K |
| ANTELOPE (ZONE) | ANTELOPE (ZONE) | 4/9/1997 | Winter Storm | | 0 | 0 | 0.00K | 0.00K |
| ANTELOPE (ZONE) | ANTELOPE (ZONE) | 4/11/1997 | Winter Storm | | 0 | 0 | 0.00K | 0.00K |
| ANTELOPE (ZONE) | ANTELOPE (ZONE) | 11/10/1998 | Winter Storm | | 0 | 0 | 0.00K | 0.00K |
| ANTELOPE (ZONE) | ANTELOPE (ZONE) | 2/22/1999 | Winter Storm | | 0 | 0 | 0.00K | 0.00K |
| ANTELOPE (ZONE) | ANTELOPE (ZONE) | 3/8/1999 | Winter Storm | | 0 | 0 | 0.00K | 0.00K |
| ANTELOPE (ZONE) | ANTELOPE (ZONE) | 11/23/1999 | Winter Storm | | 0 | 0 | 0.00K | 0.00K |
| ANTELOPE (ZONE) | ANTELOPE (ZONE) | 11/11/2000 | Winter Storm | | 0 | 0 | 0.00K | 0.00K |
| ANTELOPE (ZONE) | ANTELOPE (ZONE) | 12/16/2000 | Winter Storm | | 0 | 0 | 0.00K | 0.00K |
| ANTELOPE (ZONE) | ANTELOPE (ZONE) | 12/16/2000 | Extreme Cold/Wind Chill | | 0 | 0 | 0.00K | 0.00K |
| ANTELOPE (ZONE) | ANTELOPE (ZONE) | 12/18/2000 | Extreme Cold/Wind Chill | | 0 | 0 | 0.00K | 0.00K |
| ANTELOPE (ZONE) | ANTELOPE (ZONE) | 1/13/2001 | Winter Storm | | 0 | 0 | 0.00K | 0.00K |
| ANTELOPE (ZONE) | ANTELOPE (ZONE) | 1/29/2001 | Winter Storm | | 0 | 0 | 0.00K | 0.00K |
| ANTELOPE (ZONE) | ANTELOPE (ZONE) | 2/23/2001 | Winter Storm | | 0 | 0 | 0.00K | 0.00K |
| ANTELOPE (ZONE) | ANTELOPE (ZONE) | 11/26/2001 | Winter Storm | | 0 | 0 | 0.00K | 0.00K |
| ANTELOPE (ZONE) | ANTELOPE (ZONE) | 2/9/2002 | Winter Storm | | 0 | 0 | 0.00K | 0.00K |
| ANTELOPE (ZONE) | ANTELOPE (ZONE) | 1/15/2003 | Winter Storm | | 0 | 0 | 0.00K | 0.00K |
| ANTELOPE (ZONE) | ANTELOPE (ZONE) | 1/22/2003 | Extreme Cold/Wind Chill | | 0 | 0 | 0.00K | 0.00K |
| ANTELOPE (ZONE) | ANTELOPE (ZONE) | 2/4/2004 | Winter Storm | | 0 | 0 | 0.00K | 0.00K |

Section Six [Participant Profiles I Antelope County]

| Location | County/ Zone | Date | Type | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|-----------------|-----------------|------------|-------------------------|-----------|--------|----------|-----------------|-------------|
| ANTELOPE (ZONE) | ANTELOPE (ZONE) | 11/28/2005 | Winter Storm | | 0 | 0 | 0.00K | 0.00K |
| ANTELOPE (ZONE) | ANTELOPE (ZONE) | 11/28/2005 | Blizzard | | 0 | 0 | 0.00K | 0.00K |
| ANTELOPE (ZONE) | ANTELOPE (ZONE) | 3/19/2006 | Winter Storm | | 0 | 0 | 0.00K | 0.00K |
| ANTELOPE (ZONE) | ANTELOPE (ZONE) | 12/29/2006 | Winter Storm | | 0 | 0 | 5.00M | 0.00K |
| ANTELOPE (ZONE) | ANTELOPE (ZONE) | 2/24/2007 | Winter Storm | | 0 | 0 | 0.00K | 0.00K |
| ANTELOPE (ZONE) | ANTELOPE (ZONE) | 12/8/2007 | Heavy Snow | | 0 | 0 | 0.00K | 0.00K |
| ANTELOPE (ZONE) | ANTELOPE (ZONE) | 1/20/2008 | Heavy Snow | | 0 | 0 | 0.00K | 0.00K |
| ANTELOPE (ZONE) | ANTELOPE (ZONE) | 4/10/2008 | Winter Storm | | 0 | 0 | 0.00K | 0.00K |
| ANTELOPE (ZONE) | ANTELOPE (ZONE) | 12/15/2008 | Extreme Cold/Wind Chill | | 0 | 0 | 0.00K | 0.00K |
| ANTELOPE (ZONE) | ANTELOPE (ZONE) | 12/18/2008 | Winter Storm | | 0 | 0 | 0.00K | 0.00K |
| ANTELOPE (ZONE) | ANTELOPE (ZONE) | 3/31/2009 | Winter Storm | | | | 0.00K | 0.00K |
| ANTELOPE (ZONE) | ANTELOPE (ZONE) | 4/4/2009 | Blizzard | | 0 | 0 | 0.00K | 0.00K |
| ANTELOPE (ZONE) | ANTELOPE (ZONE) | 12/8/2009 | Winter Storm | | 0 | 0 | 0.00K | 0.00K |
| ANTELOPE (ZONE) | ANTELOPE (ZONE) | 12/8/2009 | Blizzard | | 0 | 0 | 0.00K | 0.00K |
| ANTELOPE (ZONE) | ANTELOPE (ZONE) | 12/24/2009 | Winter Storm | | 0 | 0 | 0.00K | 0.00K |
| ANTELOPE (ZONE) | ANTELOPE (ZONE) | 12/25/2009 | Blizzard | | 0 | 0 | 0.00K | 0.00K |
| ANTELOPE (ZONE) | ANTELOPE (ZONE) | 1/6/2010 | Winter Storm | | 0 | 0 | 0.00K | 0.00K |
| ANTELOPE (ZONE) | ANTELOPE (ZONE) | 1/7/2010 | Extreme Cold/Wind Chill | | 0 | 0 | 0.00K | 0.00K |
| ANTELOPE (ZONE) | ANTELOPE (ZONE) | 2/14/2010 | Blizzard | | 0 | 0 | 0.00K | 0.00K |
| ANTELOPE (ZONE) | ANTELOPE (ZONE) | 12/11/2010 | Blizzard | | 0 | 0 | 0.00K | 0.00K |
| ANTELOPE (ZONE) | ANTELOPE (ZONE) | 1/9/2011 | Winter Storm | | 0 | 0 | 0.00K | 0.00K |
| ANTELOPE (ZONE) | ANTELOPE (ZONE) | 4/15/2011 | Winter Storm | | 0 | 0 | 0.00K | 0.00K |
| ANTELOPE (ZONE) | ANTELOPE (ZONE) | 2/21/2013 | Heavy Snow | | 0 | 0 | 0.00K | 0.00K |
| ANTELOPE (ZONE) | ANTELOPE (ZONE) | 4/9/2013 | Winter Storm | | 0 | 0 | 0.00K | 0.00K |
| ANTELOPE (ZONE) | ANTELOPE (ZONE) | 1/5/2014 | Extreme Cold/Wind Chill | | 0 | 0 | 0.00K | 0.00K |
| ANTELOPE (ZONE) | ANTELOPE (ZONE) | 12/15/2014 | Winter Storm | | 0 | 0 | 0.00K | 0.00K |
| Totals [49] | | | | | 0 | 0 | 5.00M | 0.00K |

TABLE 6.28: NCDC EVENTS [SEVERE THUNDERSTORMS] JANUARY 1, 1950 – JANUARY 31, 2016

| Location | County/ Zone | Date | Type | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|----------|--------------|-----------|----------------------|-----------|--------|----------|-----------------|-------------|
| | ANTELOPE CO. | 7/11/1956 | Hail | 1 in. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 6/15/1957 | Hail | 1 in. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 7/7/1957 | Hail | 2.5 in. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 7/7/1957 | Hail | 2.5 in. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 7/21/1958 | Hail | 2 in. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 7/21/1958 | Hail | 2 in. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 6/21/1959 | Hail | 2 in. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 5/3/1960 | Hail | 2.75 in. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 8/9/1961 | Hail | 1.5 in. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 7/21/1962 | Hail | 4.5 in. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 7/12/1963 | Hail | 1.5 in. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 5/15/1964 | Hail | 2 in. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 8/10/1964 | Hail | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 6/18/1967 | Hail | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 7/25/1969 | Hail | 1 in. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 3/2/1970 | Hail | 1 in. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 5/11/1970 | Hail | 1 in. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 8/15/1973 | Hail | 1.75 in. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 6/21/1974 | Hail | 1.5 in. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 8/31/1976 | Hail | 1.75 in. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 9/2/1977 | Hail | 1.75 in. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 6/19/1979 | Thunderstorm Wind | 65 kts. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 6/19/1979 | Hail | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 7/14/1979 | Hail | 1.5 in. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 7/22/1979 | Hail | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 7/29/1979 | Hail | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 8/9/1979 | Hail | 1.5 in. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 5/26/1980 | Hail | 1.5 in. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 5/26/1980 | Hail | 2.75 in. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 5/29/1980 | Hail | 1.5 in. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 6/14/1980 | Hail | 1.5 in. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 6/14/1980 | Thunderstorm Wind | 70 kts. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 6/13/1981 | Hail | 2 in. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 6/13/1981 | Hail | 1.75 in. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 6/13/1981 | Hail | 2 in. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 8/1/1981 | Hail | 1 in. | 0 | 0 | 0.00K | 0.00K |

Section Six [Participant Profiles I Antelope County]

| Location | County/ Zone | Date | Type | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|------------|--------------|-----------|-------------------|-----------|--------|----------|-----------------|-------------|
| | ANTELOPE CO. | 3/30/1982 | Thunderstorm Wind | 60 kts. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 6/17/1984 | Hail | 2.75 in. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 7/5/1984 | Hail | 1 in. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 7/5/1984 | Hail | 1.75 in. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 7/5/1984 | Thunderstorm Wind | 56 kts. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 7/5/1984 | Hail | 1.5 in. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 7/5/1984 | Thunderstorm Wind | 65 kts. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 4/19/1985 | Thunderstorm Wind | 61 kts. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 4/19/1985 | Thunderstorm Wind | 61 kts. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 7/27/1986 | Hail | 1 in. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 7/29/1986 | Hail | 3.8 | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 7/30/1986 | Hail | 1.75 in. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 6/24/1987 | Hail | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 6/24/1987 | Thunderstorm Wind | 52 kts. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 8/17/1987 | Hail | 1.75 in. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 6/14/1990 | Hail | 1.75 in. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 6/14/1990 | Hail | 1.75 in. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 6/14/1990 | Hail | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 6/14/1990 | Hail | 1.75 in. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 8/24/1990 | Hail | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 6/4/1991 | Hail | 1.75 in. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 7/21/1991 | Hail | 1 in. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 5/15/1992 | Hail | 1.5 in. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 5/15/1992 | Hail | 1.75 in. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 5/15/1992 | Hail | 1.75 in. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 5/16/1992 | Hail | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 5/16/1992 | Hail | 1.75 in. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 7/5/1992 | Hail | 1 in. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 8/13/1992 | Hail | 1.75 in. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 9/17/1992 | Hail | 1.75 in. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 5/7/1993 | Thunderstorm Wind | 50 kts. | 0 | 0 | 0.00K | 0.00K |
| Clearwater | ANTELOPE CO. | 7/1/1994 | Thunderstorm Wind | 61 kts. | 0 | 0 | 0.00K | 0.00K |
| Neligh | ANTELOPE CO. | 7/1/1994 | Thunderstorm Wind | 61 kts. | 0 | 0 | 0.00K | 0.00K |
| Elgin | ANTELOPE CO. | 7/4/1994 | Thunderstorm Wind | 52 kts. | 0 | 0 | 0.00K | 0.00K |
| Neligh | ANTELOPE CO. | 7/4/1994 | Thunderstorm Wind | 52 kts. | 0 | 0 | 0.00K | 0.00K |

Section Six [Participant Profiles | Antelope County]

| Location | County/ Zone | Date | Type | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|------------|-----------------|------------|-------------------|-----------|--------|----------|-----------------|-------------|
| Oakdale | ANTELOPE CO. | 8/4/1995 | Hail | 1 in. | 0 | 0 | 0.00K | 0.00K |
| Brunswick | ANTELOPE CO. | 9/18/1995 | Hail | 1.5 in. | 0 | 0 | 0.00K | 0.00K |
| ELGIN | ANTELOPE CO. | 3/23/1996 | Hail | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE (ZONE) | 3/24/1996 | High Wind | 52 kts. | 0 | 0 | 10.00K | 0.00K |
| ORCHARD | ANTELOPE CO. | 5/31/1996 | Hail | 1.5 in. | 0 | 0 | 0.00K | 0.00K |
| ROYAL | ANTELOPE CO. | 5/31/1996 | Hail | 1 in. | 0 | 0 | 0.00K | 0.00K |
| ORCHARD | ANTELOPE CO. | 6/19/1996 | Hail | 1.75 in. | 0 | 0 | 150.00K | 0.00K |
| NELIGH | ANTELOPE CO. | 6/19/1996 | Hail | 1.75 in. | 0 | 0 | 50.00K | 0.00K |
| NELIGH | ANTELOPE CO. | 6/19/1996 | Thunderstorm Wind | 52 kts. | 0 | 0 | 0.00K | 0.00K |
| CLEARWATER | ANTELOPE CO. | 7/1/1996 | Hail | 1.75 in. | 0 | 0 | 0.00K | 0.00K |
| ELGIN | ANTELOPE CO. | 7/1/1996 | Hail | 1.75 in. | 0 | 0 | 0.00K | 200.00K |
| NELIGH | ANTELOPE CO. | 7/26/1996 | Thunderstorm Wind | 52 kts. | 0 | 0 | 0.00K | 0.00K |
| ELGIN | ANTELOPE CO. | 8/6/1996 | Thunderstorm Wind | 52 kts. | 1 | 0 | 0.00K | 0.00K |
| CLEARWATER | ANTELOPE CO. | 10/16/1996 | Thunderstorm Wind | 55 kts. | 0 | 0 | 3.00K | 0.00K |
| CLEARWATER | ANTELOPE CO. | 10/16/1996 | Hail | 1.75 in. | 0 | 0 | 0.00K | 0.00K |
| NELIGH | ANTELOPE CO. | 10/16/1996 | Hail | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE (ZONE) | 10/26/1996 | High Wind | 52 kts. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE (ZONE) | 10/29/1996 | High Wind | 52 kts. | 0 | 0 | 0.00K | 0.00K |
| TILDEN | ANTELOPE CO. | 3/8/1997 | Hail | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE (ZONE) | 4/6/1997 | High Wind | 54 kts. | 0 | 0 | 0.00K | 0.00K |
| OAKDALE | ANTELOPE CO. | 6/20/1997 | Hail | 1.75 in. | 0 | 0 | 0.00K | 0.00K |
| ELGIN | ANTELOPE CO. | 9/8/1997 | Hail | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE (ZONE) | 11/2/1997 | High Wind | 58 kts. | 0 | 0 | 3.00K | 0.00K |
| | ANTELOPE (ZONE) | 12/30/1997 | High Wind | 50 kts. | 0 | 0 | 0.00K | 0.00K |
| CLEARWATER | ANTELOPE CO. | 5/19/1998 | Thunderstorm Wind | 52 kts. | 0 | 0 | 0.00K | 0.00K |
| ELGIN | ANTELOPE CO. | 5/20/1998 | Thunderstorm Wind | 60 kts. | 0 | 0 | 0.00K | 0.00K |
| ELGIN | ANTELOPE CO. | 5/20/1998 | Thunderstorm Wind | 56 kts. | 0 | 0 | 0.00K | 0.00K |
| ORCHARD | ANTELOPE CO. | 8/14/1998 | Hail | 1 in. | 0 | 0 | 0.00K | 0.00K |
| BRUNSWICK | ANTELOPE CO. | 8/14/1998 | Hail | 1 in. | 0 | 0 | 0.00K | 0.00K |
| ROYAL | ANTELOPE CO. | 9/25/1998 | Hail | 0.88 in. | 0 | 0 | 0.00K | 0.00K |
| ROYAL | ANTELOPE CO. | 9/25/1998 | Hail | 1.5 in. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE (ZONE) | 2/11/1999 | High Wind | 50 kts. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE (ZONE) | 3/30/1999 | High Wind | 55 kts. | 0 | 0 | 0.00K | 0.00K |

Section Six [Participant Profiles I Antelope County]

| Location | County/ Zone | Date | Type | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|------------|-----------------|-----------|-------------------|-----------|--------|----------|-----------------|-------------|
| ELGIN | ANTELOPE CO. | 6/3/1999 | Hail | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| ROYAL | ANTELOPE CO. | 7/2/1999 | Thunderstorm Wind | 61 kts. | 0 | 0 | 0.00K | 0.00K |
| BRUNSWICK | ANTELOPE CO. | 7/2/1999 | Hail | 1 in. | 0 | 0 | 0.00K | 0.00K |
| ORCHARD | ANTELOPE CO. | 4/26/2000 | Hail | 0.88 in. | 0 | 0 | 0.00K | 0.00K |
| NELIGH | ANTELOPE CO. | 5/17/2000 | Thunderstorm Wind | 65 kts. | 0 | 0 | 0.00K | 0.00K |
| NELIGH | ANTELOPE CO. | 5/17/2000 | Hail | 0.88 in. | 0 | 0 | 0.00K | 0.00K |
| OAKDALE | ANTELOPE CO. | 5/17/2000 | Thunderstorm Wind | 60 kts. | 0 | 0 | 0.00K | 0.00K |
| OAKDALE | ANTELOPE CO. | 5/17/2000 | Hail | 1.75 in. | 0 | 0 | 0.00K | 0.00K |
| OAKDALE | ANTELOPE CO. | 5/17/2000 | Hail | 1 in. | 0 | 0 | 0.00K | 0.00K |
| ELGIN | ANTELOPE CO. | 5/29/2000 | Thunderstorm Wind | 54 kts. | 0 | 0 | 0.00K | 0.00K |
| NELIGH | ANTELOPE CO. | 5/29/2000 | Thunderstorm Wind | 70 kts. | 0 | 0 | 0.00K | 0.00K |
| OAKDALE | ANTELOPE CO. | 5/29/2000 | Thunderstorm Wind | 70 kts. | 0 | 0 | 0.00K | 0.00K |
| OAKDALE | ANTELOPE CO. | 5/31/2000 | Hail | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| BRUNSWICK | ANTELOPE CO. | 6/3/2000 | Hail | 2.75 in. | 0 | 0 | 5.00K | 10.00K |
| BRUNSWICK | ANTELOPE CO. | 6/3/2000 | Hail | 2.75 in. | 0 | 0 | 0.00K | 0.00K |
| ROYAL | ANTELOPE CO. | 6/3/2000 | Hail | 2.5 in. | 0 | 0 | 1.00K | 0.00K |
| BRUNSWICK | ANTELOPE CO. | 6/3/2000 | Hail | 2.75 in. | 0 | 0 | 10.00K | 0.00K |
| NELIGH | ANTELOPE CO. | 6/3/2000 | Hail | 2 in. | 0 | 0 | 0.00K | 10.00K |
| BRUNSWICK | ANTELOPE CO. | 6/3/2000 | Thunderstorm Wind | 65 kts. | 0 | 0 | 0.00K | 0.00K |
| ELGIN | ANTELOPE CO. | 6/19/2000 | Hail | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| ELGIN | ANTELOPE CO. | 6/24/2000 | Thunderstorm Wind | 70 kts. | 0 | 0 | 35.00K | 0.00K |
| NELIGH | ANTELOPE CO. | 7/5/2000 | Hail | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| NELIGH | ANTELOPE CO. | 7/5/2000 | Hail | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| CLEARWATER | ANTELOPE CO. | 4/6/2001 | Hail | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE (ZONE) | 4/6/2001 | High Wind | 50 kts. | 0 | 0 | 0.00K | 0.00K |
| CLEARWATER | ANTELOPE CO. | 4/7/2001 | Hail | 0.88 in. | 0 | 0 | 0.00K | 0.00K |
| NELIGH | ANTELOPE CO. | 6/10/2001 | Hail | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| ORCHARD | ANTELOPE CO. | 7/2/2001 | Hail | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| CLEARWATER | ANTELOPE CO. | 7/3/2001 | Hail | 1 in. | 0 | 0 | 0.00K | 0.00K |
| NELIGH | ANTELOPE CO. | 7/3/2001 | Hail | 1 in. | 0 | 0 | 0.00K | 0.00K |
| TILDEN | ANTELOPE CO. | 7/3/2001 | Thunderstorm Wind | 55 kts. | 0 | 0 | 0.00K | 0.00K |
| NELIGH | ANTELOPE CO. | 7/16/2001 | Hail | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| CLEARWATER | ANTELOPE CO. | 7/16/2001 | Hail | 1 in. | 0 | 0 | 0.00K | 0.00K |
| NELIGH | ANTELOPE CO. | 7/16/2001 | Hail | 1 in. | 0 | 0 | 0.00K | 0.00K |
| OAKDALE | ANTELOPE CO. | 7/16/2001 | Hail | 1 in. | 0 | 0 | 0.00K | 0.00K |

Section Six [Participant Profiles | Antelope County]

| Location | County/ Zone | Date | Type | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|------------|--------------|-----------|-------------------|-----------|--------|----------|-----------------|-------------|
| OAKDALE | ANTELOPE CO. | 7/16/2001 | Thunderstorm Wind | 60 kts. | 0 | 0 | 0.00K | 0.00K |
| CLEARWATER | ANTELOPE CO. | 7/29/2001 | Thunderstorm Wind | 50 kts. | 0 | 0 | 0.00K | 0.00K |
| BRUNSWICK | ANTELOPE CO. | 6/6/2002 | Hail | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| NELIGH | ANTELOPE CO. | 6/7/2002 | Hail | 1 in. | 0 | 0 | 0.00K | 0.00K |
| CLEARWATER | ANTELOPE CO. | 6/7/2002 | Hail | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| CLEARWATER | ANTELOPE CO. | 6/7/2002 | Thunderstorm Wind | 50 kts. | 0 | 0 | 0.00K | 0.00K |
| ROYAL | ANTELOPE CO. | 6/7/2002 | Hail | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| ELGIN | ANTELOPE CO. | 6/7/2002 | Hail | 0.88 in. | 0 | 0 | 0.00K | 0.00K |
| ROYAL | ANTELOPE CO. | 6/25/2002 | Thunderstorm Wind | 55 kts. | 0 | 0 | 0.00K | 0.00K |
| CLEARWATER | ANTELOPE CO. | 6/25/2002 | Hail | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| ELGIN | ANTELOPE CO. | 6/25/2002 | Hail | 1 in. | 0 | 0 | 0.00K | 0.00K |
| ORCHARD | ANTELOPE CO. | 7/2/2002 | Hail | 0.88 in. | 0 | 0 | 0.00K | 0.00K |
| CLEARWATER | ANTELOPE CO. | 7/30/2002 | Hail | 1 in. | 0 | 0 | 0.00K | 0.00K |
| CLEARWATER | ANTELOPE CO. | 7/30/2002 | Thunderstorm Wind | 50 kts. | 0 | 0 | 0.00K | 0.00K |
| BRUNSWICK | ANTELOPE CO. | 8/9/2002 | Thunderstorm Wind | 50 kts. | 0 | 0 | 0.00K | 0.00K |
| NELIGH | ANTELOPE CO. | 8/9/2002 | Hail | 0.88 in. | 0 | 0 | 0.00K | 0.00K |
| CLEARWATER | ANTELOPE CO. | 5/5/2003 | Hail | 1 in. | 0 | 0 | 0.00K | 0.00K |
| NELIGH | ANTELOPE CO. | 5/5/2003 | Hail | 1 in. | 0 | 0 | 0.00K | 0.00K |
| OAKDALE | ANTELOPE CO. | 5/5/2003 | Hail | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| ORCHARD | ANTELOPE CO. | 5/13/2003 | Hail | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| BRUNSWICK | ANTELOPE CO. | 5/13/2003 | Hail | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| ORCHARD | ANTELOPE CO. | 5/13/2003 | Hail | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| NELIGH | ANTELOPE CO. | 5/13/2003 | Hail | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| ELGIN | ANTELOPE CO. | 5/13/2003 | Hail | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| ELGIN | ANTELOPE CO. | 5/13/2003 | Hail | 1.75 in. | 0 | 0 | 0.00K | 0.00K |
| ORCHARD | ANTELOPE CO. | 6/9/2003 | Hail | 1.75 in. | 0 | 0 | 0.00K | 0.00K |
| ROYAL | ANTELOPE CO. | 7/3/2003 | Thunderstorm Wind | 55 kts. | 0 | 0 | 0.00K | 0.00K |
| NELIGH | ANTELOPE CO. | 7/3/2003 | Thunderstorm Wind | 55 kts. | 0 | 0 | 0.00K | 0.00K |
| CLEARWATER | ANTELOPE CO. | 7/5/2003 | Thunderstorm Wind | 55 kts. | 0 | 0 | 0.00K | 0.00K |
| ELGIN | ANTELOPE CO. | 7/5/2003 | Thunderstorm Wind | 55 kts. | 0 | 0 | 0.00K | 0.00K |
| NELIGH | ANTELOPE CO. | 7/5/2003 | Thunderstorm Wind | 50 kts, | 0 | 0 | 0.00K | 0.00K |
| NELIGH | ANTELOPE CO. | 4/20/2004 | Hail | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| OAKDALE | ANTELOPE CO. | 4/20/2004 | Hail | 1.75 in. | 0 | 0 | 0.00K | 0.00K |
| OAKDALE | ANTELOPE CO. | 4/20/2004 | Thunderstorm Wind | 55 kts. | 0 | 0 | 0.00K | 0.00K |
| TILDEN | ANTELOPE CO. | 4/20/2004 | Hail | 0.88 in. | 0 | 0 | 0.00K | 0.00K |

Section Six [Participant Profiles I Antelope County]

| Location | County/ Zone | Date | Type | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|------------|-----------------|-----------|-------------------|-------------|--------|----------|-----------------|-------------|
| CLEARWATER | ANTELOPE CO. | 5/29/2004 | Thunderstorm Wind | 50 kts. | 0 | 0 | 0.00K | 0.00K |
| OAKDALE | ANTELOPE CO. | 6/12/2004 | Hail | 1 in. | 0 | 0 | 0.00K | 0.00K |
| NELIGH | ANTELOPE CO. | 6/12/2004 | Hail | 1.75 in. | 0 | 0 | 0.00K | 0.00K |
| NELIGH | ANTELOPE CO. | 7/3/2004 | Thunderstorm Wind | 60 kts. | 0 | 0 | 0.00K | 0.00K |
| BRUNSWICK | ANTELOPE CO. | 7/21/2004 | Hail | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| OAKDALE | ANTELOPE CO. | 9/13/2004 | Thunderstorm Wind | 55 kts. | 0 | 0 | 0.00K | 0.00K |
| ELGIN | ANTELOPE CO. | 9/13/2004 | Hail | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| ELGIN | ANTELOPE CO. | 9/13/2004 | Hail | 0.88 in. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE (ZONE) | 3/10/2005 | High Wind | 51 kts. | 0 | 0 | 0.00K | 0.00K |
| ELGIN | ANTELOPE CO. | 4/19/2005 | Hail | 1 in. | 0 | 0 | 0.00K | 0.00K |
| ELGIN | ANTELOPE CO. | 4/19/2005 | Hail | 1.75 in. | 0 | 0 | 0.00K | 0.00K |
| ELGIN | ANTELOPE CO. | 4/19/2005 | Hail | 0.88 in. | 0 | 0 | 0.00K | 0.00K |
| ELGIN | ANTELOPE CO. | 4/19/2005 | Hail | 1.75 in. | 0 | 0 | 0.00K | 0.00K |
| OAKDALE | ANTELOPE CO. | 4/19/2005 | Hail | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| CLEARWATER | ANTELOPE CO. | 5/24/2005 | Hail | 1.25 in. | 0 | 0 | 0.00K | 0.00K |
| CLEARWATER | ANTELOPE CO. | 5/24/2005 | Hail | 0.88 in. | 0 | 0 | 0.00K | 0.00K |
| BRUNSWICK | ANTELOPE CO. | 5/24/2005 | Hail | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| ORCHARD | ANTELOPE CO. | 6/28/2005 | Hail | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| NELIGH | ANTELOPE CO. | 7/20/2005 | Thunderstorm Wind | 50 kts. in. | 0 | 0 | 0.00K | 0.00K |
| ROYAL | ANTELOPE CO. | 7/28/2005 | Hail | 1.75 in. | 0 | 0 | 0.00K | 0.00K |
| BRUNSWICK | ANTELOPE CO. | 7/28/2005 | Hail | 1.75 in. | 0 | 0 | 0.00K | 0.00K |
| BRUNSWICK | ANTELOPE CO. | 8/9/2005 | Hail | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| ORCHARD | ANTELOPE CO. | 8/9/2005 | Hail | 0.88 in. | 0 | 0 | 0.00K | 0.00K |
| CLEARWATER | ANTELOPE CO. | 8/9/2005 | Thunderstorm Wind | 50 kts. | 0 | 0 | 0.00K | 0.00K |
| ELGIN | ANTELOPE CO. | 8/21/2005 | Hail | 1 in. | 0 | 0 | 0.00K | 0.00K |
| ELGIN | ANTELOPE CO. | 8/28/2005 | Hail | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| ORCHARD | ANTELOPE CO. | 9/12/2005 | Hail | 1.25 in. | 0 | 0 | 0.00K | 0.00K |
| BRUNSWICK | ANTELOPE CO. | 9/12/2005 | Hail | 1 in. | 0 | 0 | 0.00K | 0.00K |
| BRUNSWICK | ANTELOPE CO. | 9/12/2005 | Hail | 0.88 in. | 0 | 0 | 0.00K | 0.00K |
| CLEARWATER | ANTELOPE CO. | 9/18/2005 | Hail | 0.88 in. | 0 | 0 | 0.00K | 0.00K |
| CLEARWATER | ANTELOPE CO. | 9/18/2005 | Hail | 1.75 in. | 0 | 0 | 0.00K | 0.00K |
| NELIGH | ANTELOPE CO. | 9/18/2005 | Hail | 2.75 in. | 0 | 0 | 0.00K | 0.00K |
| OAKDALE | ANTELOPE CO. | 9/18/2005 | Thunderstorm Wind | 50 kts. | 0 | 0 | 0.00K | 0.00K |
| OAKDALE | ANTELOPE CO. | 9/24/2005 | Hail | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| TILDEN | ANTELOPE CO. | 3/30/2006 | Hail | 0.88 in. | 0 | 0 | 0.00K | 0.00K |
| OAKDALE | ANTELOPE CO. | 3/30/2006 | Hail | 1 in. | 0 | 0 | 0.00K | 0.00K |
| TILDEN | ANTELOPE CO. | 3/30/2006 | Hail | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| NELIGH | ANTELOPE CO. | 6/3/2006 | Hail | 2.5 in. | 0 | 0 | 0.00K | 0.00K |

Section Six [Participant Profiles | Antelope County]

| Location | County/ Zone | Date | Type | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|--------------------|--------------|-----------|-------------------|-----------|--------|----------|-----------------|-------------|
| OAKDALE | ANTELOPE CO. | 6/4/2006 | Hail | 1 in. | 0 | 0 | 0.00K | 0.00K |
| ROYAL | ANTELOPE CO. | 6/5/2006 | Hail | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| ELGIN | ANTELOPE CO. | 6/5/2006 | Hail | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| ELGIN | ANTELOPE CO. | 8/5/2006 | Thunderstorm Wind | 50 kts. | 0 | 0 | 0.00K | 0.00K |
| ROYAL | ANTELOPE CO. | 9/15/2006 | Hail | 1 in. | 0 | 0 | 0.00K | 0.00K |
| BRUNSWICK | ANTELOPE CO. | 9/15/2006 | Hail | 1 in. | 0 | 0 | 0.00K | 0.00K |
| ELGIN | ANTELOPE CO. | 7/8/2007 | Hail | 0.88 in. | 0 | 0 | 0.00K | 0.00K |
| NELIGH | ANTELOPE CO. | 7/12/2007 | Thunderstorm Wind | 52 kts. | 0 | 0 | 0.00K | 0.00K |
| CLEARWATER | ANTELOPE CO. | 7/12/2007 | Hail | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| CLEARWATER | ANTELOPE CO. | 7/15/2007 | Hail | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| ROYAL | ANTELOPE CO. | 7/15/2007 | Thunderstorm Wind | 65 kts. | 0 | 0 | 0.00K | 0.00K |
| NELIGH | ANTELOPE CO. | 7/15/2007 | Hail | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| ROYAL | ANTELOPE CO. | 7/18/2007 | Hail | 1 in. | 0 | 0 | 0.00K | 0.00K |
| OAKDALE | ANTELOPE CO. | 8/4/2007 | Hail | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| BRUNSWICK | ANTELOPE CO. | 8/9/2007 | Hail | 1 in. | 0 | 0 | 0.00K | 0.00K |
| ROYAL | ANTELOPE CO. | 8/9/2007 | Thunderstorm Wind | 52 kts. | 0 | 0 | 0.00K | 0.00K |
| NELIGH | ANTELOPE CO. | 8/10/2007 | Hail | 1.5 in. | 0 | 0 | 0.00K | 0.00K |
| ORCHARD | ANTELOPE CO. | 8/10/2007 | Hail | 0.88 in. | 0 | 0 | 0.00K | 0.00K |
| NELIGH | ANTELOPE CO. | 8/10/2007 | Hail | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| CLEARWATER | ANTELOPE CO. | 8/16/2007 | Thunderstorm Wind | 50 kts. | 0 | 0 | 0.00K | 0.00K |
| ELGIN | ANTELOPE CO. | 8/22/2007 | Hail | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| OAKDALE | ANTELOPE CO. | 6/5/2008 | Hail | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| ORCHARD | ANTELOPE CO. | 6/5/2008 | Thunderstorm Wind | 60 kts. | 0 | 0 | 0.00K | 0.00K |
| CLEARWATER | ANTELOPE CO. | 6/5/2008 | Hail | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| OAKDALE | ANTELOPE CO. | 6/7/2008 | Hail | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| ORCHARD | ANTELOPE CO. | 6/17/2008 | Hail | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| OAKDALE | ANTELOPE CO. | 6/19/2008 | Hail | 1 in. | 0 | 0 | 0.00K | 0.00K |
| NELIGH | ANTELOPE CO. | 6/19/2008 | Hail | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| ELGIN EDWARDS ARPT | ANTELOPE CO. | 6/21/2008 | Hail | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| ELGIN | ANTELOPE CO. | 6/21/2008 | Hail | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| ORCHARD | ANTELOPE CO. | 6/21/2008 | Hail | 0.88 in. | 0 | 0 | 0.00K | 0.00K |
| CLEARWATER | ANTELOPE CO. | 6/21/2008 | Hail | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| BRUNSWICK | ANTELOPE CO. | 6/21/2008 | Hail | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| ELGIN EDWARDS ARPT | ANTELOPE CO. | 6/26/2008 | Thunderstorm Wind | 50 kts. | 0 | 0 | 0.00K | 0.00K |
| ORCHARD | ANTELOPE CO. | 7/20/2008 | Thunderstorm Wind | 55 kts. | 0 | 0 | 0.00K | 0.00K |
| OAKDALE | ANTELOPE CO. | 7/20/2008 | Thunderstorm Wind | 60 kts. | 0 | 0 | 0.00K | 0.00K |

Section Six [Participant Profiles | Antelope County]

| Location | County/ Zone | Date | Type | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|------------|--------------|-----------|-------------------|-----------|--------|----------|-----------------|-------------|
| NELIGH | ANTELOPE CO. | 7/20/2008 | Thunderstorm Wind | 65 kts. | 0 | 0 | 0.00K | 0.00K |
| BRUNSWICK | ANTELOPE CO. | 9/28/2008 | Hail | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| ROYAL | ANTELOPE CO. | 6/7/2009 | Hail | 0.88 in. | 0 | 0 | 0.00K | 0.00K |
| NELIGH | ANTELOPE CO. | 6/17/2009 | Hail | 1.75 in. | 0 | 0 | 0.00K | 0.00K |
| OAKDALE | ANTELOPE CO. | 6/17/2009 | Hail | 1 in. | 0 | 0 | 0.00K | 0.00K |
| ORCHARD | ANTELOPE CO. | 6/18/2009 | Thunderstorm Wind | 52 kts. | 0 | 0 | 0.00K | 0.00K |
| ELGIN | ANTELOPE CO. | 8/24/2009 | Hail | 0.88 in. | 0 | 0 | 0.00K | 0.00K |
| OAKDALE | ANTELOPE CO. | 8/24/2009 | Thunderstorm Wind | 60 kts. | 0 | 0 | 0.00K | 0.00K |
| NELIGH | ANTELOPE CO. | 4/23/2010 | Hail | 1 in. | 0 | 0 | 0.00K | 0.00K |
| ELGIN | ANTELOPE CO. | 6/22/2010 | Thunderstorm Wind | 55 kts. | 0 | 0 | 0.00K | 0.00K |
| NELIGH | ANTELOPE CO. | 6/22/2010 | Thunderstorm Wind | 55 kts. | 0 | 0 | 0.00K | 0.00K |
| ROYAL | ANTELOPE CO. | 6/26/2010 | Thunderstorm Wind | 50 kts. | 0 | 0 | 0.00K | 0.00K |
| NELIGH | ANTELOPE CO. | 6/26/2010 | Hail | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| ORCHARD | ANTELOPE CO. | 6/26/2010 | Hail | 1 in. | 0 | 0 | 0.00K | 0.00K |
| CLEARWATER | ANTELOPE CO. | 8/16/2010 | Thunderstorm Wind | 52 kts. | 0 | 0 | 0.00K | 0.00K |
| NELIGH | ANTELOPE CO. | 8/16/2010 | Thunderstorm Wind | 65 kts. | 0 | 0 | 0.00K | 0.00K |
| BRUNSWICK | ANTELOPE CO. | 8/30/2010 | Thunderstorm Wind | 56 kts. | 0 | 0 | 0.00K | 0.00K |
| NELIGH | ANTELOPE CO. | 9/18/2010 | Hail | 0.88 in. | 0 | 0 | 0.00K | 0.00K |
| CLEARWATER | ANTELOPE CO. | 5/29/2011 | Thunderstorm Wind | 50 kts. | 0 | 0 | 0.00K | 0.00K |
| ELGIN | ANTELOPE CO. | 6/14/2011 | Hail | 1 in. | 0 | 0 | 0.00K | 0.00K |
| ELGIN | ANTELOPE CO. | 6/20/2011 | Thunderstorm Wind | 61 kts. | 0 | 0 | 0.00K | 0.00K |
| ROYAL | ANTELOPE CO. | 6/20/2011 | Thunderstorm Wind | 55 kts. | 0 | 0 | 0.00K | 0.00K |
| CLEARWATER | ANTELOPE CO. | 6/20/2011 | Thunderstorm Wind | 60 kts. | 0 | 0 | 0.00K | 0.00K |
| CLEARWATER | ANTELOPE CO. | 6/26/2011 | Thunderstorm Wind | 52 kts. | 0 | 0 | 0.00K | 0.00K |
| ROYAL | ANTELOPE CO. | 6/26/2011 | Hail | 1 in. | 0 | 0 | 0.00K | 0.00K |
| NELIGH | ANTELOPE CO. | 6/26/2011 | Thunderstorm Wind | 52 kts. | 0 | 0 | 0.00K | 0.00K |
| TILDEN | ANTELOPE CO. | 6/26/2011 | Thunderstorm Wind | 65 kts. | 0 | 0 | 0.00K | 0.00K |
| CLEARWATER | ANTELOPE CO. | 6/26/2011 | Thunderstorm Wind | 55 kts. | 0 | 0 | 0.00K | 0.00K |
| ELGIN | ANTELOPE CO. | 6/26/2011 | Thunderstorm Wind | 55 kts. | 0 | 0 | 0.00K | 0.00K |
| OAKDALE | ANTELOPE CO. | 8/6/2011 | Hail | 1.25 in. | 0 | 0 | 0.00K | 0.00K |
| OAKDALE | ANTELOPE CO. | 8/6/2011 | Hail | 1 in. | 0 | 0 | 0.00K | 0.00K |

Section Six [Participant Profiles | Antelope County]

| Location | County/ Zone | Date | Type | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|--------------------|-----------------|------------|-------------------|-----------|--------|----------|-----------------|-------------|
| CLEARWATER | ANTELOPE CO. | 8/18/2011 | Thunderstorm Wind | 55 kts. | 0 | 0 | 0.00K | 0.00K |
| CLEARWATER | ANTELOPE CO. | 8/18/2011 | Hail | 1 in. | 0 | 0 | 0.00K | 0.00K |
| OAKDALE | ANTELOPE CO. | 8/18/2011 | Hail | 1 in. | 0 | 0 | 0.00K | 0.00K |
| ELGIN | ANTELOPE CO. | 8/18/2011 | Hail | 1 in. | 0 | 0 | 0.00K | 0.00K |
| TILDEN | ANTELOPE CO. | 8/18/2011 | Hail | 0.88 in. | 0 | 0 | 0.00K | 0.00K |
| OAKDALE | ANTELOPE CO. | 4/14/2012 | Hail | 0.88 in. | 0 | 0 | 0.00K | 0.00K |
| ELGIN | ANTELOPE CO. | 5/27/2012 | Hail | 1.75 in. | 0 | 0 | 0.00K | 0.00K |
| ELGIN | ANTELOPE CO. | 5/27/2012 | Hail | 2.5 in. | 0 | 0 | 0.00K | 0.00K |
| OAKDALE | ANTELOPE CO. | 5/27/2012 | Hail | 2.5 in. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE (ZONE) | 10/18/2012 | High Wind | 52 kts. | 0 | 0 | 0.00K | 0.00K |
| OAKDALE | ANTELOPE CO. | 4/9/2013 | Hail | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| CLEARWATER | ANTELOPE CO. | 5/26/2013 | Hail | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| BRUNSWICK | ANTELOPE CO. | 6/15/2013 | Hail | 1 in. | 0 | 0 | 0.00K | 0.00K |
| CLEARWATER | ANTELOPE CO. | 8/1/2013 | Hail | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| ELGIN EDWARDS ARPT | ANTELOPE CO. | 8/1/2013 | Thunderstorm Wind | 65 kts. | 0 | 0 | 0.00K | 0.00K |
| OAKDALE | ANTELOPE CO. | 10/2/2013 | Hail | 1.5 in. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE (ZONE) | 1/16/2014 | High Wind | 50 kts. | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE (ZONE) | 4/23/2014 | High Wind | 56 kts.. | 0 | 0 | 0.00K | 0.00K |
| ORCHARD | ANTELOPE CO. | 6/3/2014 | Hail | 0.88 in. | 0 | 0 | 0.00K | 0.00K |
| ROYAL | ANTELOPE CO. | 6/3/2014 | Hail | 2.75 in. | 0 | 0 | 0.00K | 0.00K |
| ROYAL | ANTELOPE CO. | 6/3/2014 | Hail | 1.75 in. | 0 | 0 | 0.00K | 0.00K |
| BRUNSWICK | ANTELOPE CO. | 6/3/2014 | Hail | 1.75 in. | 0 | 0 | 0.00K | 0.00K |
| BRUNSWICK | ANTELOPE CO. | 6/3/2014 | Thunderstorm Wind | 61 kts. | 0 | 0 | 0.00K | 0.00K |
| TILDEN | ANTELOPE CO. | 6/3/2014 | Thunderstorm Wind | 52 kts. | 0 | 0 | 0.00K | 0.00K |
| ELGIN | ANTELOPE CO. | 6/16/2014 | Hail | 0.88 in. | 0 | 0 | 0.00K | 0.00K |
| NELIGH | ANTELOPE CO. | 6/20/2014 | Hail | 2 in. | 0 | 0 | 0.00K | 0.00K |
| OAKDALE | ANTELOPE CO. | 6/30/2014 | Hail | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| NELIGH | ANTELOPE CO. | 6/30/2014 | Hail | 1 in. | 0 | 0 | 0.00K | 0.00K |
| CLEARWATER | ANTELOPE CO. | 7/31/2014 | Hail | 1 in. | 0 | 0 | 0.00K | 0.00K |
| ELGIN | ANTELOPE CO. | 7/31/2014 | Hail | 0.75 in. | 0 | 0 | 0.00K | 0.00K |
| TILDEN | ANTELOPE CO. | 5/2/2015 | Hail | 1 in. | 0 | 0 | 0.00K | 0.00K |
| TILDEN | ANTELOPE CO. | 6/10/2015 | Hail | 1 in. | 0 | 0 | 0.00K | 0.00K |
| ELGIN | ANTELOPE CO. | 7/11/2015 | Hail | 1 in. | 0 | 0 | 0.00K | 0.00K |
| OAKDALE | ANTELOPE CO. | 7/17/2015 | Hail | 1 in. | 0 | 0 | 0.00K | 0.00K |
| NELIGH | ANTELOPE CO. | 7/17/2015 | Hail | 1 in. | 0 | 0 | 0.00K | 0.00K |
| NELIGH ARPT | ANTELOPE CO. | 7/17/2015 | Hail | 1.25 in. | 0 | 0 | 0.00K | 0.00K |
| NELIGH | ANTELOPE CO. | 7/17/2015 | Hail | 1 in. | 0 | 0 | 0.00K | 0.00K |

Section Six [Participant Profiles | Antelope County]

| Location | County/ Zone | Date | Type | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|--------------|--------------|-----------|-------------------|-----------|--------|----------|-----------------|-------------|
| CLEARWATER | ANTELOPE CO. | 7/20/2015 | Thunderstorm Wind | 52 kts. | 0 | 0 | 0.00K | 0.00K |
| OAKDALE | ANTELOPE CO. | 8/9/2015 | Hail | 1 in. | 0 | 0 | 0.00K | 0.00K |
| ORCHARD | ANTELOPE CO. | 8/9/2015 | Hail | 1 in. | 0 | 0 | 0.00K | 0.00K |
| ELGIN | ANTELOPE CO. | 9/14/2015 | Hail | 1 in. | 0 | 0 | 0.00K | 0.00K |
| Totals [320] | | | | | 1 | 0 | 267.00k | 220.00k |
| | | | | | | | 487.00K | |

TABLE 6.29: NCDC EVENTS [TORNADOS] JANUARY 1, 1950 – JANUARY 31, 2016

| Location | County/ Zone | Date | Type | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|----------|--------------|------------|---------|-----------|--------|----------|-----------------|-------------|
| | ANTELOPE CO. | 10/29/1956 | Tornado | F1 | 0 | 0 | 25.00K | 0 |
| | ANTELOPE CO. | 4/19/1957 | Tornado | F1 | 0 | 0 | 2.50K | 0 |
| | ANTELOPE CO. | 8/21/1959 | Tornado | | 0 | 0 | 25.00K | 0 |
| | ANTELOPE CO. | 6/15/1960 | Tornado | F2 | 0 | 0 | 25.00K | 0 |
| | ANTELOPE CO. | 5/21/1962 | Tornado | F3 | 0 | 0 | 2.50M | 0 |
| | ANTELOPE CO. | 4/26/1964 | Tornado | F2 | 0 | 0 | 250.00K | 0 |
| | ANTELOPE CO. | 5/5/1964 | Tornado | F1 | 0 | 0 | 25.00K | 0 |
| | ANTELOPE CO. | 5/8/1965 | Tornado | F4 | 0 | 0 | 25.00M | 0 |
| | ANTELOPE CO. | 6/14/1967 | Tornado | F0 | 0 | 0 | 0 | 0 |
| | ANTELOPE CO. | 6/19/1975 | Tornado | F0 | 0 | 0 | 2.50K | 0 |
| | ANTELOPE CO. | 5/18/1977 | Tornado | F1 | 0 | 0 | 2.50K | 0 |
| | ANTELOPE CO. | 6/22/1977 | Tornado | F0 | 0 | 0 | 0.25K | 0 |
| | ANTELOPE CO. | 6/19/1979 | Tornado | F1 | 0 | 0 | 250.00K | 0 |
| | ANTELOPE CO. | 5/26/1980 | Tornado | F1 | 0 | 0 | 250.00K | 0 |
| | ANTELOPE CO. | 10/16/1980 | Tornado | F2 | 0 | 0 | 25.00K | 0 |
| | ANTELOPE CO. | 10/16/1980 | Tornado | F1 | 0 | 0 | 250.00K | 0 |
| | ANTELOPE CO. | 6/17/1984 | Tornado | F0 | 0 | 0 | 0 | 0 |
| | ANTELOPE CO. | 7/29/1986 | Tornado | F1 | 0 | 0 | 25.00K | 0 |
| | ANTELOPE CO. | 7/9/1992 | Tornado | F0 | 0 | 0 | 0 | 0 |
| Elgin | ANTELOPE CO. | 4/25/1994 | Tornado | F0 | 0 | 0 | 0 | 0 |
| Neligh | ANTELOPE CO. | 4/25/1994 | Tornado | F0 | 0 | 0 | 0 | 0 |
| Neligh | ANTELOPE CO. | 10/17/1994 | Tornado | F0 | 0 | 0 | 0 | 0 |
| ORCHARD | ANTELOPE CO. | 6/19/1996 | Tornado | F0 | 0 | 0 | 25.00K | 0 |
| ORCHARD | ANTELOPE CO. | 5/3/1999 | Tornado | F0 | 0 | 0 | 10.00K | 0 |
| ELGIN | ANTELOPE CO. | 6/3/1999 | Tornado | F0 | 0 | 0 | 0 | 0 |
| NELIGH | ANTELOPE CO. | 4/26/2000 | Tornado | F0 | 0 | 0 | 2.00K | 0 |
| ROYAL | ANTELOPE CO. | 6/3/2000 | Tornado | F0 | 0 | 0 | 0 | 0 |
| ROYAL | ANTELOPE CO. | 6/3/2000 | Tornado | F0 | 0 | 0 | 0 | 0 |
| NELIGH | ANTELOPE CO. | 7/16/2001 | Tornado | F0 | 0 | 0 | 0 | 0 |
| ELGIN | ANTELOPE CO. | 7/16/2001 | Tornado | F0 | 0 | 0 | 0 | 0 |
| ORCHARD | ANTELOPE CO. | 6/9/2003 | Tornado | F0 | 0 | 0 | 0 | 0 |

Section Six [Participant Profiles | Antelope County]

| Location | County/ Zone | Date | Type | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|-------------|--------------|-----------|---------|-----------|--------|----------|-----------------|-------------|
| ROYAL | ANTELOPE CO. | 6/23/2003 | Tornado | F0 | 0 | 0 | 0 | 0 |
| CLEARWATER | ANTELOPE CO. | 8/18/2011 | Tornado | EF0 | 0 | 0 | 0 | 0 |
| ROYAL | ANTELOPE CO. | 10/4/2013 | Tornado | EF2 | 0 | 0 | 0 | 0 |
| Totals [34] | | | | | 0 | 0 | 28.695M | 0.00k |
| | | | | | | | 28.695M | |

TABLE 6.30: NCDCEVENTS [DROUGHT] JANUARY 1, 1950 – JANUARY 31, 2016

| Location | County/ Zone | Date | Type | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|-------------|--------------|-----------|---------|-----------|--------|----------|-----------------|-------------|
| | ANTELOPE CO. | 11/1/1999 | Drought | | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 7/17/2012 | Drought | | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 8/1/2012 | Drought | | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 9/1/2012 | Drought | | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 10/1/2012 | Drought | | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 11/1/2012 | Drought | | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 12/1/2012 | Drought | | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 1/1/2013 | Drought | | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 2/1/2013 | Drought | | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 3/1/2013 | Drought | | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 4/1/2013 | Drought | | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 5/1/2013 | Drought | | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 7/1/2013 | Drought | | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 7/1/2013 | Drought | | 0 | 0 | 0.00K | 0.00K |
| | ANTELOPE CO. | 8/1/2013 | Drought | | 0 | 0 | 0.00K | 0.00K |
| Totals [15] | | | | | 0 | 0 | 0.00K | 0.00K |
| | | | | | | | 0.00K | |

TABLE 6.31: NCDCEVENTS [FLOODS] JANUARY 1, 1950 – JANUARY 31, 2016

| Location | County/ Zone | Date | Type | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|---------------|-----------------|-----------|-------------|-----------|--------|----------|-----------------|-------------|
| ELGIN | ANTELOPE CO. | 5/31/1996 | Flash Flood | | 0 | 0 | 0 | 0 |
| | ANTELOPE (ZONE) | 2/18/1997 | Flood | | 0 | 0 | 0 | 0 |
| | ANTELOPE (ZONE) | 5/7/1999 | Flood | | 0 | 0 | 0 | 0 |
| ELGIN | ANTELOPE CO. | 5/17/2000 | Flash Flood | | 0 | 0 | 0 | 0 |
| OAKDALE | ANTELOPE CO. | 7/6/2000 | Flash Flood | | 0 | 0 | 0 | 0 |
| NORTH PORTION | ANTELOPE CO. | 7/16/2001 | Flash Flood | | 0 | 0 | 0 | 0 |
| COUNTYWIDE | ANTELOPE CO. | 5/29/2004 | Flash Flood | | 0 | 0 | 0 | 0 |
| ELGIN | ANTELOPE CO. | 4/19/2005 | Flash Flood | | 0 | 0 | 0 | 0 |
| NELIGH | ANTELOPE CO. | 6/4/2006 | Flash Flood | | 0 | 0 | 10.00K | 0 |

Section Six [Participant Profiles | Antelope County]

| Location | County/ Zone | Date | Type | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|-------------|--------------|-----------|-------------|-----------|--------|----------|-----------------|-------------|
| NELIGH | ANTELOPE CO. | 4/26/2007 | Flood | | 0 | 0 | 0 | 0 |
| TILDEN | ANTELOPE CO. | 8/22/2007 | Flash Flood | | 0 | 0 | 10.00K | 0 |
| NELIGH ARPT | ANTELOPE CO. | 8/15/2009 | Flash Flood | | 0 | 0 | 50.00K | 0 |
| NELIGH ARPT | ANTELOPE CO. | 8/16/2009 | Flash Flood | | 0 | 0 | 50.00K | 0 |
| NELIGH | ANTELOPE CO. | 6/13/2010 | Flood | | 0 | 0 | 4.00M | 0 |
| ELGIN | ANTELOPE CO. | 5/27/2012 | Flash Flood | | 0 | 0 | 15.00K | 0 |
| TILDEN | ANTELOPE CO. | 5/28/2013 | Flood | | 0 | 0 | 0 | 0 |
| NELIGH | ANTELOPE CO. | 10/2/2013 | Flash Flood | | 0 | 0 | 0 | 0 |
| TILDEN | ANTELOPE CO. | 8/27/2015 | Flash Flood | | 0 | 0 | 75.00K | 50.00K |
| NELIGH ARPT | ANTELOPE CO. | 8/28/2015 | Flood | | 0 | 0 | 50.00K | 125.00K |
| Totals [19] | | | | | 0 | 0 | 4.26M | 175.00K |
| | | | | | | | 4.435M | |

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Section Six [Participant Profiles – Holt County]

Section Six provides an overall profile of the plan area including geography, demographics, assets inventory, capabilities assessment, and climate as well as hazard identification and risk assessment analysis specific to each individual participant.

SECTION SIX [HOLT COUNTY]

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Section Six [Participant Profiles | Holt County]

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HAZARD MITIGATION PLAN

ANTELOPE, HOLT, AND KNOX COUNTIES

SECTION SIX [PARTICIPANT PROFILES]

HOLT COUNTY

Local governments have the responsibility to protect the health, safety, and welfare of citizens. Proactive mitigation policies and actions help reduce risk and create safer, more disaster resilient jurisdictions. Mitigation is an investment in the jurisdiction's future safety and sustainability. Consider the critical importance of mitigation to:

- ❑ Protect public safety and prevent loss of life and injury.
- ❑ Reduce harm to existing and future development.
- ❑ Prevent damage to a jurisdiction's unique economic, cultural, and environmental assets.
- ❑ Minimize operational downtime and accelerate recovery of government and business after disasters.
- ❑ Reduce the costs of disaster response and recovery and the exposure to risk for first responders.
- ❑ Help accomplish other jurisdiction objectives, such as leveraging capital improvements, infrastructure protection, open space preservation, and economic resiliency.

Demographics, assets, and capabilities information can be used to determine differing levels of vulnerability by analyzing data on population and housing, structural inventories and valuations, critical facilities, highly vulnerable areas and populations, as well as future land use and development for each participating jurisdiction. These analyses directly impact the hazard identification and risk assessment, which ultimately are reflected in the jurisdiction's priorities and mitigation alternatives.

HISTORY

Holt County, Nebraska, located in the northeastern portion of the state, was created by an act of the Nebraska Legislature in 1862 and was organized in August of 1876. It is named for Joseph Holt of Kentucky, who was Postmaster General and Secretary of War under President James Buchanan.

Section Six [Participant Profiles | Holt County]

GEOGRAPHIC SUMMARY

Geographic information, including topographic and soils data, play key roles in land planning and heavily influence land use and development. Understanding the unique, local land composition and characteristics will reduce harm to existing and future development by deterring growth into hazard prone areas.

Holt County is located in northeastern Nebraska. The county seat is O’Neill and largest community is O’Neill. Table 6.40, below, summarizes the County’s total area composition and elevation.

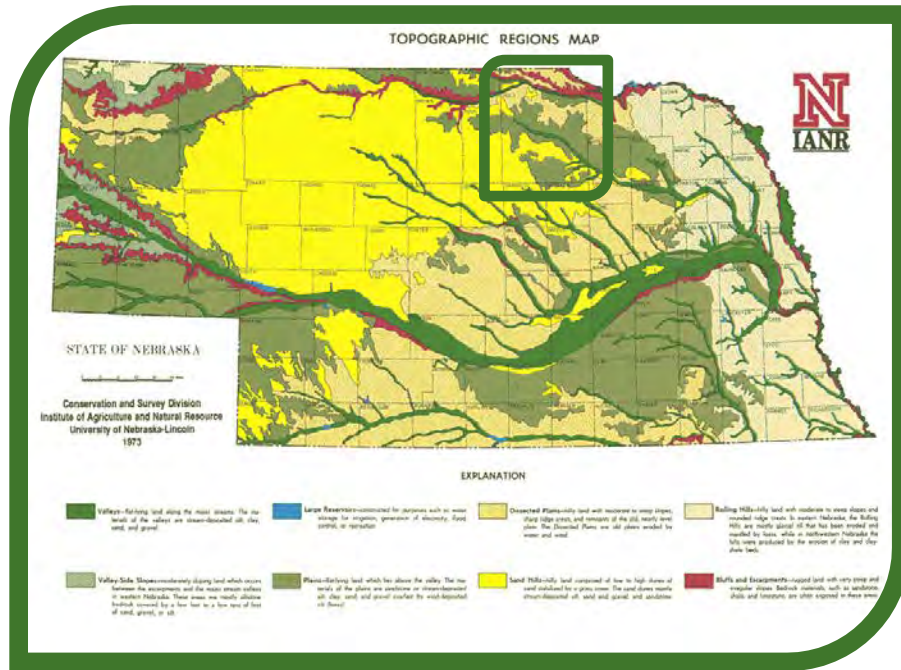
TABLE 6.32: GENERAL GEOGRAPHIC SUMMARY [CASDE] HOLT COUNTY

| Jurisdiction | Area [sq. mi.] | | | Elevation [ft.] |
|--------------|----------------|-------|-------|-----------------|
| | Total | Land | Water | |
| Holt County | 2, 417 | 2,412 | 5.1 | -- |
| Ewing | 0.45 | 0.45 | 0.0 | 1,860 |
| Stuart | 1.34 | 1.34 | 0.0 | 2,159 |

Source: University of Nebraska – Lincoln. Virtual Nebraska. www.casde.unl.edu.

Holt County contains four primary topographic regions according to the Conservation and Survey Division of the University of Nebraska- Lincoln. These include ‘valleys’, ‘dissected plains’, ‘sand hills’, and ‘plains’. The County is also comprised of four main soil series, including Valentine-Elsmere-Tyron, Jansen-O’Neill-Meadin, Onita-Reliance-Labu, and Els-Valentine-Loup. The figures and tables below display topographic and soils data, with Holt County outlined.

FIGURE 6.4: GENERAL TOPOGRAPHIC REGIONS [IANR] STATE OF NEBRASKA – HOLT COUNTY



Source: University of Nebraska – Lincoln. Institute of Agriculture and Natural Resources. Conservation and Survey Division.

TABLE 6.33: GENERAL TOPOGRAPHIC DESCRIPTIONS [IANR] STATE OF NEBRASKA – HOLT COUNTY

| Topographic Region | Description |
|--------------------|---|
| Valleys | Flat-lying land along the major streams. The materials of the valleys are stream-deposited silt, clay, sand, and gravel. |
| Dissected Plains | Hilly land with moderate to steep slopes, sharp ridge crests, and remnants of the old, nearly level plains. The Dissected Plains are old plains eroded by water or wind. |
| Sand Hills | Hilly land comprised of low to high dunes of sand stabilized by a grass cover. The sand dunes meet stream-deposited silt, sand and gravel, and sandstone. |
| Plains | Flat-lying land which rest above the valley. The materials of the plains are sandstone or stream-deposited silt, clay, sand, and gravel overlain by wind deposited silt (loess) |

Source: University of Nebraska – Lincoln. Institute of Agriculture and Natural Resources. Conservation and Survey Division.

FIGURE 6.5: GENERAL SOILS [IANR] STATE OF NEBRASKA – HOLT COUNTY



Source: University of Nebraska – Lincoln. Institute of Agriculture and Natural Resources. Conservation and Survey Division.

DEMOGRAPHICS SUMMARY

Demographic statistics aid decision-makers by developing a picture of Holt County. This picture tells the County and communities where they’ve been and where they’re now, helping decision-makers orient themselves to the most appropriate path to reduce risk and create safer, more disaster resilient jurisdictions. A jurisdiction’s population is the driving force behind its housing, employment, economic stability, and potential for change. Proactive mitigation by decision-makers will help prevent future damage to these unique assets.

Tables 6.34-6.36 and Figures 6.6 below summarize various population and housing characteristics such as population trends, population by age, housing occupancy and tenure, and age of structures. Table 6.47 highlights selected demographic characteristics including housing units lacking complete facilities, no telephone service, mobile home housing units, no vehicles available, population with a disability, and percentage of low-to-moderate income population.

Section Six [Participant Profiles | Holt County]

POPULATION

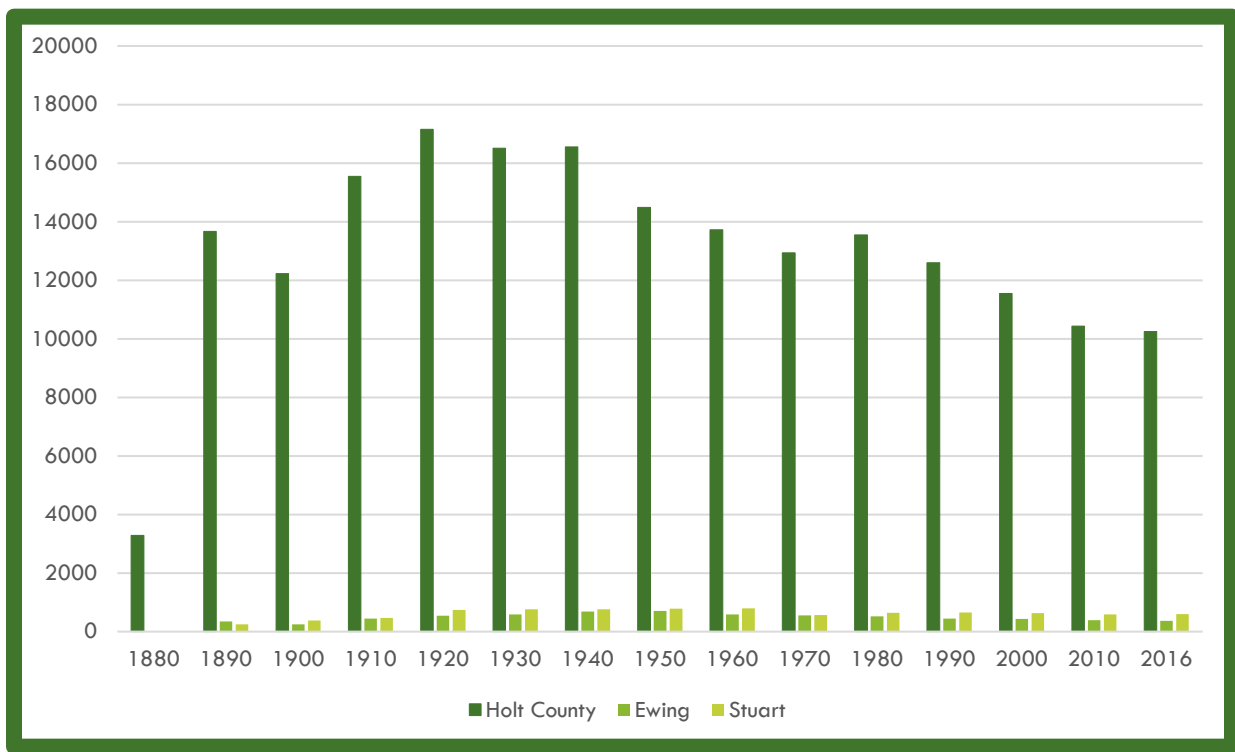
TABLE 6.34: POPULATION TRENDS [CENSUS] HOLT COUNTY 1985 – 2015

| Jurisdiction | 1980 Population | 1990 Population | 2000 Population | 2010 Population | Change '80 - '10 |
|--------------|-----------------|-----------------|-----------------|-----------------|------------------|
| Holt County | 13,552 | 12,599 | 11,551 | 10,435 | -23.0% |
| Ewing | 520 | 449 | 433 | 387 | -25.6% |
| Stuart | 641 | 650 | 625 | 590 | -8.0% |

Source: United States Census Bureau.

Overall, Holt County’s population was 13,552 persons in 1980 and 10,435 persons in 2010. This is a decrease of 3,117 people or 23.0 percent in 30 years. This is the result of a decrease in both the urban and rural populations. For this plan, the term urban is equal to the population within an incorporated jurisdiction.

FIGURE 6.6: HISTORICAL POPULATION AND TRENDS [CENSUS] HOLT COUNTY 1880 – 2014



Source: United States Census Bureau.

TABLE 6.35: POPULATION BY AGE [CENSUS] HOLT COUNTY

| Jurisdiction | < 5 – 9 | 10 – 19 | 20 – 34 | 35 – 54 | 55 – 64 | 65 – 84 | 85 < | 18 < | 21 < | 65 < | Median | Total |
|--------------|---------|---------|---------|---------|---------|---------|------|-------|-------|-------|--------|--------|
| | | | | | | | | | | | | |
| Holt County | 1,279 | 1,369 | 1,356 | 2,810 | 1,478 | 1,776 | 367 | 7,986 | 7,723 | 2,143 | 46.1 | 10,435 |
| | 12.3% | 13.1% | 13.0% | 26.9% | 14.2% | 17.0% | 3.5% | 76.5% | 74.0% | 20.5% | / | 100% |
| Ewing | 53 | 49 | 54 | 89 | 62 | 71 | 9 | 293 | 281 | 80 | 45.2 | 387 |
| | 13.7% | 12.7% | 14.0% | 23.0% | 16.0% | 18.3% | 2.3% | 75.7% | 72.6% | 20.7% | / | 100% |
| Stuart | 76 | 69 | 79 | 147 | 61 | 113 | 45 | 455 | 440 | 158 | 47.0 | 590 |

| | | | | | | | | | | | | | |
|--|-------|-------|-------|-------|-------|-------|------|--|-------|-------|-------|---|------|
| | 12.9% | 11.7% | 13.4% | 24.9% | 10.3% | 19.2% | 7.6% | | 77.1% | 74.6% | 26.8% | / | 100% |
|--|-------|-------|-------|-------|-------|-------|------|--|-------|-------|-------|---|------|

Source: United States Census Bureau.

Overall, Holt County’s median age is 46.1. The largest age cohort of 35-54 represents 26.9 percent of the total population or 2,810 persons. The smallest age cohort of 85 and greater represents 3.5 percent or 367 persons.

HOUSING

TABLE 6.36: HOUSING OCCUPANCY AND TENURE [CENSUS] HOLT COUNTY

| Jurisdiction | Total Housing Units | | | | | Occupied Housing Units | | | |
|--------------|---------------------|---------|--------|---------|--|------------------------|---------|--------|---------|
| | Occupied | | Vacant | | | Owner | | Renter | |
| | Number | Percent | Number | Percent | | Number | Percent | Number | Percent |
| Holt County | 4,447 | 85.3% | 768 | 14.7% | | 3,246 | 73.0% | 1,201 | 27.0% |
| Ewing | 165 | 84.6% | 30 | 15.4% | | 130 | 78.8% | 35 | 21.2% |
| Stuarts | 238 | 89.1% | 29 | 10.9% | | 161 | 67.6% | 77 | 32.4% |

Source: United States Census Bureau.

Overall, the housing occupancy and tenure in Holt County is owner-occupied units. Of the total housing units, 4,447 units or 85.3 percent are occupied units and 3,246 units or 73.0 percent are owner-occupied units.

ASSETS INVENTORY

Each jurisdiction has a unique set of assets and capabilities available. By reviewing the existing assets and capabilities, each jurisdiction can identify assets and capabilities that currently reduce disaster losses or could be used to reduce losses in the future, as well as capabilities that inadvertently increase risks. This is especially useful for multi-jurisdictional plans where local capability varies widely. Assessing the jurisdictions’ existing assets and capabilities available is a critical step to accomplish mitigation, and how to leverage resources for long-term vulnerability reduction in the mitigation strategy.

CRITICAL FACILITIES AND INFRASTRUCTURE

Critical facilities are structures and institutions necessary for a community’s response to and recovery from emergencies. Critical facilities must continue to operate during and following a disaster to reduce the severity of impacts and accelerate recovery. When identifying vulnerabilities, consider both the structural integrity and content value of critical facilities and the effects of interrupting their services to the community.

Infrastructure systems are critical for life, safety, and economic viability and include transportation, power, communication, and water and wastewater systems. Many critical facilities depend on infrastructure to function. For example, hospitals need electricity, water, and sewer to continue helping patients. As with critical facilities, the continued operations of infrastructure systems during and following a disaster are key factors in the severity of impacts and the speed of recovery.

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.

Each participating jurisdiction identified critical facilities vital for disaster response, providing shelter to the public, and essential for returning the jurisdiction’s functions to normal during and after a disaster. Critical facilities were identified at the ‘mitigation alternative’ public meetings through the meeting worksheets (refer to Appendix C). Table 6.48 below summarizes the critical facilities and infrastructure identified by participants. This is a total summary list and not broken into individual counties or jurisdictions.

Section Six [Participant Profiles | Holt County]

TABLE 6.37: CRITICAL FACILITIES AND INFRASTRUCTURE [FEMA] SUMMARY

| CRITICAL FACILITY | TYPE | NUMBER IDENTIFIED | CRITICAL FACILITY | TYPE | NUMBER IDENTIFIED |
|-----------------------------|----------------|-------------------|----------------------------|----------|-------------------|
| Communication Towers | Infrastructure | 8 | Elevator | Facility | 1 |
| Gas Pipeline Connection | Infrastructure | 1 | Fairgrounds | Facility | 1 |
| Internet Provider | Infrastructure | 1 | Fire Department | Facility | 9 |
| Lift Station | Infrastructure | 9 | Fuel Station | Facility | 2 |
| Light Plant Generator | Infrastructure | 1 | Golf Club | Facility | 1 |
| NPPD Substation | Infrastructure | 5 | Hospital | Facility | 11 |
| Phone Exchange | Infrastructure | 1 | Knox County District 9 | Facility | 1 |
| Waste Processing Facility | Infrastructure | 1 | Library/Museum | Facility | 7 |
| Waste Water Treatment | Infrastructure | 11 | Main Shop | Facility | 6 |
| Water Storage Facility | Infrastructure | 1 | Motel | Facility | 1 |
| Water Tower | Infrastructure | 10 | Mr. S's | Facility | 1 |
| Well | Infrastructure | 16 | NeDOT | Facility | 1 |
| Agronomy Center | Facility | 1 | Newspaper | Facility | 1 |
| Arboretum | Facility | 1 | Nursing Home/Senior Center | Facility | 9 |
| Ball Field | Facility | 9 | Nutrition Center | Facility | 1 |
| Bank | Facility | 3 | Park | Facility | 9 |
| Campground | Facility | 1 | Police Station | Facility | 2 |
| Church | Facility | 34 | Pool | Facility | 3 |
| City/Village/Tribal Office | Facility | 8 | Post Office | Facility | 11 |
| Community Center/Hub | Facility | 23 | Road Department | Facility | 2 |
| County Bard | Facility | 1 | School/Day Care | Facility | 39 |
| County Maintenance Building | Facility | 2 | Siren | Facility | 1 |
| Courthouse | Facility | 3 | Tribal Building | Facility | 1 |
| Eastern Township Building | Facility | 1 | -- | -- | -- |

VULNERABLE AREAS AND POPULATIONS

People are your most important asset. The risk assessment can identify areas of greater population density, as well as populations that may have unique vulnerabilities or be less able to respond and recover during a disaster. These include visiting populations and access and functional needs populations. In addition, the risk assessment can identify locations that provide health or social services that are critical to post-disaster response or recovery capabilities.

Visiting populations include students, second home owners, migrant farm workers, and visitors for special events. Special events could include large sporting events and festivals where large numbers of people are concentrated and vulnerable to hazards and threats. Visiting populations may be less familiar with the local environment and hazards and less prepared to protect themselves during an event.

The term “access and functional needs populations” describes groups that may not comfortably or safely access the standard resources offered in emergencies. These populations may include children, the elderly, the physically or mentally disabled, non-English speakers, or the medically or chemically dependent. Facility locations and support service operations for these populations (e.g., hospitals, dependent care facilities, oxygen delivery, and accessible transportation) also need to be considered.

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

Each participating jurisdiction identified highly vulnerable areas and populations where residents and visitors to the plan area may be more open or exposed to hazards both during and after an event and require additional response. Highly vulnerable areas and populations were identified at the ‘mitigation alternative’ public meetings through the meeting worksheets (*Appendix C*).

NATIONAL HISTORIC REGISTRY

The National Register of Historic Places is the official list of the Nation's historic places worthy of preservation. Authorized by the National Historic Preservation Act of 1966, the National Park Service's National Register of Historic Places is part of a national program to coordinate and support public and private efforts to identify, evaluate, and protect America's historic and archeological resources.

The historic sites located within Holt County, according to the National Historic Registry, are listed in Table 6.50 below. These sites were not evaluated for proximity to hazard prone areas.

TABLE 6.38: NATIONAL HISTORIC REGISTRY [NPS] HOLT COUNTY

| Site Name | Date Listed | Location | Site Name | Date Listed | Location |
|----------------------------------|-------------|----------|----------------------------|-------------|----------|
| Eagle Creek Archeological Site | 10/01/1974 | O'Neill | Redbird Site | 11/21/1974 | Redbird |
| Golden Hotel | 11/27/1989 | O'Neill | Roush Ranch | 09/04/2013 | O'Neill |
| Holt County Courthouse | 07/05/1990 | O'Neill | Sturdevant, Brantly, House | 03/25/1999 | Atkinson |
| Old Nebraska State Bank Building | 10/01/1974 | O'Neill | US Post Office, O'Neill | 05/11/1992 | O'Neill |

Source: National Park Service.

CAPABILITIES ASSESSMENT

Local mitigation capabilities are existing resources that reduce hazard impacts or that could be used to implement hazard mitigation activities. Each participating jurisdiction completed a capabilities assessment at the ‘hazard identification’ public meetings through the meeting worksheets (*refer to Appendix C*). The sections below summarize the primary types of capabilities for reducing long-term vulnerability through mitigation planning including planning and regulatory, administrative and technical, financial, and education and outreach identified by participants.

PLANNING AND REGULATORY

Planning and regulatory capabilities are based on the implementation of ordinances, policies, local laws and State statutes, and plans and programs that relate to guiding and managing growth and development. Examples of planning capabilities that can either enable or inhibit mitigation include comprehensive land use plans, capital improvements programs, transportation plans, small area development plans, disaster recovery and reconstruction plans, and emergency preparedness and response plans. Plans describe specific actions or policies that support goals and drive decisions. Likewise, examples of regulatory capabilities include the enforcement of zoning ordinances, subdivision regulations, and building codes that regulate how and where land is developed and structures are built. Planning and regulatory capabilities refer not only to the current plans and regulations, but also to the jurisdictions’ ability to change and improve those plans and regulations as needed.

Tables 6.39-6.41 below summarize the planning and regulatory capabilities currently available in the participating jurisdictions to help prevent and reduce the impacts of hazards.

Section Six [Participant Profiles | Holt County]

TABLE 6.39: PLANNING AND REGULATORY [CAPABILITY ASSESSMENT] HOLT COUNTY

| Plans | Holt County | Ewing | Stuart |
|---|-------------|-------|--------|
| Comprehensive/ Master Plan | Yes | No | No |
| Capital Improvements Plan | No | No | No |
| Economic Development Plan | Yes | No | No |
| Local Emergency Operations Plan | Yes | Yes | No |
| Continuity of Operations Plan | Yes | Yes | No |
| Transportation Plan | Yes | No | No |
| Stormwater Management Plan | Yes | No | No |
| Community Wildfire Protection Plan | Yes | No | No |
| Other special plans (e.g., brownfields redevelopment, disaster recovery, climate change adaption, etc.) | Yes | No | No |

Questions to consider for future updates: Does the plan address hazards? Does the plan identify projects to include in the mitigation strategy? Can the plan be used to implement mitigation actions?

TABLE 6.40: BUILDING CODE, PERMITTING, AND INSPECTIONS [CAPABILITY ASSESSMENT] HOLT COUNTY

| Building Code, Permitting, and Inspections | Holt County | Ewing | Stuart |
|--|-------------|-------|--------|
| Building Code | No | Yes | Yes |
| Building Code Effectiveness Grading Schedule (BCEGS) Score | No | Yes | No |
| Fire Department ISO Rating | No | Yes | No |
| Site Plan Review Requirements | No | Yes | No |

Questions to consider for future updates: Are codes adequately enforced?

TABLE 6.41: LAND USE PLANNING AND ORDINANCES [CAPABILITY ASSESSMENT] HOLT COUNTY

| Land Use Planning and Ordinances | Holt County | Ewing | Stuart |
|---|-------------|-------|--------|
| Zoning Ordinance | Yes | No | No |
| Subdivision Ordinance | Yes | No | Yes |
| Floodplain Ordinance | N/A | No | No |
| Natural hazard specific ordinance (stormwater, steep slope, wildfire) | Yes | No | No |
| Flood Insurance Rate Maps | N/A | No | Yes |
| Acquisition of land for open space and public recreation uses | N/A | No | No |
| Other | No | No | No |

Questions to consider for future updates: Is the ordinance an effective measure for reducing hazard impacts? Is the ordinance adequately administered and enforced? How can these capabilities be expanded and improved to reduce risk?

ADMINISTRATIVE AND TECHNICAL

Administrative and technical capability refers to the jurisdictions' staff and their skills and tools that can be used for mitigation planning and to implement specific mitigation actions. It also refers to the ability to access and coordinate these resources effectively. These include engineers, planners, emergency managers, GIS analysts, building inspectors, grant writers, floodplain managers, and more. The level of knowledge and technical expertise from personnel employed by each jurisdiction, the public and private sector, or resources available through other government entities, such as counties or special districts, may be accessed to implement mitigation activities in the jurisdiction or provide assistance with limited resources. The degree of intergovernmental coordination among departments also affects administrative capability.

Tables 6.42-6.44 below summarize the administrative and technical capabilities currently available in the participating jurisdictions, including staff and their skills and tools, that can be used for mitigation planning and to implement specific mitigation actions. For smaller jurisdictions without local staff resources, there may be public resources at the next higher-level government that can provide technical assistance.

TABLE 6.42: ADMINISTRATION [CAPABILITY ASSESSMENT] HOLT COUNTY

| Administration | Holt County | Ewing | Stuart |
|--|-------------|-------|--------|
| Planning Commission | Yes | No | No |
| Mitigation Planning Committee | No | No | No |
| Maintenance programs to reduce risk (e.g., tree trimming, clearing drainage systems, etc.) | Yes | No | Yes |
| Mutual Aid Agreements | Yes | Yes | Yes |

Questions to consider for future updates: Describe capability. Is coordination effective?

Section Six [Participant Profiles | Holt County]

TABLE 6.43: STAFF [CAPABILITY ASSESSMENT] HOLT COUNTY

| Staff | Holt County | Ewing | Stuart |
|--------------------------|-------------|-------|--------|
| Chief Building Official | Yes | No | No |
| Floodplain Administrator | Yes | No | No |
| Emergency Manager | Yes | No | No |
| Community Planner | Yes | Yes | No |
| Civil Engineer | Yes | Yes | No |
| GIS Coordinator | Yes | Yes | No |
| Other | No | No | No |

Questions to consider for future updates: Is staffing adequate to enforce regulations? Is staff trained on hazards and mitigation? Is coordination between agencies and staff effective?

TABLE 6.44: TECHNICAL [CAPABILITY ASSESSMENT] HOLT COUNTY

| Technical | Holt County | Ewing | Stuart |
|--|-------------|-------|--------|
| Warning systems/ services (Reverse 911, outdoor warning signals) | Yes | Yes | Yes |
| Hazard Data and Information | No | No | No |
| Grant Writing | Yes | No | No |
| HAZUS Analysis | No | No | No |
| Other | No | No | No |

Questions to consider for future updates: Describe capability. Has capability been used to assess/ mitigate risk in the past? How can these capabilities be expanded and improved to reduce risk?

FINANCIAL

Financial capabilities are the resources that a jurisdiction has access to or is eligible to use to fund mitigation actions. The costs associated with implementing mitigation activities vary. Some mitigation actions such as building assessment or outreach efforts require little to no costs other than staff time and existing operating budgets. Other actions, such as the acquisition of flood-prone properties, could require a substantial monetary commitment from local, State, and Federal funding sources.

Local governments may have access to a recurring source of revenue beyond property, sales, and income taxes, such as stormwater utility or development impact fees. These jurisdictions may be able to use the funds to support local mitigation efforts independently or as the local match or cost-share often required for grant funding.

Table 6.45 below summarizes the financial capabilities currently available in the participating jurisdictions to help fund hazard mitigation activities.

TABLE 6.45: FUNDING RESOURCE [CAPABILITY ASSESSMENT] HOLT COUNTY

| Funding Resource | Holt County | Ewing | Eustis |
|---|-------------|-------|--------|
| Capital improvements project funding | Yes | N/A | Yes |
| Authority to levy taxes for specific purposes | Yes | N/A | Yes |
| Fees for water, sewer, gas, or electric services | Yes | N/A | No |
| Impact fees for new development | No | N/A | Yes |
| Storm water utility fee | No | N/A | No |
| Incur debt through general obligation bonds and/ or special tax bonds | Yes | N/A | Yes |
| Incur debt through private activities | No | N/A | No |
| Community Development Block Grant | Yes | N/A | Yes |
| Other federal funding programs | Yes | N/A | Yes |
| State funding programs | Yes | N/A | Yes |
| Other | No | N/A | Yes |

Questions to consider for future updates: Has the funding resource been used in the past and for what type of activities? Could the resource be used to fund future mitigation actions? How can these capabilities be expanded and improved to reduce risk?

EDUCATION AND OUTREACH

This type of capability refers to education and outreach programs, methods, and initiatives already in place to implement mitigation activities and communicate hazard-related information. Examples include fire safety programs that fire departments deliver to students at local schools; participation in community programs, such as Firewise or StormReady; and activities conducted as part of hazard awareness campaigns, such as Tornado or Flood Awareness Month.

Table 6.46 below identifies the education and outreach capabilities currently available in the participating jurisdictions to increase hazard mitigation awareness.

TABLE 6.46: EDUCATION AND OUTREACH [CAPABILITY ASSESSMENT] HOLT COUNTY

| Program/ Organization | Holt County | Ewing | Stuart |
|---|-------------|-------|--------|
| Local citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc. | Yes | N/A | No |
| Ongoing public education or information program (e.g., responsible water use, fire safety, household preparedness, environmental education, etc.) | Yes | N/A | No |
| Natural disaster or safety related school programs | No | N/A | No |
| Storm Ready Certification | No | N/A | No |
| Fire Wise Communities Certification | No | N/A | No |
| Public-private partnership initiatives addressing disaster-related issues | No | N/A | No |
| Other | N/A | N/A | No |

Section Six [Participant Profiles | Holt County]

Questions to consider for future updates: Describe the program/ organization and how it relates to disaster resilience and mitigation. Could the program/ organization help implement future mitigation activities? How can these capabilities be expanded and improved to reduce risk?

SAFE GROWTH

One way to assess the impact of planning and regulatory capabilities is to complete a safe growth audit. The purpose of the safe growth audit is to analyze the impacts of current policies, ordinances, and plans on community safety from hazard risks due to growth. A safe growth audit helps identify gaps in jurisdictions’ growth guidance instruments and improvements that could be made to reduce vulnerability to future development.

Tables 6.47-6.54 below summarize the safe growth audit in terms of land use, transportation, environmental management, public safety, zoning ordinances, subdivision regulations, and capital improvements currently available in the participating jurisdictions to help prevent and reduce the impacts of hazards.

TABLE 6.47: LAND USE [SAFE GROWTH] HOLT COUNTY

| Comprehensive Plan (Land Use) | Holt County | Ewing | Stuart |
|--|-------------|-------|--------|
| Does the Future Land Use Map clearly identify natural hazard areas? | No | No | No |
| Do the land-use policies discourage development or redevelopment within natural hazard areas? | Yes | No | No |
| Does the plan provide adequate space for expected future growth in areas located outside natural hazard areas? | Yes | No | No |

TABLE 6.48: TRANSPORTATION [SAFE GROWTH] HOLT COUNTY

| Comprehensive Plan (Transportation) | Holt County | Ewing | Stuart |
|---|-------------|-------|--------|
| Does the Transportation Plan limit access to hazard areas? | Yes | No | No |
| Is transportation policy used to guide growth to safe locations? | Yes | No | No |
| Are movement systems designed to function under disaster conditions (e.g., evacuation)? | Yes | No | No |

TABLE 6.49: ENVIRONMENTAL MANAGEMENT [SAFE GROWTH] HOLT COUNTY

| Comprehensive Plan (Environmental Management) | Holt County | Ewing | Stuart |
|--|-------------|-------|--------|
| Are environmental systems that protect development from hazards identified and mapped? | No | No | No |
| Do environmental policies maintain and restore protective ecosystems? | No | No | No |
| Do environmental policies provide incentives to development that is located outside protective ecosystems? | No | No | No |

TABLE 6.50: PUBLIC SAFETY [SAFE GROWTH] HOLT COUNTY

| Comprehensive Plan (Public Safety) | Holt County | Ewing | Stuart |
|---|-------------|-------|--------|
| Are the goals and policies of the Comprehensive Plan related to those of the FEMA Local Hazard Mitigation Plan? | Yes | No | No |
| Is safety explicitly included in the plan's growth and development policies? | No | No | No |
| Does the monitoring and implementation section of the plan cover safe growth objectives? | No | No | No |

TABLE 6.51: ZONING ORDINANCE [SAFE GROWTH] HOLT COUNTY

| Zoning Ordinance | Holt County | Ewing | Stuart |
|--|-------------|-------|--------|
| Does the Zoning Ordinance conform to the Comprehensive Plan in terms of discouraging development or redevelopment within natural hazard areas? | Yes | No | No |
| Does the ordinance contain natural hazard overlay zones that set conditions for land uses within such zones? | No | No | No |
| Do rezoning procedures recognize natural hazard areas as limits on zoning changes that allow greater intensity or density of use? | Yes | No | No |
| Does the ordinance prohibit development within, or filling of, wetlands, floodways, and floodplains? | Yes | No | No |

TABLE 6.52: SUBDIVISION REGULATIONS [SAFE GROWTH] HOLT COUNTY

| Subdivision Regulations | Holt County | Ewing | Stuart |
|---|-------------|-------|--------|
| Do the Subdivision Regulations restrict the subdivision of land within or adjacent to natural hazard areas? | No | No | No |
| Do the regulations provide for conservation subdivisions or cluster subdivisions to conserve environmental resources? | No | No | No |
| Do the regulations allow density transfers where hazard areas exist? | No | No | No |

TABLE 6.53: CAPITAL IMPROVEMENTS [SAFE GROWTH] HOLT COUNTY

| Capital Improvement Program and Infrastructure Policies | Holt County | Ewing | Stuart |
|---|-------------|-------|--------|
| Does the Capital Improvement Program limit expenditures on projects that would encourage development in areas vulnerable to natural hazards? | No | No | No |
| Do Infrastructure Policies limit extension of existing facilities and services that would encourage development in areas vulnerable to natural hazards? | No | No | No |
| Does the Capital Improvement Program provide funding for hazard mitigation projects identified in the FEMA Mitigation Plan? | No | No | No |

Section Six [Participant Profiles | Holt County]

TABLE 6.54: ADDITIONAL PLANNING MECHANISMS [SAFE GROWTH] HOLT COUNTY

| Additional Planning Mechanisms | Holt County | Curtis | Stuart |
|---|-------------|--------|--------|
| Do small area or corridor plans recognize the need to avoid or mitigate natural hazards? | No | No | No |
| Does the Building Code contain provisions to strengthen or elevate construction to withstand hazard forces? | No | No | No |
| Do economic development or redevelopment strategies include provisions for mitigating natural hazards? | No | No | No |
| Is there an adopted evacuation and shelter plan to deal with emergencies from natural hazards? | Yes | No | No |

CLIMATE SUMMARY

The monthly climate normals information displayed in the figures and table below is taken from weather station near Ewing. The data from this station is provided by the High Plains Regional Climate Center.

Normals are produced by the National Climatic Data Center (NCDC). Climate normals are an arithmetic average of a variable such as temperature over a prescribed 30-year period. This base period changes every 10 years to reflect the previous 30 years of data. The current period is 1985-2015. Note that NCDC normals may not be the same as a straight average over the 30-year period, due to adjustments for discontinuities such as station moves or changes in observation time.

TABLE 6.55: GENERAL CLIMATE STATISTICS [HPRCC] MONTHLY COMPARISONS

| Month | Mean Maximum Temperature (F) | Mean Minimum Temperature (F) | Mean Average Temperature (F) | Total Precipitation (in.) | Total Snowfall (in.) |
|-----------|------------------------------|------------------------------|------------------------------|---------------------------|----------------------|
| January | 33.1 | 11.4 | 22.3 | 0.01 | 0.1 |
| February | 35.7 | 13.8 | 24.6 | 0.02 | 0.2 |
| March | 48.0 | 23.5 | 35.7 | 0.05 | 0.2 |
| April | 59.4 | 34.5 | 46.9 | 0.09 | 0.1 |
| May | 71.0 | 46.4 | 58.7 | 0.12 | 0.0 |
| June | 81.3 | 56.7 | 69.0 | 0.12 | 0.0 |
| July | 87.9 | 61.8 | 74.9 | 0.09 | 0.0 |
| August | 85.1 | 59.6 | 72.3 | 0.10 | 0.0 |
| September | 76.8 | 49.2 | 62.9 | 0.08 | 0.0 |
| October | 62.1 | 36.4 | 49.2 | 0.06 | 0.0 |
| November | 46.6 | 23.0 | 35.0 | 0.03 | 0.1 |
| December | 34.1 | 13.8 | 24.0 | 0.02 | 0.1 |

Source: High Plains Regional Climate Center.

HAZARD IDENTIFICATION AND RISK ASSESSMENT SUMMARY

The hazard identification was conducted to determine the hazards that threaten Antelope, Holt, and Knox Counties. It was established through public input and information provided by elected officials, key stakeholders, and residents throughout the planning area, as well as conducting research on each hazard type identified in the State of Nebraska Hazard Mitigation Plan. For this plan update, nine natural hazards were initially considered, including severe winter storms (including extreme cold and severe winter weather), tornados, severe thunderstorms (including hail, lightning, and severe wind), 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 exceptions of dam failure and levee failure, were not included in this plan. Using existing hazards data and input gained through planning and public meetings, Antelope, Holt, and Knox Counties identified the hazards that could affect the planning area.

To best describe the hazards that affect the jurisdictions Antelope, Holt, and Knox Counties utilized the following activities for identifying hazards in the planning area:

- ❑ Reviewed the State Hazard Mitigation Plan for information on hazards affecting the planning area.
- ❑ Documented the disaster declaration history.
- ❑ Downloaded weather-related events from online resources, such as the National Climatic Data Center.
- ❑ Reviewed existing studies, reports, and plans related to hazards in the planning area.
- ❑ Used flood insurance rate maps (FIRM) and non-regulatory flood risk assessment products developed for the planning area by FEMA as part of the National Flood Insurance Program (NFIP) and the RiskMAP program.
- ❑ Contacted colleges or universities that have hazard-related academic programs or extension services.
- ❑ Interviewed the planning team and stakeholders about which hazards affect the planning area and should be described in the mitigation plan.
- ❑ Consulted local resources such as the newspaper, chamber of commerce, local historical society, or other resources with records of past occurrences.
- ❑ Referenced hazards previously identified to determine if they were still relevant.

Hazards data from the Nebraska Emergency Management Agency (NEMA) State of Nebraska Mitigation Plan, Federal Emergency Management Agency (FEMA), National Oceanic and Atmospheric Administration (NOAA), National Climatic Data Center (NCDC), as well as other sources were analyzed to gauge the overall significance of the hazards to Antelope, Holt, and Knox Counties. Overall significance was calculated based on risk assessment criteria such as frequency and damage, including deaths and injuries, as well as property, crop, and economic damage. Hazards that occur relatively infrequent or have minimal to no impact on the planning area were deemed to be of low significance. This evaluation was used by Antelope, Holt, and Knox Counties to identify the hazards of greatest overall significance, allowing the Counties to concentrate resources where they are needed most.

The mitigation plan update focuses on how risk has changed since the previous plans were completed, particularly changes related to land use development and new hazard information. New development in hazard-prone areas, areas affected by recent disasters, and new data and reports were incorporated into the plan to analyze the current risk and update mitigation actions. The Nebraska State Hazard Mitigation Plan was consulted to assess the potential of new hazards for Antelope, Holt, and Knox Counties. The previous Holt County Plan was also reevaluated, and the comments in Table 6.68 detail how hazards were updated.

Section Six [Participant Profiles | Holt County]

TABLE 6.56: HOLT COUNTY HAZARD IDENTIFICATION [COMPARISON] 2010-2016

| 2016 Hazards | 2010 Hazards* | 2016 Comment |
|-----------------------|---|---|
| Dam Failure | Hazard identified and evaluated. | Hazard identified and evaluated with updated data, analysis, and risk assessment. |
| Drought | Hazard identified but not evaluated. | New hazard. |
| Earthquake | Hazard identified but not evaluated. | Hazard identified but not evaluated. |
| Extreme Cold | Hazard not identified. | New hazard (included under Severe Winter Storms). |
| Extreme Heat | Hazard not identified. | New hazard. |
| Flood | Hazard identified and evaluated. | Hazard identified and evaluated with updated data, analysis, and risk assessment. |
| Hail | Hazard identified and evaluated (included under Summer Storms). | Hazard identified and evaluated with updated data, analysis, and risk assessment (included under Severe Thunderstorms). |
| Landslide | Hazard identified but not evaluated. | Hazard identified but not evaluated. |
| Lightning | Hazard identified and evaluated (included under Summer Storms). | Hazard identified and evaluated with updated data, analysis, and risk assessment (included under Severe Thunderstorms). |
| Severe Wind | Hazard identified and evaluated (included under Summer Storms). | Hazard identified and evaluated with updated data, analysis, and risk assessment (included under Severe Thunderstorms). |
| Severe Winter Weather | Hazard identified and evaluated. | Hazard identified and evaluated with updated data, analysis, and risk assessment. |
| Tornado | Hazard identified and evaluated. | Hazard identified and evaluated with updated data, analysis, and risk assessment. |
| Wildfire | Hazard identified and evaluated. | Hazard identified but not evaluated. |
| Levee Failure | Hazard identified but not evaluated. | Hazard identified but not evaluated. |

Source: Holt County Hazard Mitigation Plan, 2008.

The Disaster Mitigation Act requires that Antelope, Holt, and Knox Counties evaluate the risks associated with each hazard identified in the planning process. Refer to Section Three for additional explanations on which hazards were evaluated and why certain hazards were not evaluated in this plan. The overall risk assessment for the identified hazard types represents the presence and vulnerability to each hazard type throughout the planning area. The individual hazard identification tables, based on the public input and information received, identify those hazard types which have occurred, have a significant likelihood to occur again, or have reason to potentially occur in Antelope, Holt, and Knox Counties. These tables were compiled after receiving responses from the public, discussing the public responses with the State Hazard Mitigation Officer, and conducting detailed research on the presence and risk of each hazard type. The individual participant hazard identification tables and responses may or may not reflect the consensus for risk and vulnerability to each hazard type for the planning area.

Tables 6.57-6.59 summarizes the results of the hazard identification and risk assessment for Holt County, based on the hazard data and input from the public. For each hazard identified, this table includes the location, maximum probable extent, probability of future events, and overall significance for the County and incorporated jurisdictions.

TABLE 6.57: HAZARD IDENTIFICATION & RISK ASSESSMENT [HOLT COUNTY] 2016

| Hazard | Location | Maximum Probable Extent | Overall Significance |
|----------------------|-------------|-------------------------|----------------------|
| Severe Winter Storms | Extensive | Moderate | Highly Likely |
| Severe Thunderstorms | Significant | Moderate | Highly Likely |
| Tornados | Negligible | Severe | Highly Likely |
| Floods | Significant | Moderate | Highly Likely |
| Extreme Heat | Extensive | Severe | Unlikely |
| Drought | Extensive | Severe | Likely |
| Dam Failure | Significant | Severe | Unlikely |

TABLE 6.58: HAZARD IDENTIFICATION & RISK ASSESSMENT [EWING] 2016

| Hazard | Location | Maximum Probable Extent | Overall Significance |
|----------------------|-------------|-------------------------|----------------------|
| Severe Winter Storms | Extensive | Moderate | Highly Likely |
| Severe Thunderstorms | Significant | Moderate | Highly Likely |
| Tornados | Negligible | Severe | Highly Likely |
| Floods | Significant | Moderate | Highly Likely |
| Extreme Heat | Extensive | Severe | Unlikely |
| Drought | Extensive | Severe | Likely |
| Dam Failure | Significant | Severe | Unlikely |

TABLE 6.59: HAZARD IDENTIFICATION & RISK ASSESSMENT [STUART] 2016

| Hazard | Location | Maximum Probable Extent | Overall Significance |
|----------------------|-------------|-------------------------|----------------------|
| Severe Winter Storms | Extensive | Moderate | Highly Likely |
| Severe Thunderstorms | Significant | Moderate | Highly Likely |
| Tornados | Negligible | Severe | Highly Likely |
| Floods | Significant | Moderate | Highly Likely |
| Extreme Heat | Extensive | Severe | Unlikely |
| Drought | Extensive | Severe | Likely |
| Dam Failure | Significant | Severe | Unlikely |

THE ACTION PLAN – HOLT COUNTY

The action plan lays the groundwork for implementation. The plan was developed to present the recommendations established by Antelope, Holt, and Knox Counties on how the participating jurisdictions can reduce risk and vulnerability of people, property, infrastructure, and natural resources to future disaster losses. The action plan identifies how mitigation actions will be implemented, including who is responsible for which actions, what funding mechanisms and other resources are available or will be pursued, when actions will be completed, and how they are prioritized.

Section Six [Participant Profiles | Holt County]

Plan updates reflect progress in local mitigation efforts. The integration of the plan into existing planning mechanisms and the implementation of mitigation actions demonstrate progress in risk reduction. Details describing how the current mitigation strategy, including goals and actions, will be incorporated into existing mechanisms are discussed in *Section Five: Review, Evaluation, and Implementation*.

The action plan detailed below contains both new actions developed for this plan update, as well as viable actions that had yet to be completed from the previous plans. Each action item is listed with a current status statement. The status will be one of the following three options:

- **New – Mitigation Action Items that are new in the 2016 plan**
- **Continued Action (Ongoing Action) – These 2010 action items have been completed to a certain point but require continued review and work on them**
- **Continued Action (Insufficient Funding) – These 2010 action items have not been completed due to insufficient funding. The jurisdictions still intend to complete these action items if funding becomes available.**

The actions are also listed by Priority with High being listed first. Each jurisdiction ranked the chosen action items by priority during the planning process and that ranking will be utilized if and when funding becomes available. The selected action item will be determined from discussions between the individual jurisdiction, specific county and pertinent Emergency Manager. Priority rankings, available funding, local needs, and other specific criteria will be used to select which action items will be completed.

HOLT COUNTY

HOLT COUNTY

Holt County determined that existing or future flooding potential was a high concern. They were concerned with areas that currently flood or have the potential to flood in the future. They also wanted to improve warning and safety systems. These concerns were discussed and used to create most of the Mitigation Action Items. These Mitigation Action Items are fairly similar to the items listed in the 2010 Plan.

STREAM BANK STABILIZATION

[Background] Stream bank/bed degradation can occur along many rivers and creeks. Stabilization improvements including rock rip rap, vegetative cover, j-hooks, boulder vanes, etc. can be implemented to reestablish the channel banks. Grade control structures including sheet-pile weirs, rock weirs, ponds, road dams, etc. can be implemented and improved to maintain the channel bed. Channel stabilization can protect structures, increase conveyance and provide flooding benefits. Flood protection for critical and/or highly vulnerable facilities, areas, populations, and infrastructure is key.

[Benefits] Stream bed/grade stabilization improvements can serve to more effectively protect structures, increase conveyance, prevent down cutting, and provide flooding benefits.

[Responsible Agency & Partners] Holt County, Public Works, Utility, and/or Floodplain Management Department, and Lower Niobrara Natural Resources District

[Cost Estimate & Funding] \$50,000 to \$100,000+; Hazard Mitigation Assistance Grant Programs, Natural Resources Districts

[Timeline] 1-3 years

[Priority] High

[Status] Continued Action from previous plan that requires ongoing action.

ROAD AND EMBANKMENT IMPROVEMENTS

[Background] Identify, design, and construct road and embankment improvements as necessary for proper drainage and to adequately manage the traffic load.

[Benefits] Properly designed and constructed roads and embankments promote safer travel and allow for increased emergency response.

[Responsible Agency & Partners] Holt County Board of Commissioners and Planning and Zoning Commission

[Cost Estimate & Funding] \$50,000+; Hazard Mitigation Assistance Grant Programs

[Timeline] 1-3 years

[Priority] High

[Status] This a continued action from past plan that is an ongoing action.

WARNING SYSTEMS

[Background] Improve city cable TV interrupt warning system and implement telephone interrupt system such as Reverse 911.

[Benefits] Reduces the risk of death/injury associated with severe weather; promoting awareness and ensures people take shelter when needed.

[Responsible Agency & Partners] Holt County, Public Works, Utility, and/or Floodplain Management Department

[Cost Estimate & Funding] \$5,000+; Hazard Mitigation Assistance Grant Programs, Natural Resources Districts

[Timeline] 1-3 years

[Priority] High

[Status] Continued Action from previous plan that has not been completed yet due to insufficient funding.

EMERGENCY COMMUNICATIONS

[Background] Establish an action plan to improve communication between agencies to better assist residents and businesses during and following emergencies. Establish inner-operable communications.

[Benefits] Coordination and clear and efficient communications between agencies increases the capabilities to protect and rescue, increases safety, and reduces the risk of mistakes due to miscommunications.

[Responsible Agency & Partners] Holt County

[Cost Estimate & Funding] \$10,000+; Hazard Mitigation Assistance Grant Programs,

[Timeline] 1-3 years

[Priority] High

[Status] Continued Action from previous plan that has not been completed yet due to insufficient funding.

Section Six [Participant Profiles | Holt County]

FLOOD-PRONE PROPERTY ACQUISITION

[Background] Voluntary acquisition and demolition of properties prone to flooding will reduce the general threat of flooding for communities. Additionally, this can provide flood insurance benefits to those communities within the National Flood Insurance Program. Repetitive loss structures are typically highest priority.

[Benefits] Voluntary acquisition and demolition of properties prone to flooding will reduce the damages associated with flooding for communities. Additionally, this can provide flood insurance benefits to those communities within the National Flood Insurance Program. Communities must be in good standing with National Flood Insurance Program to be eligible for Hazard Mitigation Grant Program.

[Responsible Agency & Partners] Holt County, Public Works, Utility, and/or Floodplain Management Department, and Middle Republican Natural Resources District

[Cost Estimate & Funding] \$10,000+; Hazard Mitigation Assistance Grant Programs, Community Development Block Grant, Natural Resources Districts

[Timeline] 1-3 years

[Priority] High

[Status] Continued Action from previous plan that requires ongoing action.

DRAINAGE ASSESSMENT FOR BRIDGE AND CULVERT IMPROVEMENTS

[Background] Preliminary drainage studies and assessments can be conducted to identify and prioritize design improvements to address site specific localized flooding/drainage issues to reduce and/or alleviate flooding. Stormwater master plans can be conducted to perform a community-wide stormwater evaluation, identifying multiple problem areas and potential drainage improvements.

[Benefits] Proactive steps to identify all potential problems/issues can lead to effectively addressing improvements and prioritizing the projects to improve conditions. These improvements can serve to more effectively convey runoff within jurisdictions, preventing interior localized flooding resulting in damages. This ensures that the most beneficial projects are done first and could possibly eliminate the need for others.

[Responsible Agency & Partners] Holt County Engineering, Roads Department, and Lower Niobrara Natural Resource Districts

[Cost Estimate & Funding] \$10,000 to \$100,000+; Hazard Mitigation Assistance Grant Programs, Community Development Block Grant, Natural Resources Districts

[Timeline] 1-3 years

[Priority] Medium

[Status] Continued Action from previous plan that requires ongoing action.

STORM SHELTER AND SAFE ROOMS

[Background] Assess, design and construct fully supplied safe rooms in highly vulnerable urban and rural areas such as mobile home parks, campgrounds, schools, and other such areas throughout the planning area. Assess the adequacy of current public buildings to be used as safe rooms. Construct safe rooms in areas of greatest need, either as new construction or retrofitting.

[Benefits] Reduce the risk of death or injury in areas vulnerable to tornados, severe thunderstorms and other hazards.

[Responsible Agency & Partners] Holt County, Individual City or Villages Public Works Departments and/or Emergency Management Departments

[Cost Estimate & Funding] \$400 to \$500/square foot (stand-alone), \$350 to 400/square foot (addition/retrofit); Hazard Mitigation Assistance Grant Programs

[Timeline] 1-3 years

[Priority] Medium

[Status] Continued Action from previous plan that has not been completed yet due to insufficient funding.

BACKUP GENERATORS

[Background] Provide a portable or stationary source of backup power to redundant power supplies, municipal wells, lift stations, and other critical facilities and shelters.

[Benefits] Reduce the danger to human life/health by keeping utilities operating. Reduce the economic downtime associated with utility loss.

[Responsible Agency & Partners] Holt County, Individual City or Villages Public Works Departments and/or Emergency Management Departments

[Cost Estimate & Funding] \$20,000 to \$35,000/generator; Hazard Mitigation Assistance Grant Programs

[Timeline] 1-3 years

[Priority] Medium

[Status] Continued Action from previous plan that has not been completed yet due to insufficient funding.

WEATHER RADIOS

[Background] Conduct an inventory of weather radios at schools and other critical facilities and provide new radios as needed.

[Benefits] Reduces the risk of death/injury associated with severe weather conditions by communication.

[Responsible Agency & Partners] Holt County, Individual City or Villages Public Works Departments and/or Emergency Management Departments

[Cost Estimate & Funding] \$75/radio; Hazard Mitigation Assistance Grant Programs

[Timeline] 1-3 years

[Priority] Medium

[Status] Continued Action from previous plan that has not been completed yet due to insufficient funding.

ALERT AND WARNING SIRENS

[Background] Perform an evaluation of existing alert sirens to determine sirens which should be replaced or upgraded. Install new sirens where lacking and remote activation.

[Benefits] Reduces the risk of death/injury associated with severe weather; promoting awareness and ensures people take shelter when needed.

[Responsible Agency & Partners] Holt County, Individual City or Villages Public Works Departments and/or Emergency Management Departments, Natural Resources Districts

[Cost Estimate & Funding] \$25,000+; Hazard Mitigation Assistance Grant Programs, Natural Resources Districts

Section Six [Participant Profiles I Holt County]

[Timeline] 1-3 years

[Priority] Medium

[Status] Continued Action from previous plan that has not been completed yet due to insufficient funding.

CIVIL SERVICE IMPROVEMENTS

[Background] Improve emergency rescue and response equipment and facilities by providing additional, or updating existing emergency response equipment. This could include fire equipment, ATVs, water tanks/truck, snow removal equipment, pumps, etc. This would also include developing backup systems for emergency vehicles, identifying and training additional personnel for emergency response, or continuing educational opportunities for current personnel.

[Benefits] Having appropriate and up to date equipment along with adequately trained and numbered personnel increases safety and reduces the risk of damage.

[Responsible Agency & Partners] Holt County, Individual City or Villages Public Works Departments and/or Emergency Management Departments

[Cost Estimate & Funding] \$5,000+; Hazard Mitigation Assistance Grant Programs

[Timeline] 1-3 years

[Priority] Medium

[Status] Continued Action from previous plan that requires ongoing action.

PUBLIC AWARENESS AND EDUCATION CAMPAIGNS

[Background] Through activities such as outreach projects, distribution of maps and environmental education increase public awareness of natural hazards to both public and private property owners, renters, businesses, and local officials about hazards and ways to protect people and property from these hazards. In addition, educate citizens on erosion control and water conservation methods.

[Benefits] Public awareness reduces the risk of property loss and damage, injury and death. It increases knowledge on emergency procedures, facilities, conservation, and is key to preparedness.

[Responsible Agency & Partners] Holt County, Individual City or Villages Departments (Fire, Police, Administration, Public Works, Parks, Floodplain Management, Utility, Roads, and/or Emergency Management Department(s); School Boards; Neighborhood/Homeowner Associations), Natural Resources Districts, Nebraska Emergency Management Agency, Nebraska Department of Environmental Quality, Nebraska Department of Natural Resources

[Cost Estimate & Funding] \$1,000+; Hazard Mitigation Assistance Grant Programs

[Timeline] 1-3 years

[Priority] Medium

[Status] Continued Action from previous plan that requires ongoing action.

EWING

Ewing wanted to make sure their existing infrastructure were in good shape for the current conditions and future conditions. Ewing was also concerned with their current warning and safety systems. These concerns were discussed and used to create most of the Mitigation Action Items. Ewing listed similar Mitigation Action Items in the 2010 plan however their priorities changes

slightly. Ewing listed existing infrastructure as higher than safety systems in this plan update which was a change from the 2010 plan.

DRAINAGE ASSESSMENT FOR BRIDGE AND CULVERT IMPROVEMENTS

[Background] Preliminary drainage studies and assessments can be conducted to identify and prioritize design improvements to address site specific localized flooding/drainage issues to reduce and/or alleviate flooding. Stormwater master plans can be conducted to perform a community-wide stormwater evaluation, identifying multiple problem areas and potential drainage improvements.

[Benefits] Proactive steps to identify all potential problems/issues can lead to effectively addressing improvements and prioritizing the projects to improve conditions. These improvements can serve to more effectively convey runoff within jurisdictions, preventing interior localized flooding resulting in damages. This ensures that the most beneficial projects are done first and could possibly eliminate the need for others.

[Responsible Agency & Partners] Ewing Administration (Village Board)

[Cost Estimate & Funding] \$10,000 to \$100,000+; Hazard Mitigation Assistance Grant Programs, Community Development Block Grant, Natural Resources Districts

[Timeline] 1-3 years

[Priority] High

[Status] Continued Action from previous plan that requires ongoing action.

STREAM BANK STABILIZATION

[Background] Stream bank/bed degradation can occur along many rivers and creeks. Stabilization improvements including rock rip rap, vegetative cover, j-hooks, boulder vanes, etc. can be implemented to reestablish the channel banks. Grade control structures including sheet-pile weirs, rock weirs, ponds, road dams, etc. can be implemented and improved to maintain the channel bed. Channel stabilization can protect structures, increase conveyance and provide flooding benefits. Flood protection for critical and/or highly vulnerable facilities, areas, populations, and infrastructure is key.

[Benefits] Stream bed/grade stabilization improvements can serve to more effectively protect structures, increase conveyance, prevent down cutting, and provide flooding benefits.

[Responsible Agency & Partners] Ewing Administration (Village Board)

[Cost Estimate & Funding] \$50,000 to \$100,000+; Hazard Mitigation Assistance Grant Programs, Natural Resources Districts

[Timeline] 1-3 years

[Priority] High

[Status] Continued Action from previous plan that requires ongoing action.

BACKUP GENERATORS

[Background] Provide a portable or stationary source of backup power to redundant power supplies, municipal wells, lift stations, and other critical facilities and shelters.

[Benefits] Reduce the danger to human life/health by keeping utilities operating. Reduce the economic downtime associated with utility loss.

[Responsible Agency & Partners] Ewing Administration (Village Board), and/or Emergency Management Departments

Section Six [Participant Profiles | Holt County]

[Cost Estimate & Funding] \$20,000 to \$35,000/generator; Hazard Mitigation Assistance Grant Programs

[Timeline] 1-3 years

[Priority] High

[Status] Continued Action from previous plan that has not been completed yet due to insufficient funding.

CIVIL SERVICE IMPROVEMENTS

[Background] Improve emergency rescue and response equipment and facilities by providing additional, or updating existing emergency response equipment. This could include fire equipment, ATVs, water tanks/truck, snow removal equipment, pumps, etc. This would also include developing backup systems for emergency vehicles, identifying and training additional personnel for emergency response, or continuing educational opportunities for current personnel.

[Benefits] Having appropriate and up to date equipment along with adequately trained and numbered personnel increases safety and reduces the risk of damage.

[Responsible Agency & Partners] Ewing Administration (Village Board), and/or Emergency Management Departments

[Cost Estimate & Funding] \$5,000+; Hazard Mitigation Assistance Grant Programs

[Timeline] 1-3 years

[Priority] High

[Status] Continued Action from previous plan that requires ongoing action.

STORM SHELTER AND SAFE ROOMS

[Background] Assess, design and construct fully supplied safe rooms in highly vulnerable urban and rural areas such as mobile home parks, campgrounds, schools, and other such areas throughout the planning area. Assess the adequacy of current public buildings to be used as safe rooms. Construct safe rooms in areas of greatest need, either as new construction or retrofitting.

[Benefits] Reduce the risk of death or injury in areas vulnerable to tornados, severe thunderstorms and other hazards.

[Responsible Agency & Partners] Ewing Administration (Village Board)

[Cost Estimate & Funding] \$400 to \$500/square foot (stand-alone), \$350 to 400/square foot (addition/retrofit); Hazard Mitigation Assistance Grant Programs

[Timeline] 1-3 years

[Priority] Medium

[Status] Continued Action from previous plan that has not been completed yet due to insufficient funding.

WEATHER RADIOS

[Background] Conduct an inventory of weather radios at schools and other critical facilities and provide new radios as needed.

[Benefits] Reduces the risk of death/injury associated with severe weather conditions by communication.

[Responsible Agency & Partners] Ewing Administration (Village Board), and/or Emergency Management Departments

[Cost Estimate & Funding] \$75/radio; Hazard Mitigation Assistance Grant Programs

[Timeline] 1-3 years

[Priority] Medium

[Status] Continued Action from previous plan that has not been completed yet due to insufficient funding.

PUBLIC AWARENESS AND EDUCATION CAMPAIGNS

[Background] Through activities such as outreach projects, distribution of maps and environmental education increase public awareness of natural hazards to both public and private property owners, renters, businesses, and local officials about hazards and ways to protect people and property from these hazards. In addition, educate citizens on erosion control and water conservation methods.

[Benefits] Public awareness reduces the risk of property loss and damage, injury and death. It increases knowledge on emergency procedures, facilities, conservation, and is key to preparedness.

[Responsible Agency & Partners] Ewing Administration (Village Board)

[Cost Estimate & Funding] \$1,000+; Hazard Mitigation Assistance Grant Programs

[Timeline] 1-3 years

[Priority] Medium

[Status] Continued Action from previous plan that requires ongoing action.

TREE CITY U.S.A.

[Background] Work to become a Tree City U.S.A. through the National Arbor Day Foundation to receive direction, technical assistance, and public education on how to establish a hazardous tree identification and removal program to limit potential tree damage and damages caused by trees in a community when a storm event occurs. The four main requirements include: 1) Establish a tree board; 2) Enact a tree care ordinance; 3) Establish a forestry care program; 4) Enact an Arbor Day observance and proclamation.

[Benefits] Better maintained trees and hazardous tree removal will eliminate damages to power lines and personal property during hazards events. Participation in Tree City U.S.A. will support community actions to mitigate damages from trees.

[Responsible Agency & Partners] Ewing Administration (Village Board) and Parks Department

[Cost Estimate & Funding] \$5,000+; Arbor Day Foundation, United States/State Forest Service

[Timeline] 3-5 years

[Priority] Low

[Status] Continued Action from previous plan that requires ongoing action.

STUART

Stuart's main concerns were their existing warning and safety systems. They were also concerned with infrastructure and flooding. These concerns were discussed and used to create most of Mitigation Action Items. Ewing listed similar Mitigation Action Items in the 2010 plan with their priorities being the same.

Section Six [Participant Profiles | Holt County]

PARTICIPATE OR MAINTAIN GOOD STANDING IN THE NATIONAL FLOOD INSURANCE PROGRAM

[Background] Participate in the National Flood Insurance Program (NFIP) or maintain good standing with the NFIP including floodplain management practices/requirements and regulation enforcements and updates.

[Benefits] Enable property owners to purchase insurance protection against flood losses. Good standing enables participants to apply for Pre-Disaster Mitigation Grant Program and Hazard Mitigation Grant Program cost-share.

[Responsible Agency & Partners] Stuart Administration (Village Board)

[Cost Estimate & Funding] \$5,000, Tax Revenue, grants, bequeaths

[Timeline] Continuous

[Priority] High

[Status] Continued Action from previous plan that requires ongoing action.

STORM SHELTER AND SAFE ROOMS

[Background] Assess, design and construct fully supplied safe rooms in highly vulnerable urban and rural areas such as mobile home parks, campgrounds, schools, and other such areas throughout the planning area. Assess the adequacy of current public buildings to be used as safe rooms. Construct safe rooms in areas of greatest need, either as new construction or retrofitting.

[Benefits] Reduce the risk of death or injury in areas vulnerable to tornados, severe thunderstorms and other hazards.

[Responsible Agency & Partners] Stuart Administration (Village Board)

[Cost Estimate & Funding] \$400 to \$500/square foot (stand-alone), \$350 to 400/square foot (addition/retrofit); Hazard Mitigation Assistance Grant Programs

[Timeline] 1-3 years

[Priority] Medium

[Status] Continued Action from previous plan that has not been completed yet due to insufficient funding.

WEATHER RADIOS

[Background] Conduct an inventory of weather radios at schools and other critical facilities and provide new radios as needed.

[Benefits] Reduces the risk of death/injury associated with severe weather conditions by communication.

[Responsible Agency & Partners] Stuart Administration (Village Board), and/or Emergency Management Departments

[Cost Estimate & Funding] \$75/radio; Hazard Mitigation Assistance Grant Programs

[Timeline] 1-3 years

[Priority] Medium

[Status] Continued Action from previous plan that has not been completed yet due to insufficient funding.

CIVIL SERVICE IMPROVEMENTS

[Background] Improve emergency rescue and response equipment and facilities by providing additional, or updating existing emergency response equipment. This could include fire equipment, ATVs, water tanks/truck, snow removal equipment, pumps, etc. This would also include developing backup systems for emergency vehicles, identifying and training additional personnel for emergency response, or continuing educational opportunities for current personnel.

[Benefits] Having appropriate and up to date equipment along with adequately trained and numbered personnel increases safety and reduces the risk of damage.

[Responsible Agency & Partners] Stuart Administration (Village Board), and/or Emergency Management Departments

[Cost Estimate & Funding] \$5,000+; Hazard Mitigation Assistance Grant Programs

[Timeline] 1-3 years

[Priority] Medium

[Status] Continued Action from previous plan that requires ongoing action.

ALERT AND WARNING SIRENS

[Background] Perform an evaluation of existing alert sirens to determine sirens which should be replaced or upgraded.

[Benefits] Reduces the risk of death/injury associated with severe weather; promoting awareness and ensures people take shelter when needed.

[Responsible Agency & Partners] Stuart Administration (Village Board)

[Cost Estimate & Funding] \$25,000+; Hazard Mitigation Assistance Grant Programs, Natural Resources Districts

[Timeline] 4-5 years

[Priority] Medium

[Status] Continued Action from previous plan that has not been completed yet due to insufficient funding.

DRAINAGE ASSESSMENT FOR BRIDGE AND CULVERT IMPROVEMENTS

[Background] Preliminary drainage studies and assessments can be conducted to identify and prioritize design improvements to address site specific localized flooding/drainage issues to reduce and/or alleviate flooding. Stormwater master plans can be conducted to perform a community-wide stormwater evaluation, identifying multiple problem areas and potential drainage improvements.

[Benefits] Proactive steps to identify all potential problems/issues can lead to effectively addressing improvements and prioritizing the projects to improve conditions. These improvements can serve to more effectively convey runoff within jurisdictions, preventing interior localized flooding resulting in damages. This ensures that the most beneficial projects are done first and could possibly eliminate the need for others.

[Responsible Agency & Partners] Stuart Administration (Village Board)

[Cost Estimate & Funding] \$10,000 to \$100,000+; Hazard Mitigation Assistance Grant Programs, Community Development Block Grant, Natural Resources Districts

[Timeline] 1-3 years

Section Six [Participant Profiles | Holt County]

[Priority] Low

[Status] Continued Action from previous plan that requires ongoing action.

STREAM BANK STABILIZATION

[Background] Stream bank/bed degradation can occur along many rivers and creeks. Stabilization improvements including rock rip rap, vegetative cover, j-hooks, boulder vanes, etc. can be implemented to reestablish the channel banks. Grade control structures including sheet-pile weirs, rock weirs, ponds, road dams, etc. can be implemented and improved to maintain the channel bed. Channel stabilization can protect structures, increase conveyance and provide flooding benefits. Flood protection for critical and/or highly vulnerable facilities, areas, populations, and infrastructure is key.

[Benefits] Stream bed/grade stabilization improvements can serve to more effectively protect structures, increase conveyance, prevent down cutting, and provide flooding benefits.

[Responsible Agency & Partners] Stuart Administration (Village Board)

[Cost Estimate & Funding] \$50,000 to \$100,000+; Hazard Mitigation Assistance Grant Programs, Natural Resources Districts

[Timeline] 1-3 years

[Priority] Low

[Status] Continued Action from previous plan that requires ongoing action.

BACKUP GENERATORS

[Background] Provide a portable or stationary source of backup power to redundant power supplies, municipal wells, lift stations, and other critical facilities and shelters.

[Benefits] Reduce the danger to human life/health by keeping utilities operating. Reduce the economic downtime associated with utility loss.

[Responsible Agency & Partners] Stuart Administration (Village Board), and/or Emergency Management Departments

[Cost Estimate & Funding] \$20,000 to \$35,000/generator; Hazard Mitigation Assistance Grant Programs

[Timeline] 1-3 years

[Priority] Low

[Status] Continued Action from previous plan that has not been completed yet due to insufficient funding.

PUBLIC AWARENESS AND EDUCATION CAMPAIGNS

[Background] Through activities such as outreach projects, distribution of maps and environmental education increase public awareness of natural hazards to both public and private property owners, renters, businesses, and local officials about hazards and ways to protect people and property from these hazards. In addition, educate citizens on erosion control and water conservation methods.

[Benefits] Public awareness reduces the risk of property loss and damage, injury and death. It increases knowledge on emergency procedures, facilities, conservation, and is key to preparedness.

[Responsible Agency & Partners] Stuart Administration (Village Board)

[Cost Estimate & Funding] \$1,000+; Hazard Mitigation Assistance Grant Programs

[Timeline] 1-3 years

[Priority] Low

[Status] Continued Action from previous plan that requires ongoing action.

NATIONAL CLIMATIC DATA CENTER [NCDC]

HAZARD EVENT DETAILS

TABLE 6.60: NCDC EVENTS [SEVERE WINTER STORMS] JANUARY 1, 1950 – JANUARY 31, 2016

| Location | County/ Zone | Date | Type | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|-------------|--------------|------------|-------------------------|-----------|--------|----------|-----------------|-------------|
| HOLT (ZONE) | HOLT (ZONE) | 1/17/1996 | Blizzard | | 0 | 0 | 1.00K | 0 |
| HOLT (ZONE) | HOLT (ZONE) | 3/24/1996 | Blizzard | | 0 | 0 | 0 | 0 |
| HOLT (ZONE) | HOLT (ZONE) | 11/14/1996 | Winter Storm | | 0 | 0 | 0 | 0 |
| HOLT (ZONE) | HOLT (ZONE) | 1/4/1997 | Blizzard | | 0 | 0 | 0 | 0 |
| HOLT (ZONE) | HOLT (ZONE) | 2/3/1997 | Winter Storm | | 0 | 0 | 0 | 0 |
| HOLT (ZONE) | HOLT (ZONE) | 4/9/1997 | Winter Storm | | 0 | 0 | 0 | 0 |
| HOLT (ZONE) | HOLT (ZONE) | 10/24/1997 | Winter Storm | | 0 | 0 | 0 | 0 |
| HOLT (ZONE) | HOLT (ZONE) | 1/20/1998 | Winter Storm | | 0 | 0 | 0 | 0 |
| HOLT (ZONE) | HOLT (ZONE) | 2/25/1998 | Winter Storm | | 0 | 0 | 0 | 0 |
| HOLT (ZONE) | HOLT (ZONE) | 3/6/1998 | Winter Storm | | 0 | 0 | 0 | 0 |
| HOLT (ZONE) | HOLT (ZONE) | 3/30/1998 | Winter Storm | | 0 | 0 | 0 | 0 |
| HOLT (ZONE) | HOLT (ZONE) | 11/9/1998 | Winter Storm | | 0 | 0 | 8.00K | 0 |
| HOLT (ZONE) | HOLT (ZONE) | 2/17/1999 | Heavy Snow | | 0 | 0 | 0 | 0 |
| HOLT (ZONE) | HOLT (ZONE) | 2/22/1999 | Winter Storm | | 0 | 0 | 0 | 0 |
| HOLT (ZONE) | HOLT (ZONE) | 11/11/2000 | Heavy Snow | | 0 | 0 | 0 | 0 |
| HOLT (ZONE) | HOLT (ZONE) | 1/13/2001 | Winter Storm | | 0 | 0 | 0 | 0 |
| HOLT (ZONE) | HOLT (ZONE) | 1/29/2001 | Winter Storm | | 0 | 0 | 0 | 0 |
| HOLT (ZONE) | HOLT (ZONE) | 4/11/2001 | Winter Storm | | 0 | 0 | 0 | 0 |
| HOLT (ZONE) | HOLT (ZONE) | 11/26/2001 | Winter Storm | | 0 | 0 | 0 | 0 |
| HOLT (ZONE) | HOLT (ZONE) | 2/9/2002 | Winter Storm | | 0 | 0 | 0 | 0 |
| HOLT (ZONE) | HOLT (ZONE) | 3/14/2002 | Winter Storm | | 0 | 0 | 0 | 0 |
| HOLT (ZONE) | HOLT (ZONE) | 3/18/2002 | Heavy Snow | | 0 | 0 | 0 | 0 |
| HOLT (ZONE) | HOLT (ZONE) | 4/7/2003 | Winter Storm | | 0 | 0 | 0 | 0 |
| HOLT (ZONE) | HOLT (ZONE) | 1/5/2005 | Winter Storm | | 0 | 0 | 0 | 0 |
| HOLT (ZONE) | HOLT (ZONE) | 11/27/2005 | Blizzard | | 0 | 0 | 5.41M | 0 |
| HOLT (ZONE) | HOLT (ZONE) | 3/19/2006 | Winter Storm | | 0 | 0 | 0 | 0 |
| HOLT (ZONE) | HOLT (ZONE) | 12/19/2006 | Winter Storm | | 0 | 0 | 15.00K | 0 |
| HOLT (ZONE) | HOLT (ZONE) | 12/29/2006 | Winter Storm | | 0 | 0 | 30.00K | 0 |
| HOLT (ZONE) | HOLT (ZONE) | 2/24/2007 | Blizzard | | 0 | 0 | 0 | 0 |
| HOLT (ZONE) | HOLT (ZONE) | 3/2/2007 | Blizzard | | 0 | 0 | 0 | 0 |
| HOLT (ZONE) | HOLT (ZONE) | 1/20/2008 | Heavy Snow | | 0 | 0 | 0 | 0 |
| HOLT (ZONE) | HOLT (ZONE) | 4/10/2008 | Winter Storm | | 0 | 0 | 0 | 0 |
| HOLT (ZONE) | HOLT (ZONE) | 4/25/2008 | Winter Storm | | 0 | 0 | 0 | 0 |
| HOLT (ZONE) | HOLT (ZONE) | 12/14/2008 | Extreme Cold/Wind Chill | | 0 | 0 | 0 | 0 |

Section Six [Participant Profiles | Holt County]

| Location | County/ Zone | Date | Type | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|-------------|--------------|------------|-------------------------|-----------|--------|----------|-----------------|-------------|
| HOLT (ZONE) | HOLT (ZONE) | 12/21/2008 | Extreme Cold/Wind Chill | | 0 | 0 | 0 | 0 |
| HOLT (ZONE) | HOLT (ZONE) | 4/4/2009 | Blizzard | | 0 | 0 | 30.00K | 0 |
| HOLT (ZONE) | HOLT (ZONE) | 12/7/2009 | Winter Storm | | 0 | 0 | 0 | 0 |
| HOLT (ZONE) | HOLT (ZONE) | 12/23/2009 | Blizzard | | 0 | 0 | 0 | 0 |
| HOLT (ZONE) | HOLT (ZONE) | 1/6/2010 | Winter Storm | | 0 | 0 | 0 | 0 |
| HOLT (ZONE) | HOLT (ZONE) | 1/7/2010 | Extreme Cold/Wind Chill | | 0 | 0 | 0 | 0 |
| HOLT (ZONE) | HOLT (ZONE) | 12/31/2010 | Winter Storm | | 0 | 0 | 0 | 0 |
| HOLT (ZONE) | HOLT (ZONE) | 1/8/2011 | Heavy Snow | | 0 | 0 | 0 | 0 |
| HOLT (ZONE) | HOLT (ZONE) | 1/31/2011 | Extreme Cold/Wind Chill | | 0 | 0 | 0 | 0 |
| HOLT (ZONE) | HOLT (ZONE) | 2/1/2011 | Extreme Cold/Wind Chill | | 0 | 0 | 0 | 0 |
| HOLT (ZONE) | HOLT (ZONE) | 2/10/2013 | Blizzard | | 0 | 0 | 0 | 0 |
| HOLT (ZONE) | HOLT (ZONE) | 2/20/2013 | Heavy Snow | | 0 | 0 | 0 | 0 |
| HOLT (ZONE) | HOLT (ZONE) | 4/9/2013 | Winter Storm | | 0 | 0 | 50.00K | 0 |
| HOLT (ZONE) | HOLT (ZONE) | 12/5/2013 | Extreme Cold/Wind Chill | | 0 | 0 | 0 | 0 |
| HOLT (ZONE) | HOLT (ZONE) | 1/5/2014 | Extreme Cold/Wind Chill | | 0 | 0 | 0 | 0 |
| HOLT (ZONE) | HOLT (ZONE) | 12/14/2014 | Winter Storm | | 0 | 0 | 0 | 0 |
| Totals [50] | | | | | 0 | 0 | 5.544M | 0.00K |
| | | | | | | | 5.544M | |

TABLE 6.61: NCDC EVENTS [SEVERE THUNDERSTORMS] JANUARY 1, 1950 – JANUARY 31, 2016

| Location | County/ Zone | Date | Type | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|----------|--------------|-----------|-------------------|-----------|--------|----------|-----------------|-------------|
| | HOLT CO. | 7/8/1958 | Hail | 2.5 in. | 0 | 0 | 0 | 0 |
| | HOLT CO. | 7/8/1958 | Hail | 2.5 in. | 0 | 0 | 0 | 0 |
| | HOLT CO. | 8/28/1959 | Thunderstorm Wind | 70 tks. | 0 | 0 | 0 | 0 |
| | HOLT CO. | 9/20/1959 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| | HOLT CO. | 6/15/1960 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| | HOLT CO. | 7/18/1961 | Hail | 4 in. | 0 | 0 | 0 | 0 |
| | HOLT CO. | 7/17/1971 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| | HOLT CO. | 5/22/1972 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| | HOLT CO. | 7/1/1973 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| | HOLT CO. | 7/6/1977 | Hail | 3 in. | 0 | 0 | 0 | 0 |
| | HOLT CO. | 9/8/1977 | Thunderstorm Wind | 52 tks. | 0 | 0 | 0 | 0 |
| | HOLT CO. | 6/21/1978 | Hail | 2 in. | 0 | 0 | 0 | 0 |
| | HOLT CO. | 6/21/1978 | Thunderstorm Wind | 70 tks. | 0 | 0 | 0 | 0 |
| | HOLT CO. | 8/14/1978 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| | HOLT CO. | 7/14/1979 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |

Section Six [Participant Profiles | Holt County]

| Location | County/ Zone | Date | Type | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|----------|--------------|-----------|-------------------|-----------|--------|----------|-----------------|-------------|
| | HOLT CO. | 7/29/1979 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| | HOLT CO. | 5/26/1980 | Hail | 2 in. | 0 | 0 | 0 | 0 |
| | HOLT CO. | 5/29/1980 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| | HOLT CO. | 6/14/1980 | Hail | 1.5 in. | 0 | 0 | 0 | 0 |
| | HOLT CO. | 6/14/1980 | Thunderstorm Wind | 70 tks. | 0 | 0 | 0 | 0 |
| | HOLT CO. | 6/18/1980 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| | HOLT CO. | 6/30/1980 | Thunderstorm Wind | 65 tks. | 0 | 0 | 0 | 0 |
| | HOLT CO. | 6/30/1980 | Thunderstorm Wind | 65 tks. | 0 | 0 | 0 | 0 |
| | HOLT CO. | 7/15/1980 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| | HOLT CO. | 8/1/1981 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| | HOLT CO. | 4/14/1982 | Hail | 1.5 in. | 0 | 0 | 0 | 0 |
| | HOLT CO. | 5/9/1982 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| | HOLT CO. | 8/31/1982 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| | HOLT CO. | 9/9/1982 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| | HOLT CO. | 9/9/1982 | Hail | 4 in. | 0 | 0 | 0 | 0 |
| | HOLT CO. | 9/9/1982 | Hail | 1.5 in. | 0 | 0 | 0 | 0 |
| | HOLT CO. | 9/9/1982 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| | HOLT CO. | 9/9/1982 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| | HOLT CO. | 9/9/1982 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| | HOLT CO. | 10/5/1982 | Hail | 1.25 in. | 0 | 0 | 0 | 0 |
| | HOLT CO. | 10/5/1982 | Hail | 1.25 in. | 0 | 0 | 0 | 0 |
| | HOLT CO. | 6/5/1984 | Hail | 1.5 in. | 0 | 0 | 0 | 0 |
| | HOLT CO. | 6/5/1984 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| | HOLT CO. | 6/24/1984 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| | HOLT CO. | 7/5/1984 | Hail | 2.75 in. | 0 | 0 | 0 | 0 |
| | HOLT CO. | 7/5/1984 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| | HOLT CO. | 7/19/1984 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| | HOLT CO. | 9/16/1985 | Thunderstorm Wind | 74 tks. | 0 | 0 | 0 | 0 |
| | HOLT CO. | 4/26/1986 | Hail | 2 in. | 0 | 0 | 0 | 0 |
| | HOLT CO. | 4/26/1986 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| | HOLT CO. | 6/29/1986 | Thunderstorm Wind | 56 tks | 0 | 0 | 0 | 0 |
| | HOLT CO. | 7/18/1986 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| | HOLT CO. | 7/18/1986 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| | HOLT CO. | 7/18/1986 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| | HOLT CO. | 8/6/1986 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| | HOLT CO. | 9/10/1986 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| | HOLT CO. | 8/17/1987 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| | HOLT CO. | 8/3/1988 | Thunderstorm Wind | 50 tks. | 0 | 0 | 0 | 0 |

Section Six [Participant Profiles | Holt County]

| Location | County/ Zone | Date | Type | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|-----------|--------------|-----------|-------------------|-----------|--------|----------|-----------------|-------------|
| | HOLT CO. | 5/21/1989 | Hail | 2.75 in. | 0 | 0 | 0 | 0 |
| | HOLT CO. | 6/28/1989 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| | HOLT CO. | 6/28/1989 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| | HOLT CO. | 6/28/1989 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| | HOLT CO. | 8/20/1989 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| | HOLT CO. | 4/23/1990 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| | HOLT CO. | 6/14/1990 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| | HOLT CO. | 4/12/1991 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| | HOLT CO. | 4/26/1991 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| | HOLT CO. | 5/31/1991 | Hail | 2.75 in. | 0 | 0 | 0 | 0 |
| | HOLT CO. | 6/9/1991 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| | HOLT CO. | 6/9/1991 | Thunderstorm Wind | 52 tks. | 0 | 0 | 0 | 0 |
| | HOLT CO. | 6/16/1992 | Thunderstorm Wind | 53 tks. | 0 | 0 | 0 | 0 |
| | HOLT CO. | 7/18/1992 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| | HOLT CO. | 9/17/1992 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| Atkinson | HOLT CO. | 5/7/1993 | Hail | 1.5 in. | 0 | 0 | 0 | 0 |
| Inman | HOLT CO. | 6/24/1994 | Hail | 1.75 in. | 0 | 0 | 5.00K | 0 |
| Ewing | HOLT CO. | 6/24/1994 | Hail | 0.75 in. | 0 | 0 | 0 | 500.00K |
| Elgin to | HOLT CO. | 6/24/1994 | Hail | 1.75 in. | 0 | 0 | 0 | 500.00K |
| Page | HOLT CO. | 6/24/1994 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| Ewing | HOLT CO. | 6/24/1994 | Hail | 1.75 in. | 0 | 0 | 500.00K | 0 |
| Inman | HOLT CO. | 7/1/1994 | Thunderstorm Wind | 52 tks. | 0 | 0 | 0 | 0 |
| Amelia | HOLT CO. | 7/4/1994 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| Atkinson | HOLT CO. | 8/24/1994 | Thunderstorm Wind | 50 tks. | 0 | 0 | 0 | 0 |
| Swan Lake | HOLT CO. | 8/18/1995 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| | HOLT CO. | 4/25/1996 | High Wind | 53 tks. | 0 | 0 | 100.00K | 0 |
| O NEILL | HOLT CO. | 5/18/1996 | Thunderstorm Wind | 52 tks. | 0 | 0 | 0 | 0 |
| O NEILL | HOLT CO. | 5/24/1996 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 5/31/1996 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| O NEILL | HOLT CO. | 5/31/1996 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| O NEILL | HOLT CO. | 5/31/1996 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 6/19/1996 | Hail | 2 in. | 0 | 0 | 0 | 0 |
| O NEILL | HOLT CO. | 6/19/1996 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| O NEILL | HOLT CO. | 6/19/1996 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| EWING | HOLT CO. | 6/19/1996 | Hail | 1.5 in. | 0 | 0 | 0 | 0 |
| CHAMBERS | HOLT CO. | 6/20/1996 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| CHAMBERS | HOLT CO. | 6/20/1996 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 7/6/1996 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 8/4/1996 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |

Section Six [Participant Profiles | Holt County]

| Location | County/ Zone | Date | Type | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|----------|--------------|------------|-------------------|-----------|--------|----------|-----------------|-------------|
| AMELIA | HOLT CO. | 8/10/1996 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| CHAMBERS | HOLT CO. | 8/10/1996 | Hail | 1.5 in. | 0 | 0 | 0 | 0 |
| CHAMBERS | HOLT CO. | 8/10/1996 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| O NEILL | HOLT CO. | 10/16/1996 | Hail | 1.5 in. | 0 | 0 | 0 | 0 |
| CHAMBERS | HOLT CO. | 10/16/1996 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| O NEILL | HOLT CO. | 5/17/1997 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 6/11/1997 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| CHAMBERS | HOLT CO. | 6/11/1997 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 6/18/1997 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| AMELIA | HOLT CO. | 6/18/1997 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| CHAMBERS | HOLT CO. | 6/18/1997 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| STUART | HOLT CO. | 6/19/1997 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| CHAMBERS | HOLT CO. | 6/19/1997 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| EWING | HOLT CO. | 6/19/1997 | Thunderstorm Wind | 60 tks | 0 | 0 | 0 | 0 |
| STUART | HOLT CO. | 7/22/1997 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 7/22/1997 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 7/24/1997 | Hail | 0.88 in. | 0 | 0 | 2.00K | 0 |
| ATKINSON | HOLT CO. | 7/24/1997 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| STUART | HOLT CO. | 7/24/1997 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 8/13/1997 | Lightning | | 0 | 0 | 0 | 0 |
| O NEILL | HOLT CO. | 8/14/1997 | Hail | 2 in. | 0 | 0 | 1.00M | 500.0K |
| O NEILL | HOLT CO. | 8/14/1997 | Hail | 1.75 in. | 0 | 0 | 0 | 400.00K |
| INMAN | HOLT CO. | 8/14/1997 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| AMELIA | HOLT CO. | 8/29/1997 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| O NEILL | HOLT CO. | 9/8/1997 | Hail | 0.75 in. | 0 | 0 | 0 | 100.00K |
| O NEILL | HOLT CO. | 9/8/1997 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| EWING | HOLT CO. | 9/8/1997 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| STUART | HOLT CO. | 10/8/1997 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| CHAMBERS | HOLT CO. | 5/11/1998 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| EWING | HOLT CO. | 5/11/1998 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| EWING | HOLT CO. | 5/19/1998 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| CHAMBERS | HOLT CO. | 6/11/1998 | Hail | 1.5 in. | 0 | 0 | 0 | 0 |
| CHAMBERS | HOLT CO. | 6/11/1998 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| CHAMBERS | HOLT CO. | 6/17/1998 | Hail | 0.75 in. | 0 | 0 | 5.00K | 0 |
| O NEILL | HOLT CO. | 6/17/1998 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| AMELIA | HOLT CO. | 6/24/1998 | Hail | 2.5 in. | 0 | 0 | 25.00K | 25.00K |
| O NEILL | HOLT CO. | 6/24/1998 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| O NEILL | HOLT CO. | 6/24/1998 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| O NEILL | HOLT CO. | 6/29/1998 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| O NEILL | HOLT CO. | 6/29/1998 | Hail | 2 in. | 0 | 0 | 10.00K | 0 |
| ATKINSON | HOLT CO. | 8/14/1998 | Hail | 1.75 in. | 0 | 0 | 5.00K | 10.00K |

Section Six [Participant Profiles | Holt County]

| Location | County/ Zone | Date | Type | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|-----------|--------------|------------|-------------------|-----------|--------|----------|-----------------|-------------|
| CHAMBERS | HOLT CO. | 8/14/1998 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 8/14/1998 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 10/28/1998 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 10/28/1998 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| EWING | HOLT CO. | 5/3/1999 | Hail | 4.5 in. | 0 | 0 | 15.00K | 0 |
| PAGE | HOLT CO. | 5/3/1999 | Hail | 1.75 in. | 0 | 0 | 3.00K | 0 |
| | | | | | | | | |
| STUART | HOLT CO. | 5/3/1999 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| O NEILL | HOLT CO. | 6/21/1999 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| AMELIA | HOLT CO. | 7/15/1999 | Thunderstorm Wind | 70 kts. | 0 | 0 | 1.00K | 0 |
| PAGE | HOLT CO. | 7/15/1999 | Thunderstorm Wind | 70 kts. | 0 | 0 | 1.00K | 0 |
| ATKINSON | HOLT CO. | 4/26/2000 | Hail | 1.25 in. | 0 | 0 | 0 | 0 |
| O NEILL | HOLT CO. | 4/26/2000 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| O NEILL | HOLT CO. | 4/26/2000 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| SWAN LAKE | HOLT CO. | 7/3/2000 | Thunderstorm Wind | 52 kts. | 0 | 0 | 1.00K | 0 |
| AMELIA | HOLT CO. | 7/5/2000 | Hail | 1.5 in. | 0 | 0 | 5.00K | 15.00K |
| AMELIA | HOLT CO. | 7/19/2000 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| STUART | HOLT CO. | 7/21/2000 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| SWAN LAKE | HOLT CO. | 7/21/2000 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| AMELIA | HOLT CO. | 7/22/2000 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| INMAN | HOLT CO. | 7/22/2000 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| PAGE | HOLT CO. | 8/25/2000 | Hail | 1 in. | 0 | 0 | 0 | 10.00K |
| CHAMBERS | HOLT CO. | 8/25/2000 | Hail | 1 in. | 0 | 0 | 0 | 5.00K |
| CHAMBERS | HOLT CO. | 8/25/2000 | Hail | 1.75 in. | 0 | 0 | 15.00K | 30.00K |
| INMAN | HOLT CO. | 8/25/2000 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| AMELIA | HOLT CO. | 10/31/2000 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| EWING | HOLT CO. | 6/10/2001 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| EWING | HOLT CO. | 6/26/2001 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| STUART | HOLT CO. | 7/1/2001 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| AMELIA | HOLT CO. | 7/2/2001 | Hail | 1.75 in. | 0 | 0 | 10.00K | 0 |
| AMELIA | HOLT CO. | 7/2/2001 | Hail | 4 in. | 0 | 0 | 30.00K | 0 |
| AMELIA | HOLT CO. | 7/2/2001 | Hail | 4.25 in. | 0 | 0 | 35.00K | 0 |
| CHAMBERS | HOLT CO. | 7/2/2001 | Hail | 1 in. | 0 | 0 | 5.00K | 0 |
| EWING | HOLT CO. | 7/2/2001 | Hail | 1 in. | 0 | 0 | 5.00K | 0 |
| INMAN | HOLT CO. | 7/2/2001 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| CHAMBERS | HOLT CO. | 7/2/2001 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| EWING | HOLT CO. | 7/3/2001 | Hail | 1.75 in. | 0 | 0 | 6.00K | 0 |
| STUART | HOLT CO. | 7/16/2001 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 7/16/2001 | Hail | 1.75 in. | 0 | 0 | 15.00K | 5.00K |
| O NEILL | HOLT CO. | 7/16/2001 | Hail | 1.75 in. | 0 | 0 | 24.00K | 6.00K |

Section Six [Participant Profiles | Holt County]

| Location | County/ Zone | Date | Type | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|--------------|--------------|------------|-------------------|-----------|--------|----------|-----------------|-------------|
| O NEILL | HOLT CO. | 7/16/2001 | Hail | 1.75 in. | 0 | 0 | 15.00K | 240.00K |
| O NEILL | HOLT CO. | 7/16/2001 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| PAGE | HOLT CO. | 7/16/2001 | Hail | 1.75 in. | 0 | 0 | 16.00K | 35.00K |
| EWING | HOLT CO. | 7/16/2001 | Hail | 1.75 in. | 0 | 0 | 6.00K | 5.00K |
| EWING | HOLT CO. | 7/16/2001 | Hail | 1.75 in. | 0 | 0 | 6.00K | 5.00K |
| EWING | HOLT CO. | 7/16/2001 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| O NEILL | HOLT CO. | 7/16/2001 | Thunderstorm Wind | 52 kts. | 0 | 0 | 0 | 0 |
| EWING | HOLT CO. | 7/16/2001 | Thunderstorm Wind | 62 kts. | 0 | 0 | 35.00K | 0 |
| AMELIA | HOLT CO. | 7/17/2001 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| CHAMBERS | HOLT CO. | 7/17/2001 | Hail | 1.75 in. | 0 | 0 | 6.00K | 0 |
| AMELIA | HOLT CO. | 7/22/2001 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| CHAMBERS | HOLT CO. | 7/22/2001 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| AMELIA | HOLT CO. | 7/29/2001 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| STUART | HOLT CO. | 7/31/2001 | Thunderstorm Wind | 52 kts. | 0 | 0 | 0 | 0 |
| O NEILL | HOLT CO. | 7/31/2001 | Thunderstorm Wind | 52 kts. | 0 | 0 | 0 | 0 |
| AMELIA | HOLT CO. | 8/2/2001 | Thunderstorm Wind | 50 kts. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 8/29/2001 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| O NEILL ARPT | HOLT CO. | 9/6/2001 | Thunderstorm Wind | 55 kts. | 0 | 0 | 0 | 0 |
| AMELIA | HOLT CO. | 9/7/2001 | Thunderstorm Wind | 52 kts. | 0 | 0 | 2.00K | 0 |
| AMELIA | HOLT CO. | 10/9/2001 | Hail | 1 in. | 0 | 0 | 1.00K | 0 |
| CHAMBERS | HOLT CO. | 10/9/2001 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| | HOLT CO. | 10/23/2001 | High Wind | 52 kts. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 5/5/2002 | Hail | 2 in. | 0 | 0 | 10.00K | 8.00K |
| O NEILL | HOLT CO. | 5/5/2002 | Hail | 1.75 in. | 0 | 0 | 15.00K | 5.00K |
| AMELIA | HOLT CO. | 5/5/2002 | Hail | 1 in. | 0 | 0 | 5.00K | 0 |
| O NEILL | HOLT CO. | 5/26/2002 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| STUART | HOLT CO. | 6/7/2002 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 6/7/2002 | Hail | 1 in. | 0 | 0 | 4.00K | 0 |
| CHAMBERS | HOLT CO. | 6/7/2002 | Hail | 1.75 in. | 0 | 0 | 8.00K | 10.00K |
| EWING | HOLT CO. | 6/7/2002 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| INMAN | HOLT CO. | 6/7/2002 | Hail | 1 in. | 0 | 0 | 4.00K | 8.00K |
| AMELIA | HOLT CO. | 6/19/2002 | Hail | 1 in. | 0 | 0 | 4.00K | 0 |
| EWING | HOLT CO. | 6/19/2002 | Hail | 1.5 in. | 0 | 0 | 8.00K | 10.00K |
| EWING | HOLT CO. | 6/25/2002 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| STUART | HOLT CO. | 7/9/2002 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 7/9/2002 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| O NEILL | HOLT CO. | 7/9/2002 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| O NEILL | HOLT CO. | 7/24/2002 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |

Section Six [Participant Profiles | Holt County]

| Location | County/ Zone | Date | Type | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|----------|--------------|-----------|-------------------|-----------|--------|----------|-----------------|-------------|
| INMAN | HOLT CO. | 7/24/2002 | Hail | 1 in. | 0 | 0 | 0 | 2.00K |
| O NEILL | HOLT CO. | 7/24/2002 | Hail | 1.75 in. | 0 | 0 | 0 | 2.00K |
| CHAMBERS | HOLT CO. | 7/24/2002 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 7/30/2002 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 7/30/2002 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| O NEILL | HOLT CO. | 7/30/2002 | Hail | 1.75 in. | 0 | 0 | 0 | 2.00K |
| INMAN | HOLT CO. | 7/30/2002 | Hail | 1.75 in. | 0 | 0 | 0 | 2.00K |
| O NEILL | HOLT CO. | 7/30/2002 | Hail | 1.25 in. | 0 | 0 | 0 | 2.00K |
| EWING | HOLT CO. | 7/30/2002 | Hail | 1 in. | 0 | 0 | 0 | 2.00K |
| EWING | HOLT CO. | 7/30/2002 | Hail | 1.75 in. | 0 | 0 | 5.00K | 5.00K |
| O NEILL | HOLT CO. | 7/30/2002 | Thunderstorm Wind | 52 kts. | 0 | 0 | 0 | 0 |
| O NEILL | HOLT CO. | 8/9/2002 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| AMELIA | HOLT CO. | 8/9/2002 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| O NEILL | HOLT CO. | 8/9/2002 | Thunderstorm Wind | 50 kts. | 0 | 0 | 1.00K | 1.00K |
| ATKINSON | HOLT CO. | 8/9/2002 | Thunderstorm Wind | 50 kts. | 0 | 0 | 15.00K | 10.00K |
| AMELIA | HOLT CO. | 8/16/2002 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| CHAMBERS | HOLT CO. | 8/16/2002 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| AMELIA | HOLT CO. | 8/16/2002 | Thunderstorm Wind | 52 kts. | 0 | 0 | 1.00K | 1.00K |
| AMELIA | HOLT CO. | 8/24/2002 | Thunderstorm Wind | 55 kts. | 0 | 0 | 8.00K | 8.00K |
| EWING | HOLT CO. | 8/24/2002 | Thunderstorm Wind | 52 kts. | 0 | 0 | 3.00K | 5.00K |
| O NEILL | HOLT CO. | 8/26/2002 | Hail | 1 in. | 0 | 0 | 12.00K | 1.00K |
| INMAN | HOLT CO. | 8/26/2002 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| CHAMBERS | HOLT CO. | 4/15/2003 | Hail | 1 in. | 0 | 0 | 3.00K | 0 |
| ATKINSON | HOLT CO. | 5/13/2003 | Hail | 1.5 in. | 0 | 0 | 3.00K | 0 |
| O NEILL | HOLT CO. | 5/13/2003 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| O NEILL | HOLT CO. | 5/13/2003 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| O NEILL | HOLT CO. | 6/23/2003 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| EMMET | HOLT CO. | 6/23/2003 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 6/23/2003 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| O NEILL | HOLT CO. | 6/23/2003 | Hail | 1.75 in. | 0 | 0 | 6.00K | 15.00K |
| INMAN | HOLT CO. | 6/23/2003 | Hail | 1.75 in. | 0 | 0 | 5.00K | 10.00K |
| O NEILL | HOLT CO. | 6/23/2003 | Hail | 3 in. | 0 | 0 | 20.00K | 30.00K |
| O NEILL | HOLT CO. | 6/23/2003 | Hail | 1.75 in. | 0 | 0 | 15.00K | 25.00K |
| PAGE | HOLT CO. | 6/23/2003 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| O NEILL | HOLT CO. | 6/23/2003 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 6/23/2003 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| INMAN | HOLT CO. | 6/23/2003 | Thunderstorm Wind | 52 kts. | 0 | 0 | 2.00K | 5.00K |
| O NEILL | HOLT CO. | 6/23/2003 | Lightning | | 0 | 0 | 10.00K | 0 |

Section Six [Participant Profiles | Holt County]

| Location | County/ Zone | Date | Type | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|--------------|--------------|-----------|-------------------|-----------|--------|----------|-----------------|-------------|
| EMMET | HOLT CO. | 6/24/2003 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| SWAN LAKE | HOLT CO. | 6/24/2003 | Thunderstorm Wind | 52 kts. | 0 | 0 | 0 | 0 |
| AMELIA | HOLT CO. | 6/24/2003 | Thunderstorm Wind | 52 kts. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 6/24/2003 | Thunderstorm Wind | 65 kts. | 0 | 0 | 7.00K | 0 |
| O NEILL | HOLT CO. | 6/24/2003 | Thunderstorm Wind | 56 kts. | 0 | 0 | 0 | 0 |
| O NEILL | HOLT CO. | 7/5/2003 | Hail | 1.25 in. | 0 | 0 | 3.00K | 5.00K |
| ATKINSON | HOLT CO. | 7/5/2003 | Hail | 1.25 in. | 0 | 0 | 3.00K | 0 |
| AMELIA | HOLT CO. | 7/5/2003 | Hail | 1.25 in. | 0 | 0 | 1.00K | 0 |
| INMAN | HOLT CO. | 7/8/2003 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 7/31/2003 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 4/18/2004 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| O NEILL | HOLT CO. | 4/18/2004 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| STUART | HOLT CO. | 4/20/2004 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 4/20/2004 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 4/20/2004 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 5/9/2004 | Hail | 1 in. | 0 | 0 | 1.00K | 0 |
| SWAN LAKE | HOLT CO. | 5/9/2004 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| O NEILL | HOLT CO. | 5/9/2004 | Hail | 1 in. | 0 | 0 | 20.00K | 0 |
| SWAN LAKE | HOLT CO. | 5/16/2004 | Hail | 1.5 in. | 0 | 0 | 8.00K | 0 |
| AMELIA | HOLT CO. | 5/16/2004 | Hail | 1.25 in. | 0 | 0 | 1.00K | 0 |
| ATKINSON | HOLT CO. | 5/29/2004 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| O NEILL | HOLT CO. | 5/29/2004 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| O NEILL ARPT | HOLT CO. | 5/30/2004 | Thunderstorm Wind | 53 kts. | 0 | 0 | 0 | 0 |
| O NEILL | HOLT CO. | 6/10/2004 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| O NEILL | HOLT CO. | 6/10/2004 | Thunderstorm Wind | 50 kts. | 0 | 0 | 12.00K | 0 |
| ATKINSON | HOLT CO. | 7/3/2004 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| O NEILL | HOLT CO. | 7/12/2004 | Hail | 1.75 in. | 0 | 0 | 20.00K | 0 |
| CHAMBERS | HOLT CO. | 7/12/2004 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| AMELIA | HOLT CO. | 7/14/2004 | Hail | 1.25 in. | 0 | 0 | 2.00K | 0 |
| O NEILL | HOLT CO. | 7/15/2004 | Hail | 1.25 in. | 0 | 0 | 2.00K | 5.00K |
| CHAMBERS | HOLT CO. | 7/21/2004 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 8/1/2004 | Thunderstorm Wind | 52 kts. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 8/8/2004 | Thunderstorm Wind | 52 kts. | 0 | 0 | 0 | 0 |
| AMELIA | HOLT CO. | 3/29/2005 | Hail | 1.25 in. | 0 | 0 | 3.00K | 0 |
| CHAMBERS | HOLT CO. | 3/29/2005 | Hail | 1.25 in. | 0 | 0 | 3.00K | 0 |
| AMELIA | HOLT CO. | 3/29/2005 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 5/7/2005 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |

Section Six [Participant Profiles | Holt County]

| Location | County/ Zone | Date | Type | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|----------|--------------|-----------|-------------------|-----------|--------|----------|-----------------|-------------|
| EWING | HOLT CO. | 5/10/2005 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 6/4/2005 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| O NEILL | HOLT CO. | 6/4/2005 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 6/4/2005 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| O NEILL | HOLT CO. | 6/4/2005 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| O NEILL | HOLT CO. | 6/4/2005 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| O NEILL | HOLT CO. | 6/4/2005 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| O NEILL | HOLT CO. | 6/21/2005 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| O NEILL | HOLT CO. | 6/21/2005 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| EWING | HOLT CO. | 6/21/2005 | Thunderstorm Wind | 52 kts. | 0 | 0 | 0 | 0 |
| O NEILL | HOLT CO. | 6/27/2005 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| AMELIA | HOLT CO. | 7/5/2005 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| AMELIA | HOLT CO. | 7/5/2005 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| INMAN | HOLT CO. | 7/5/2005 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 7/20/2005 | Thunderstorm Wind | 62 kts. | 0 | 0 | 0 | 0 |
| STUART | HOLT CO. | 7/28/2005 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| O NEILL | HOLT CO. | 7/28/2005 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| EWING | HOLT CO. | 8/9/2005 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| PAGE | HOLT CO. | 9/12/2005 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| STUART | HOLT CO. | 9/17/2005 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 9/18/2005 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| CHAMBERS | HOLT CO. | 9/18/2005 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| CHAMBERS | HOLT CO. | 9/18/2005 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| INMAN | HOLT CO. | 9/24/2005 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| STUART | HOLT CO. | 4/6/2006 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| O NEILL | HOLT CO. | 4/6/2006 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| O NEILL | HOLT CO. | 4/27/2006 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 5/7/2006 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| O NEILL | HOLT CO. | 6/3/2006 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| PAGE | HOLT CO. | 6/3/2006 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| PAGE | HOLT CO. | 6/16/2006 | Thunderstorm Wind | 61 kts. | 0 | 0 | 40.00K | 10.00K |
| CHAMBERS | HOLT CO. | 7/13/2006 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| CHAMBERS | HOLT CO. | 7/13/2006 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| O NEILL | HOLT CO. | 7/13/2006 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| O NEILL | HOLT CO. | 7/13/2006 | Hail | 1.75 in. | 0 | 0 | 9.00K | 0 |
| O NEILL | HOLT CO. | 8/10/2006 | Hail | 2 in. | 0 | 0 | 8.00K | 18.00K |
| AMELIA | HOLT CO. | 5/4/2007 | Hail | 1.75 in. | 0 | 0 | 3.00K | 0 |
| ATKINSON | HOLT CO. | 5/4/2007 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| O NEILL | HOLT CO. | 5/4/2007 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| O NEILL | HOLT CO. | 5/4/2007 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |

Section Six [Participant Profiles | Holt County]

| Location | County/ Zone | Date | Type | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|-------------------|--------------|-----------|-------------------|-----------|--------|----------|-----------------|-------------|
| O NEILL | HOLT CO. | 5/4/2007 | Hail | 1.25 in. | 0 | 0 | 0 | 0 |
| CHAMBERS | HOLT CO. | 5/5/2007 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| CHAMBERS | HOLT CO. | 5/5/2007 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| AMELIA | HOLT CO. | 6/6/2007 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 6/6/2007 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| STUART | HOLT CO. | 7/5/2007 | Thunderstorm Wind | 52 kts. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 7/5/2007 | Thunderstorm Wind | 52 kts. | 0 | 0 | 0 | 0 |
| AMELIA | HOLT CO. | 7/15/2007 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| AMELIA | HOLT CO. | 7/15/2007 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| AMELIA | HOLT CO. | 7/15/2007 | Hail | 1.5 in. | 0 | 0 | 10.00K | 0 |
| CHAMBERS | HOLT CO. | 7/15/2007 | Hail | 1.5 in. | 0 | 0 | 5.00K | 0 |
| EWING | HOLT CO. | 7/15/2007 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| O NEILL | HOLT CO. | 7/15/2007 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 8/9/2007 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| EMMET | HOLT CO. | 8/9/2007 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 8/9/2007 | Hail | 1.75 in. | 0 | 0 | 20.00K | 25.00K |
| EMMET | HOLT CO. | 8/9/2007 | Hail | 1.75 in. | 0 | 0 | 55.00K | 0 |
| STUART | HOLT CO. | 8/9/2007 | Hail | 1.75 in. | 0 | 0 | 8.00K | 25.00K |
| O NEILL | HOLT CO. | 8/9/2007 | Hail | 1.75 in. | 0 | 0 | 100.00K | 0 |
| ATKINSON | HOLT CO. | 8/9/2007 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| CHAMBERS | HOLT CO. | 8/9/2007 | Thunderstorm Wind | 61 kts. | 0 | 0 | 0 | 0 |
| STUART | HOLT CO. | 8/9/2007 | Thunderstorm Wind | 52 kts. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 8/10/2007 | Thunderstorm Wind | 52 kts. | 0 | 0 | 5.00K | 0 |
| CHAMBERS | HOLT CO. | 8/12/2007 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| O NEILL | HOLT CO. | 8/21/2007 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| CHAMBERS | HOLT CO. | 8/21/2007 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| CHAMBERS | HOLT CO. | 8/21/2007 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| O NEILL | HOLT CO. | 10/5/2007 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| SWAN LAKE | HOLT CO. | 5/6/2008 | Hail | 1 in. | 0 | 0 | 1.00K | 0 |
| SWAN LAKE | HOLT CO. | 5/6/2008 | Hail | 1.25 in. | 0 | 0 | 1.00K | 0 |
| (ONL)O NEILL ARPT | HOLT CO. | 5/29/2008 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| O NEILL | HOLT CO. | 5/29/2008 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| (ONL)O NEILL ARPT | HOLT CO. | 6/5/2008 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| O NEILL | HOLT CO. | 6/17/2008 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| O NEILL | HOLT CO. | 6/17/2008 | Hail | 1.25 in. | 0 | 0 | 0 | 0 |
| O NEILL | HOLT CO. | 6/17/2008 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 6/17/2008 | Hail | 1.75 in. | 0 | 0 | 2.00K | 0 |
| STUART | HOLT CO. | 6/17/2008 | Hail | 1.75 in. | 0 | 0 | 40.00K | 15.00K |

Section Six [Participant Profiles I Holt County]

| Location | County/ Zone | Date | Type | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|-------------------|--------------|-----------|-------------------|-----------|--------|----------|-----------------|-------------|
| STUART | HOLT CO. | 6/17/2008 | Hail | 1.75 in. | 0 | 0 | 75.00K | 13.00K |
| STUART | HOLT CO. | 6/17/2008 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 6/17/2008 | Hail | 1.75 in. | 0 | 0 | 5.00K | 10.00K |
| ATKINSON | HOLT CO. | 6/17/2008 | Hail | 3 in. | 0 | 0 | 100.00K | 15.00K |
| O NEILL | HOLT CO. | 6/17/2008 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| STUART | HOLT CO. | 6/17/2008 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 6/17/2008 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| STUART | HOLT CO. | 6/17/2008 | Hail | 1.75 in. | 0 | 0 | 25.00K | 20.00K |
| STUART | HOLT CO. | 6/17/2008 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| STUART | HOLT CO. | 6/17/2008 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| STUART | HOLT CO. | 6/17/2008 | Hail | 1.5 in. | 0 | 0 | 0 | 0 |
| STUART | HOLT CO. | 6/17/2008 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 6/17/2008 | Hail | 1.75 in. | 0 | 0 | 1.50K | 0 |
| STUART | HOLT CO. | 6/17/2008 | Thunderstorm Wind | 52 kts. | 0 | 0 | 5.00K | 0 |
| PAGE | HOLT CO. | 6/21/2008 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| PAGE | HOLT CO. | 6/21/2008 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| PAGE | HOLT CO. | 6/21/2008 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| EMMET | HOLT CO. | 7/15/2008 | Hail | 1.25 in. | 0 | 0 | 0 | 0 |
| (ONL)O NEILL ARPT | HOLT CO. | 7/15/2008 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| (ONL)O NEILL ARPT | HOLT CO. | 7/15/2008 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| CHAMBERS | HOLT CO. | 7/15/2008 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| CHAMBERS | HOLT CO. | 7/15/2008 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| CHAMBERS | HOLT CO. | 7/15/2008 | Hail | 1.25 in. | 0 | 0 | 0 | 0 |
| CHAMBERS | HOLT CO. | 7/15/2008 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| CHAMBERS | HOLT CO. | 7/15/2008 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| CHAMBERS | HOLT CO. | 7/15/2008 | Hail | 1.25 in. | 0 | 0 | 0 | 0 |
| CHAMBERS | HOLT CO. | 7/15/2008 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| CHAMBERS | HOLT CO. | 9/24/2008 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| EMMET | HOLT CO. | 9/28/2008 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 9/28/2008 | Thunderstorm Wind | 52 kts. | 0 | 0 | 0 | 0 |
| CHAMBERS | HOLT CO. | 3/23/2009 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| (ONL)O NEILL ARPT | HOLT CO. | 3/23/2009 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| SWAN LAKE | HOLT CO. | 6/17/2009 | Hail | 1.25 in. | 0 | 0 | 5.00K | 0 |
| EMMET | HOLT CO. | 6/18/2009 | Thunderstorm Wind | 61 kts. | 0 | 0 | 35.00K | 25.00K |
| STUART | HOLT CO. | 6/24/2009 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 6/24/2009 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| STUART | HOLT CO. | 6/24/2009 | Thunderstorm Wind | 52 kts. | 0 | 0 | 3.00K | 0 |

Section Six [Participant Profiles | Holt County]

| Location | County/ Zone | Date | Type | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|-------------------|--------------|-----------|-------------------|-----------|--------|----------|-----------------|-------------|
| STUART | HOLT CO. | 6/24/2009 | Thunderstorm Wind | 61 kts. | 0 | 0 | 10.00K | 10.00K |
| STUART | HOLT CO. | 6/24/2009 | Thunderstorm Wind | 52 kts. | 0 | 0 | 0 | 0 |
| CHAMBERS | HOLT CO. | 6/25/2009 | Hail | 1 in. | 0 | 0 | 12.00K | 0 |
| SWAN LAKE | HOLT CO. | 6/26/2009 | Thunderstorm Wind | 52 kts. | 0 | 0 | 0 | 0 |
| O NEILL | HOLT CO. | 6/26/2009 | Thunderstorm Wind | 52 kts. | 0 | 0 | 2.00K | 0 |
| STUART | HOLT CO. | 7/20/2009 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 7/23/2009 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| AMELIA | HOLT CO. | 7/31/2009 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| STUART | HOLT CO. | 8/8/2009 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| STUART | HOLT CO. | 8/8/2009 | Hail | 2.75 in. | 0 | 0 | 0 | 0 |
| SWAN LAKE | HOLT CO. | 8/15/2009 | Thunderstorm Wind | 60 kts. | 0 | 0 | 0 | 0 |
| STUART | HOLT CO. | 9/2/2009 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 6/10/2010 | Thunderstorm Wind | 52 kts. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 6/10/2010 | Thunderstorm Wind | 52 kts. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 6/11/2010 | Thunderstorm Wind | 52 kts. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 6/11/2010 | Thunderstorm Wind | 60 kts. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 6/22/2010 | Thunderstorm Wind | 61 kts. | 0 | 0 | 20.00K | 0 |
| EWING | HOLT CO. | 6/26/2010 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| PAGE | HOLT CO. | 6/26/2010 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 7/11/2010 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| AMELIA | HOLT CO. | 7/11/2010 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| STUART | HOLT CO. | 7/11/2010 | Thunderstorm Wind | 52 kts. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 7/17/2010 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| (ONL)O NEILL ARPT | HOLT CO. | 7/17/2010 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| STUART | HOLT CO. | 8/8/2010 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| STUART | HOLT CO. | 8/8/2010 | Hail | 2 in. | 0 | 0 | 5.00K | 0 |
| ATKINSON | HOLT CO. | 8/8/2010 | Hail | 1.5 in. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 8/8/2010 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 8/8/2010 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 8/8/2010 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| STUART | HOLT CO. | 8/8/2010 | Thunderstorm Wind | 52 kts. | 0 | 0 | 0 | 0 |
| STUART | HOLT CO. | 8/8/2010 | Thunderstorm Wind | 52 kts. | 0 | 0 | 40.00K | 0 |
| STUART | HOLT CO. | 8/8/2010 | Thunderstorm Wind | 52 kts. | 0 | 0 | 2.00K | 0 |

Section Six [Participant Profiles | Holt County]

| Location | County/ Zone | Date | Type | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|-------------------|--------------|------------|-------------------|-----------|--------|----------|-----------------|-------------|
| STUART | HOLT CO. | 8/8/2010 | Thunderstorm Wind | 61 kts. | 0 | 0 | 60.00K | 50.00K |
| ATKINSON | HOLT CO. | 8/8/2010 | Thunderstorm Wind | 56 kts. | 0 | 0 | 120.00K | 0 |
| ATKINSON | HOLT CO. | 8/8/2010 | Thunderstorm Wind | 61 kts. | 0 | 0 | 0 | 0 |
| EMMET | HOLT CO. | 8/8/2010 | Thunderstorm Wind | 61 kts. | 0 | 0 | 0 | 0 |
| (ONL)O NEILL ARPT | HOLT CO. | 8/8/2010 | Thunderstorm Wind | 61 kts. | 0 | 0 | 0 | 0 |
| (ONL)O NEILL ARPT | HOLT CO. | 8/8/2010 | Thunderstorm Wind | 52 kts. | 0 | 0 | 0 | 0 |
| EMMET | HOLT CO. | 8/16/2010 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| STUART | HOLT CO. | 8/16/2010 | Thunderstorm Wind | 61 kts. | 0 | 0 | 0 | 0 |
| STUART | HOLT CO. | 8/16/2010 | Thunderstorm Wind | 65 kts. | 0 | 0 | 10.00K | 0 |
| ATKINSON | HOLT CO. | 8/16/2010 | Thunderstorm Wind | 70 kts. | 0 | 0 | 0 | 0 |
| (ONL)O NEILL ARPT | HOLT CO. | 8/16/2010 | Thunderstorm Wind | 65 kts. | 0 | 0 | 0 | 0 |
| (ONL)O NEILL ARPT | HOLT CO. | 8/16/2010 | Thunderstorm Wind | 59 kts. | 0 | 0 | 0 | 0 |
| EWING | HOLT CO. | 8/16/2010 | Thunderstorm Wind | 70 kts. | 0 | 0 | 0 | 0 |
| SWAN LAKE | HOLT CO. | 8/19/2010 | Thunderstorm Wind | 52 kts. | 0 | 0 | 0 | 0 |
| AMELIA | HOLT CO. | 8/19/2010 | Thunderstorm Wind | 52 kts. | 0 | 0 | 0 | 0 |
| (ONL)O NEILL ARPT | HOLT CO. | 8/30/2010 | Thunderstorm Wind | 52 kts. | 0 | 0 | 0 | 0 |
| CHAMBERS | HOLT CO. | 8/30/2010 | Thunderstorm Wind | 61 ks. | 0 | 0 | 0 | 0 |
| (ONL)O NEILL ARPT | HOLT CO. | 9/2/2010 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| SWAN LAKE | HOLT CO. | 9/22/2010 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| STUART | HOLT CO. | 9/22/2010 | Hail | 1.25 in. | 0 | 0 | 0 | 0 |
| INMAN | HOLT CO. | 9/22/2010 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 9/22/2010 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| INMAN | HOLT CO. | 9/22/2010 | Hail | 2.5 in. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 9/22/2010 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| (ONL)O NEILL ARPT | HOLT CO. | 9/22/2010 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| PAGE | HOLT CO. | 9/22/2010 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| SWAN LAKE | HOLT CO. | 10/23/2010 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| SWAN LAKE | HOLT CO. | 10/23/2010 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| SWAN LAKE | HOLT CO. | 10/23/2010 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| SWAN LAKE | HOLT CO. | 10/23/2010 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| CHAMBERS | HOLT CO. | 5/29/2011 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| CHAMBERS | HOLT CO. | 5/29/2011 | Hail | 1.25 in. | 0 | 0 | 0 | 0 |

Section Six [Participant Profiles | Holt County]

| Location | County/ Zone | Date | Type | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|-------------------|--------------|-----------|-------------------|-----------|--------|----------|-----------------|-------------|
| PAGE | HOLT CO. | 5/29/2011 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| (ONL)O NEILL ARPT | HOLT CO. | 5/29/2011 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 5/30/2011 | Hail | 2.75 in. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 5/30/2011 | Hail | 4 in. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 5/30/2011 | Hail | 2.75 in. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 5/30/2011 | Hail | 2.75 in. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 5/30/2011 | Hail | 2.75 in. | 0 | 0 | 0 | 0 |
| STUART | HOLT CO. | 5/30/2011 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 5/30/2011 | Hail | 2 in. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 5/30/2011 | Hail | 4 in. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 5/30/2011 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 5/30/2011 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| EMMET | HOLT CO. | 5/30/2011 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| EMMET | HOLT CO. | 5/30/2011 | Thunderstorm Wind | 70 kts. | 0 | 0 | 100.00M | 0 |
| AMELIA | HOLT CO. | 6/14/2011 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| CHAMBERS | HOLT CO. | 6/14/2011 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| STUART | HOLT CO. | 6/19/2011 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| STUART | HOLT CO. | 6/19/2011 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| STUART | HOLT CO. | 6/19/2011 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| SWAN LAKE | HOLT CO. | 6/26/2011 | Hail | 2.75 in. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 6/26/2011 | Thunderstorm Wind | 61 kts. | 0 | 0 | 0 | 0 |
| (ONL)O NEILL ARPT | HOLT CO. | 6/26/2011 | Thunderstorm Wind | 61 kts. | 0 | 0 | 0 | 0 |
| (ONL)O NEILL ARPT | HOLT CO. | 7/10/2011 | Thunderstorm Wind | 52 kts. | 0 | 0 | 0 | 0 |
| (ONL)O NEILL ARPT | HOLT CO. | 7/10/2011 | Thunderstorm Wind | 52 kts. | 0 | 0 | 15.00K | 0 |
| ATKINSON | HOLT CO. | 8/7/2011 | Thunderstorm Wind | 52 kts. | 0 | 0 | 0 | 0 |
| (ONL)O NEILL ARPT | HOLT CO. | 8/7/2011 | Thunderstorm Wind | 50 kts. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 8/7/2011 | Thunderstorm Wind | 61 kts. | 0 | 0 | 0 | 0 |
| (ONL)O NEILL ARPT | HOLT CO. | 8/14/2011 | Thunderstorm Wind | 52 kts. | 0 | 0 | 2.00K | 0 |
| INMAN | HOLT CO. | 8/18/2011 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| EWING | HOLT CO. | 8/18/2011 | Hail | 2 in. | 0 | 0 | 0 | 0 |
| EWING | HOLT CO. | 8/18/2011 | Hail | 2.5 in. | 0 | 0 | 0 | 0 |
| (ONL)O NEILL ARPT | HOLT CO. | 8/18/2011 | Hail | 1.5 in. | 0 | 0 | 0 | 0 |
| PAGE | HOLT CO. | 8/18/2011 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| PAGE | HOLT CO. | 8/18/2011 | Hail | 2.75 in. | 0 | 0 | 0 | 0 |
| SWAN LAKE | HOLT CO. | 4/15/2012 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |

Section Six [Participant Profiles | Holt County]

| Location | County/ Zone | Date | Type | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|-------------------|--------------|-----------|-------------------|-----------|--------|----------|-----------------|-------------|
| PAGE | HOLT CO. | 5/4/2012 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| (ONL)O NEILL ARPT | HOLT CO. | 5/4/2012 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| PAGE | HOLT CO. | 5/4/2012 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| (ONL)O NEILL ARPT | HOLT CO. | 5/4/2012 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| PAGE | HOLT CO. | 5/4/2012 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| SWAN LAKE | HOLT CO. | 5/19/2012 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| CHAMBERS | HOLT CO. | 5/22/2012 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| CHAMBERS | HOLT CO. | 5/22/2012 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| INMAN | HOLT CO. | 5/22/2012 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| INMAN | HOLT CO. | 5/22/2012 | Hail | 1.25 in. | 0 | 0 | 0 | 0 |
| AMELIA | HOLT CO. | 7/12/2012 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 7/12/2012 | Thunderstorm Wind | 52 kts. | 0 | 0 | 0 | 0 |
| SWAN LAKE | HOLT CO. | 8/1/2012 | Thunderstorm Wind | 52 kts. | 0 | 0 | 0 | 0 |
| PAGE | HOLT CO. | 9/4/2012 | Thunderstorm Wind | 50 kts. | 0 | 0 | 0 | 0 |
| (ONL)O NEILL ARPT | HOLT CO. | 5/26/2013 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| STUART | HOLT CO. | 5/26/2013 | Hail | 1.25 in. | 0 | 0 | 0 | 0 |
| INMAN | HOLT CO. | 5/29/2013 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| (ONL)O NEILL ARPT | HOLT CO. | 5/29/2013 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| O NEILL | HOLT CO. | 5/29/2013 | Thunderstorm Wind | 61 kts. | 0 | 0 | 20.00K | 0 |
| SWAN LAKE | HOLT CO. | 6/22/2013 | Thunderstorm Wind | 52 kts. | 0 | 0 | 0 | 0 |
| CHAMBERS | HOLT CO. | 6/22/2013 | Thunderstorm Wind | 52 kts. | 0 | 0 | 0 | 0 |
| PAGE | HOLT CO. | 6/22/2013 | Thunderstorm Wind | 60 kts. | 0 | 0 | 0 | 0 |
| EWING | HOLT CO. | 6/22/2013 | Thunderstorm Wind | 52 kts. | 0 | 0 | 0 | 0 |
| (ONL)O NEILL ARPT | HOLT CO. | 7/7/2013 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| (ONL)O NEILL ARPT | HOLT CO. | 7/7/2013 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| STUART | HOLT CO. | 7/24/2013 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| STUART | HOLT CO. | 7/24/2013 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| STUART | HOLT CO. | 7/24/2013 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| SWAN LAKE | HOLT CO. | 7/24/2013 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| (ONL)O NEILL ARPT | HOLT CO. | 8/1/2013 | Hail | 1.25 in. | 0 | 0 | 0 | 0 |
| O NEILL | HOLT CO. | 8/1/2013 | Hail | 1.5 in. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 8/21/2013 | Thunderstorm Wind | 52 kts. | 0 | 0 | 0 | 0 |

Section Six [Participant Profiles | Holt County]

| Location | County/ Zone | Date | Type | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|-------------------|--------------|-----------|-------------------|------------|--------|----------|-----------------|-------------|
| (ONL)O NEILL ARPT | HOLT CO. | 8/21/2013 | Thunderstorm Wind | 52 kts. | 0 | 0 | 0 | 0 |
| SWAN LAKE | HOLT CO. | 9/19/2013 | Thunderstorm Wind | 56 kts. | 0 | 0 | 0.50K | 0 |
| | HOLT CO. | 1/16/2014 | High Wind | 52 kts. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 4/27/2014 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| EWING | HOLT CO. | 5/26/2014 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| EWING | HOLT CO. | 5/26/2014 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| EWING | HOLT CO. | 5/26/2014 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| EWING | HOLT CO. | 6/1/2014 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| STUART | HOLT CO. | 6/3/2014 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 6/3/2014 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 6/3/2014 | Hail | 1.75 in. | 0 | 0 | 50.00K | 0 |
| ATKINSON | HOLT CO. | 6/3/2014 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| EMMET | HOLT CO. | 6/3/2014 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| PAGE | HOLT CO. | 6/3/2014 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| STUART | HOLT CO. | 6/3/2014 | Thunderstorm Wind | 103 kts. | 0 | 0 | 200.00K | 0 |
| STUART | HOLT CO. | 6/3/2014 | Thunderstorm Wind | 70 kts. | 0 | 0 | 25.00K | 0 |
| STUART | HOLT CO. | 6/3/2014 | Thunderstorm Wind | 70 kts. | 0 | 0 | 0 | 0 |
| STUART | HOLT CO. | 6/3/2014 | Thunderstorm Wind | 70 kts. | 0 | 0 | 0 | 0 |
| SWAN LAKE | HOLT CO. | 6/16/2014 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| CHAMBERS | HOLT CO. | 6/16/2014 | Hail | 1.25 in. | 0 | 0 | 0 | 0 |
| SWAN LAKE | HOLT CO. | 6/16/2014 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 6/18/2014 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| CHAMBERS | HOLT CO. | 6/20/2014 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| PAGE | HOLT CO. | 6/30/2014 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| SWAN LAKE | HOLT CO. | 6/30/2014 | Hail | 1.25 in. | 0 | 0 | 0 | 0 |
| EWING | HOLT CO. | 6/30/2014 | Hail | 1 in. kts. | 0 | 0 | 0 | 0 |
| EWING | HOLT CO. | 6/30/2014 | Thunderstorm Wind | 61 kts. | 0 | 0 | 20.00K | 0 |
| EWING | HOLT CO. | 6/30/2014 | Thunderstorm Wind | 52 | 0 | 0 | 0 | 0 |
| PAGE | HOLT CO. | 7/26/2014 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| STUART | HOLT CO. | 8/2/2014 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| SWAN LAKE | HOLT CO. | 8/20/2014 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| CHAMBERS | HOLT CO. | 4/24/2015 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| (ONL)O NEILL ARPT | HOLT CO. | 6/6/2015 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| (ONL)O NEILL ARPT | HOLT CO. | 6/20/2015 | Thunderstorm Wind | 50 kts. | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 7/5/2015 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| O NEILL | HOLT CO. | 7/17/2015 | Hail | 1 in. | 0 | 0 | 0 | 0 |

Section Six [Participant Profiles | Holt County]

| Location | County/ Zone | Date | Type | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|--------------|--------------|-----------|-------------------|-----------|--------|----------|-----------------|-------------|
| EMMET | HOLT CO. | 7/19/2015 | Thunderstorm Wind | 52 kts. | 0 | 0 | 10.00K | 0 |
| PAGE | HOLT CO. | 8/9/2015 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| PAGE | HOLT CO. | 9/9/2015 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| CHAMBERS | HOLT CO. | 9/9/2015 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| Totals [572] | | | | | 0 | 0 | 4.338M | 2.806M |
| | | | | | | | | 7.144M |

TABLE 6.62: NCDC EVENTS [TORNADOS] JANUARY 1, 1950 – JANUARY 31, 2016

| Location | County/ Zone | Date | Type | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|----------|--------------|-----------|---------|-----------|--------|----------|-----------------|-------------|
| | HOLT CO. | 6/15/1952 | Tornado | F1 | 0 | 0 | 2.50K | 0 |
| | HOLT CO. | 8/21/1959 | Tornado | F0 | 0 | 0 | 2.50K | 0 |
| | HOLT CO. | 6/5/1961 | Tornado | | 0 | 0 | 0 | 0 |
| | HOLT CO. | 7/18/1961 | Tornado | F1 | 0 | 0 | 0 | 0 |
| | HOLT CO. | 5/29/1962 | Tornado | F4 | 0 | 0 | 0 | 0 |
| | HOLT CO. | 5/8/1965 | Tornado | F3 | 0 | 0 | 25.00M | 0 |
| | HOLT CO. | 6/26/1965 | Tornado | F1 | 0 | 0 | 25.00K | 0 |
| | HOLT CO. | 6/21/1968 | Tornado | F1 | 0 | 1 | 2.50K | 0 |
| | HOLT CO. | 6/11/1970 | Tornado | | 0 | 0 | 0 | 0 |
| | HOLT CO. | 5/22/1972 | Tornado | F0 | 0 | 0 | 0 | 0 |
| | HOLT CO. | 5/22/1972 | Tornado | F1 | 0 | 0 | 25.00K | 0 |
| | HOLT CO. | 5/23/1972 | Tornado | F0 | 0 | 0 | 0 | 0 |
| | HOLT CO. | 4/20/1974 | Tornado | F1 | 0 | 0 | 2.50K | 0 |
| | HOLT CO. | 6/19/1975 | Tornado | F1 | 0 | 0 | 25.00K | 0 |
| | HOLT CO. | 6/19/1975 | Tornado | F1 | 0 | 0 | 2.50K | 0 |
| | HOLT CO. | 5/26/1980 | Tornado | F1 | 0 | 0 | 250.00K | 0 |
| | HOLT CO. | 5/26/1980 | Tornado | F0 | 0 | 0 | 0.25K | 0 |
| | HOLT CO. | 5/9/1982 | Tornado | F0 | 0 | 0 | 0.03K | 0 |
| | HOLT CO. | 6/5/1984 | Tornado | F0 | 0 | 0 | 0 | 0 |
| | HOLT CO. | 4/20/1985 | Tornado | F1 | 0 | 0 | 0 | 0 |
| | HOLT CO. | 5/10/1985 | Tornado | F1 | 0 | 0 | 0 | 0 |
| | HOLT CO. | 5/11/1985 | Tornado | F0 | 0 | 0 | 0 | 0 |
| | HOLT CO. | 7/29/1986 | Tornado | F1 | 0 | 0 | 2.50K | 0 |
| | HOLT CO. | 6/16/1990 | Tornado | F0 | 0 | 0 | 250.00K | 0 |
| | HOLT CO. | 6/16/1990 | Tornado | F0 | 0 | 0 | 250.00K | 0 |
| | HOLT CO. | 5/15/1992 | Tornado | F2 | 0 | 0 | 25.00K | 0 |
| | HOLT CO. | 5/15/1992 | Tornado | F2 | 0 | 0 | 250.00K | 0 |
| | HOLT CO. | 5/15/1992 | Tornado | F2 | 0 | 0 | 250.00K | 0 |
| | HOLT CO. | 5/15/1992 | Tornado | F2 | 0 | 0 | 250.00K | 0 |
| | HOLT CO. | 5/15/1992 | Tornado | F0 | 0 | 0 | 0 | 0 |
| | HOLT CO. | 5/15/1992 | Tornado | F0 | 0 | 0 | 0 | 0 |

Section Six [Participant Profiles | Holt County]

| Location | County/ Zone | Date | Type | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|----------|--------------|------------|---------|-----------|--------|----------|-----------------|-------------|
| | HOLT CO. | 5/15/1992 | Tornado | F0 | 0 | 0 | 0 | 0 |
| O Neill | HOLT CO. | 6/24/1994 | Tornado | F1 | 0 | 0 | 500.00K | 0 |
| Chambers | HOLT CO. | 7/4/1994 | Tornado | F1 | 0 | 0 | 500.00K | 0 |
| O NEILL | HOLT CO. | 6/19/1996 | Tornado | F2 | 0 | 0 | 1.00M | 0 |
| PAGE | HOLT CO. | 6/19/1996 | Tornado | F1 | 0 | 0 | 250.00K | 0 |
| BASSETT | HOLT CO. | 10/26/1996 | Tornado | F1 | 0 | 1 | 5.00K | 0 |
| O NEILL | HOLT CO. | 10/26/1996 | Tornado | F1 | 0 | 3 | 150.00K | 0 |
| ATKINSON | HOLT CO. | 10/28/1998 | Tornado | F1 | 0 | 0 | 20.00K | 0 |
| ATKINSON | HOLT CO. | 10/28/1998 | Tornado | F0 | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 10/28/1998 | Tornado | F0 | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 10/28/1998 | Tornado | F0 | 0 | 0 | 10.00K | 0 |
| EMMET | HOLT CO. | 10/28/1998 | Tornado | F0 | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 10/28/1998 | Tornado | F2 | 0 | 0 | 50.00K | 0 |
| PAGE | HOLT CO. | 10/28/1998 | Tornado | F0 | 0 | 0 | 0 | 0 |
| EWING | HOLT CO. | 5/3/1999 | Tornado | F1 | 0 | 0 | 750.00K | 0 |
| ATKINSON | HOLT CO. | 4/26/2000 | Tornado | F1 | 0 | 0 | 200.00K | 0 |
| O NEILL | HOLT CO. | 4/26/2000 | Tornado | F0 | 0 | 0 | 0 | 0 |
| O NEILL | HOLT CO. | 4/26/2000 | Tornado | F1 | 0 | 0 | 20.00K | 0 |
| CHAMBERS | HOLT CO. | 4/6/2001 | Tornado | F1 | 0 | 0 | 10.00K | 0 |
| ATKINSON | HOLT CO. | 7/9/2001 | Tornado | F0 | 0 | 0 | 0 | 0 |
| O NEILL | HOLT CO. | 7/16/2001 | Tornado | F0 | 0 | 0 | 25.00K | 25.00K |
| CHAMBERS | HOLT CO. | 7/17/2001 | Tornado | F0 | 0 | 0 | 0 | 0 |
| CHAMBERS | HOLT CO. | 7/24/2002 | Tornado | F0 | 0 | 0 | 10.00K | 0 |
| STUART | HOLT CO. | 6/9/2003 | Tornado | F0 | 0 | 0 | 5.00K | 0 |
| ATKINSON | HOLT CO. | 6/9/2003 | Tornado | F0 | 0 | 0 | 25.00K | 0 |
| EMMET | HOLT CO. | 6/9/2003 | Tornado | F3 | 0 | 0 | 5.70M | 1.30M |
| EMMET | HOLT CO. | 6/9/2003 | Tornado | F0 | 0 | 0 | 5.00K | 0 |
| ATKINSON | HOLT CO. | 7/5/2003 | Tornado | F0 | 0 | 0 | 0 | 0 |
| AMELIA | HOLT CO. | 7/5/2003 | Tornado | F0 | 0 | 0 | 0 | 0 |
| CHAMBERS | HOLT CO. | 4/20/2004 | Tornado | F0 | 0 | 0 | 0 | 0 |
| EWING | HOLT CO. | 4/20/2004 | Tornado | F0 | 0 | 0 | 0 | 0 |
| AMELIA | HOLT CO. | 5/16/2004 | Tornado | F0 | 0 | 0 | 0 | 0 |
| AMELIA | HOLT CO. | 5/16/2004 | Tornado | F1 | 0 | 0 | 45.00K | 10.00K |
| INMAN | HOLT CO. | 5/16/2004 | Tornado | F0 | 0 | 0 | 0 | 0 |
| PAGE | HOLT CO. | 5/16/2004 | Tornado | F0 | 0 | 0 | 0 | 2.00K |
| O NEILL | HOLT CO. | 5/29/2004 | Tornado | F0 | 0 | 0 | 0 | 1.00K |
| O NEILL | HOLT CO. | 5/29/2004 | Tornado | F0 | 0 | 0 | 0 | 0 |
| O NEILL | HOLT CO. | 5/29/2004 | Tornado | F0 | 0 | 0 | 10.00K | 1.00K |
| PAGE | HOLT CO. | 7/15/2004 | Tornado | F1 | 0 | 0 | 35.00K | 10.00K |
| EWING | HOLT CO. | 7/15/2004 | Tornado | F0 | 0 | 0 | 0 | 0 |
| EWING | HOLT CO. | 9/18/2005 | Tornado | F0 | 0 | 0 | 0 | 0 |

Section Six [Participant Profiles | Holt County]

| Location | County/ Zone | Date | Type | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|-------------------|--------------|-----------|---------|-----------|--------|----------|-----------------|-------------|
| STUART | HOLT CO. | 6/5/2008 | Tornado | EF2 | 0 | 0 | 150.00K | 15.00K |
| (ONL)O NEILL ARPT | HOLT CO. | 3/23/2009 | Tornado | EF2 | 0 | 0 | 20.00K | 0 |
| ATKINSON | HOLT CO. | 5/30/2011 | Tornado | EF0 | 0 | 0 | 0 | 0 |
| O NEILL | HOLT CO. | 5/30/2011 | Tornado | EF0 | 0 | 0 | 0 | 0 |
| EWING | HOLT CO. | 8/18/2011 | Tornado | EF0 | 0 | 0 | 0 | 0 |
| EWING | HOLT CO. | 8/18/2011 | Tornado | EF0 | 0 | 0 | 0 | 0 |
| Totals [78] | | | | | 0 | 5 | 36.11M | 1.364M |
| | | | | | | | 37.474M | |

TABLE 6.63: NCDCEVENTS [DROUGHT] JANUARY 1, 1950 – JANUARY 31, 2016

| Location | County/ Zone | Date | Type | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|-------------|--------------|-----------|---------|-----------|--------|----------|-----------------|-------------|
| HOLT (ZONE) | HOLT (ZONE) | 7/1/2012 | Drought | | 0 | 0 | 50.00M | 10.00M |
| HOLT (ZONE) | HOLT (ZONE) | 8/1/2012 | Drought | | 0 | 0 | 0.00K | 0.00K |
| HOLT (ZONE) | HOLT (ZONE) | 9/1/2012 | Drought | | 0 | 0 | 0.00K | 0.00K |
| HOLT (ZONE) | HOLT (ZONE) | 10/1/2012 | Drought | | 0 | 0 | 0.00K | 0.00K |
| HOLT (ZONE) | HOLT (ZONE) | 11/1/2012 | Drought | | 0 | 0 | 0.00K | 0.00K |
| HOLT (ZONE) | HOLT (ZONE) | 12/1/2012 | Drought | | 0 | 0 | 0.00K | 0.00K |
| HOLT (ZONE) | HOLT (ZONE) | 1/1/2013 | Drought | | 0 | 0 | 0.00K | 0.00K |
| HOLT (ZONE) | HOLT (ZONE) | 2/1/2013 | Drought | | 0 | 0 | 0.00K | 0.00K |
| HOLT (ZONE) | HOLT (ZONE) | 3/1/2013 | Drought | | 0 | 0 | 0.00K | 0.00K |
| HOLT (ZONE) | HOLT (ZONE) | 4/1/2013 | Drought | | 0 | 0 | 0.00K | 0.00K |
| HOLT (ZONE) | HOLT (ZONE) | 5/1/2013 | Drought | | 0 | 0 | 0.00K | 0.00K |
| HOLT (ZONE) | HOLT (ZONE) | 6/1/2013 | Drought | | 0 | 0 | 0.00K | 0.00K |
| HOLT (ZONE) | HOLT (ZONE) | 7/1/2013 | Drought | | 0 | 0 | 0.00K | 0.00K |
| HOLT (ZONE) | HOLT (ZONE) | 8/1/2013 | Drought | | 0 | 0 | 0.00K | 0.00K |
| HOLT (ZONE) | HOLT (ZONE) | 9/1/2013 | Drought | | 0 | 0 | 0.00K | 0.00K |
| HOLT (ZONE) | HOLT (ZONE) | 5/1/2014 | Drought | | 0 | 0 | 0.00K | 0.00K |
| HOLT (ZONE) | HOLT (ZONE) | 6/1/2014 | Drought | | 0 | 0 | 0.00K | 0.00K |
| Totals [17] | | | | | 0 | 0 | 50.00M | 10.M |
| | | | | | | | 60.00M | |

TABLE 6.64: NCDCEVENTS [FLOODS] JANUARY 1, 1950 – JANUARY 31, 2016

| Location | County/ Zone | Date | Type | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|--------------|--------------|-----------|-------------|-----------|--------|----------|-----------------|-------------|
| EAST PORTION | HOLT CO. | 7/19/1999 | Flash Flood | | 0 | 0 | 500.00K | 0 |
| STUART | HOLT CO. | 7/6/2000 | Flash Flood | | 0 | 0 | 100.00K | 0 |
| O NEILL | HOLT CO. | 5/29/2004 | Flash Flood | | 0 | 0 | 2.00K | 8.00K |
| EWING | HOLT CO. | 5/29/2008 | Flash Flood | | 0 | 0 | 150.00K | 0 |
| O NEILL | HOLT CO. | 5/29/2008 | Flash Flood | | 0 | 0 | 8.00K | 0 |

Section Six [Participant Profiles I Holt County]

| Location | County/ Zone | Date | Type | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|----------------------|--------------|-----------|-------------|-----------|--------|----------|-----------------|-------------|
| CHAMBERS | HOLT CO. | 8/15/2009 | Flash Flood | | 0 | 0 | 0 | 0 |
| ATKINSON | HOLT CO. | 6/10/2010 | Flood | | 0 | 0 | 1.00M | 50.00K |
| AMELIA | HOLT CO. | 6/12/2010 | Flood | | 0 | 0 | 200.00K | 25.00K |
| STUART | HOLT CO. | 7/22/2010 | Flash Flood | | 0 | 0 | 100.00K | 0 |
| ATKINSON | HOLT CO. | 6/22/2011 | Flood | | 0 | 0 | 0 | 0 |
| SWAN LAKE | HOLT CO. | 7/10/2014 | Flash Flood | | 0 | 0 | 0 | 0 |
| (ONL)O NEILL ARPT | HOLT CO. | 6/6/2015 | Flash Flood | | 0 | 0 | 0 | 0 |
| PAGE | HOLT CO. | 6/6/2015 | Flash Flood | | 0 | 0 | 0 | 0 |
| Totals [13] | | | | | 0 | 0 | \$1.07M | 83.0K |
| | | | | | | | \$1.153M | |

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Section Six [Participant Profiles-Knox County]

Section Six provides an overall profile of the plan area including geography, demographics, assets inventory, capabilities assessment, and climate as well as hazard identification and risk assessment analysis specific to each individual participant.

SECTION SIX [KNOX COUNTY]

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HAZARD MITIGATION PLAN

ANTELOPE, HOLT, AND KNOX COUNTIES

SECTION SIX [PARTICIPANT PROFILES]

KNOX COUNTY

Local governments have the responsibility to protect the health, safety, and welfare of citizens. Proactive mitigation policies and actions help reduce risk and create safer, more disaster resilient jurisdictions. Mitigation is an investment in the jurisdiction's future safety and sustainability. Consider the critical importance of mitigation to:

- ❑ Protect public safety and prevent loss of life and injury.
- ❑ Reduce harm to existing and future development.
- ❑ Prevent damage to a jurisdiction's unique economic, cultural, and environmental assets.
- ❑ Minimize operational downtime and accelerate recovery of government and business after disasters.
- ❑ Reduce the costs of disaster response and recovery and the exposure to risk for first responders.
- ❑ Help accomplish other jurisdiction objectives, such as leveraging capital improvements, infrastructure protection, open space preservation, and economic resiliency.

Demographics, assets, and capabilities information can be used to determine differing levels of vulnerability by analyzing data on population and housing, structural inventories and valuations, critical facilities, highly vulnerable areas and populations, as well as future land use and development for each participating jurisdiction. These analyses directly impact the hazard identification and risk assessment, which ultimately are reflected in the jurisdiction's priorities and mitigation alternatives.

HISTORY

Knox County was organized by the Territorial Legislature in 1857 and originally named L'Eau Qui Court. That is the French name for the river named by the Indians Niobrara – both names in English mean Running Water. The name was changed to Knox by a statute passed February 21, 1873, which took effect April 1, 1873. Knox County was named after Major General Henry Knox. The first settlers were from Virginia, Maryland, New Jersey, and Pennsylvania and were attracted by the fertile land. Center was established as the county seat and Creighton is the largest city in Knox County.

GEOGRAPHIC SUMMARY

Geographic information, including topographic and soils data, play key roles in land planning and heavily influence land use and development. Understanding the unique, local land composition and characteristics will reduce harm to existing and future development by deterring growth into hazard prone areas.

Knox County is located in northeastern Nebraska, along the state boarder with South Dakota. The county seat is Center and the largest community is Creighton. Table 6.65, below, summarizes the County’s total area composition and elevation.

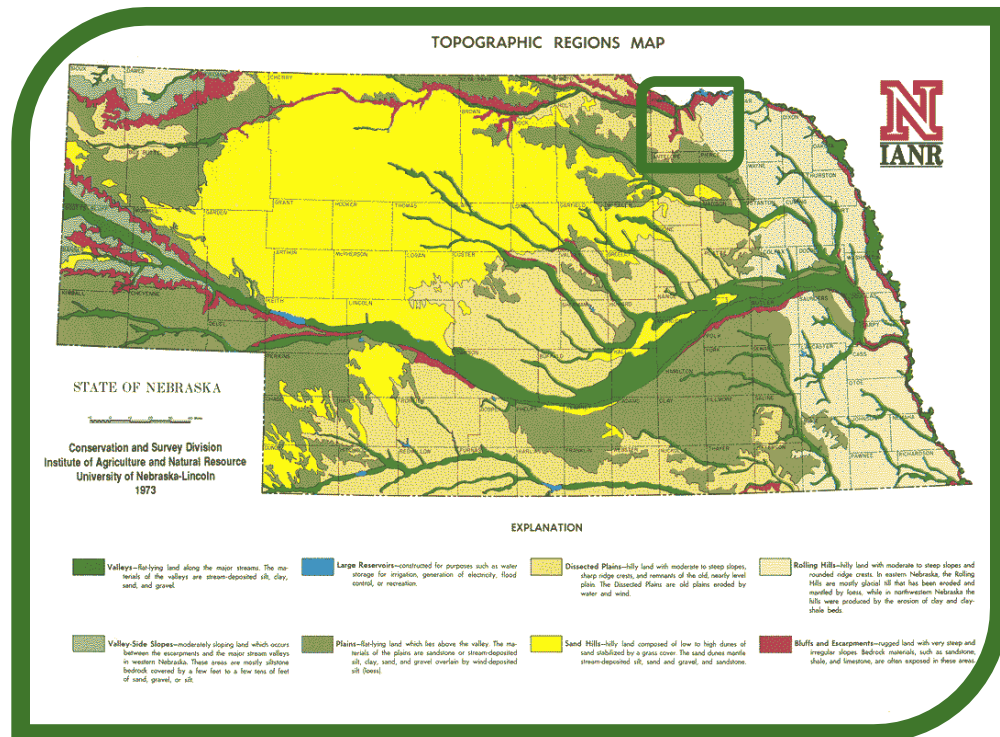
TABLE 6.65: GENERAL GEOGRAPHIC SUMMARY [CASDE] KNOX COUNTY

| Jurisdiction | Area [sq. mi.] | | | Elevation [ft.] |
|--------------|----------------|-------|-------|-----------------|
| | Total | Land | Water | |
| Knox County | 1,140 | 1,108 | 31 | -- |
| Center | 0.10 | 0.10 | 0.0 | 1,394 |
| Creighton | 1.21 | 1.21 | 0.0 | 1,640 |
| Niobrara | 0.73 | 0.73 | 0.0 | 1,230 |

Source: University of Nebraska – Lincoln. Virtual Nebraska. www.casde.unl.edu.

Knox County contains four primary topographic regions according to the Conservation and Survey Division of the University of Nebraska- Lincoln. These include ‘rolling hills’, ‘plains’, ‘dissected plains’, ‘valley’, and ‘bluffs and escarpments’. The County is also comprised of four main soil series, including Onita-Reliance-Labu, Labu-Bristow-Redstoe, Brunswick-Paka-Simeon, and Moody-Thurman. The figures and tables below display topographic and soils data, with Knox County outlined.

FIGURE 6.7: GENERAL TOPOGRAPHIC REGIONS [IANR] STATE OF NEBRASKA – KNOX COUNTY



Source: University of Nebraska – Lincoln. Institute of Agriculture and Natural Resources. Conservation and Survey Division.

Section Six [Participant Profiles | Knox County]

TABLE 6.66: GENERAL TOPOGRAPHIC DESCRIPTIONS [IANR] STATE OF NEBRASKA – KNOX COUNTY

| Topographic Region | Description |
|------------------------|--|
| Rolling Hills | Hilly land with moderate to steep slopes and rounded ridge crests. In eastern Nebraska, the Rolling Hills are mostly glacial till that has been eroded. |
| Plains | Flat-lying land which lies above the valley. The materials of the plains are sandstone or stream-deposited silt, clay, sand, and gravel overlain by wind-deposited silt (loess). |
| Dissected Plains | Hilly land with moderate to steep slopes, sharp ridge crests, and remnants of the old, nearly level plains. The Dissected Plains are old plains eroded by water or wind. |
| Valleys | Flat-lying land along the major streams. The materials of the valleys are stream-deposited silt, clay, sand, and gravel. |
| Bluffs and Escarpments | Rugged land with very steep and irregular slopes. Bedrock materials, such as sandstone, shale and limestone, are often exposed in these areas. |

Source: University of Nebraska – Lincoln. Institute of Agriculture and Natural Resources. Conservation and Survey Division.

FIGURE 6.8: GENERAL SOILS [IANR] STATE OF NEBRASKA – KNOX COUNTY



Source: University of Nebraska – Lincoln. Institute of Agriculture and Natural Resources. Conservation and Survey Division.

DEMOGRAPHICS SUMMARY

Demographic statistics aid decision-makers by developing a picture of Knox County. This picture tells the County and communities where they've been and where they're now, helping decision-makers orient themselves to the most appropriate path to reduce risk and create safer, more disaster resilient jurisdictions. A jurisdiction's population is the driving force behind its housing, employment, economic stability, and potential for change. Proactive mitigation by decision-makers will help prevent future damage to these unique assets.

Tables 6.67-6.68 and Figure 6.9 below summarize various population and housing characteristics such as population trends, population by age, housing occupancy and tenure, and age of structures. Table 6.89 highlights selected demographic

characteristics including housing units lacking complete facilities, no telephone service, mobile home housing units, no vehicles available, population with a disability, and percentage of low-to-moderate income population.

POPULATION

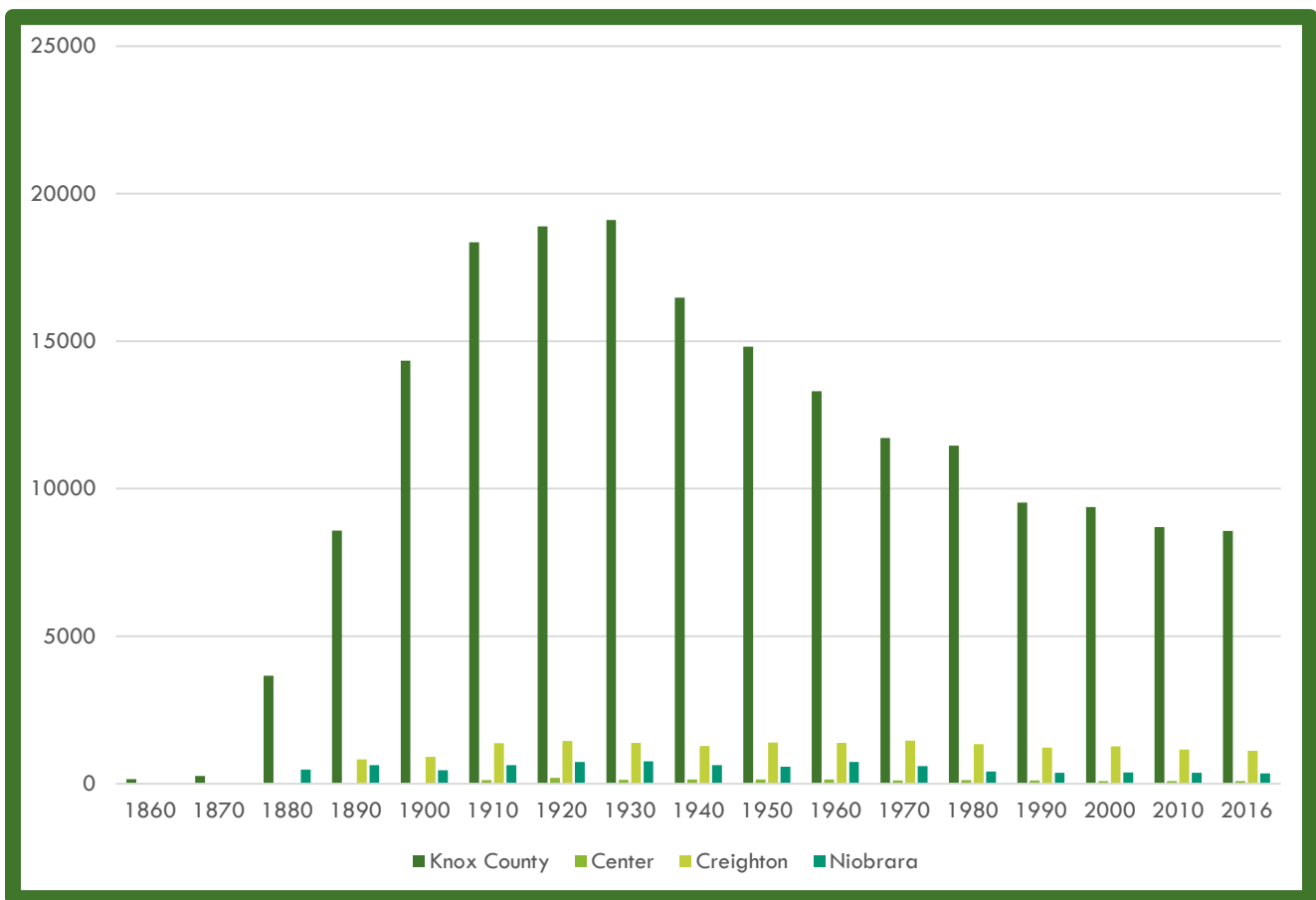
TABLE 6.67: POPULATION TRENDS [CENSUS] KNOX COUNTY 1985 – 2015

| Jurisdiction | 1980 Population | 1990 Population | 2000 Population | 2010 Population | Change '80 - '10 |
|--------------|-----------------|-----------------|-----------------|-----------------|------------------|
| Knox County | 11,457 | 9,534 | 9,374 | 8,701 | -24.1% |
| Center | 123 | 112 | 90 | 94 | -23.6% |
| Creighton | 1,341 | 1,223 | 1,270 | 1,154 | -13.9% |
| Niobrara | 419 | 376 | 379 | 370 | -11.7% |

Source: United States Census Bureau.

Overall, Knox County’s population was 11,457 persons in 1980 and 8,701 persons in 2010. This is a decrease of 2,756 people or 24.1 percent in 30 years. This is the result of a decrease in both the urban and rural populations. For this plan, the term urban is equal to the population within an incorporated jurisdiction.

FIGURE 6.9: HISTORICAL POPULATION AND TRENDS [CENSUS] KNOXCOUNTY 1880 – 2014



Source: United States Census Bureau.

Section Six [Participant Profiles | Knox County]

TABLE 6.68: POPULATION BY AGE [CENSUS] KNOX COUNTY

| Jurisdiction | < 5 – 9 | 10 – 19 | 20 – 34 | 35 – 54 | 55 – 64 | 65 – 84 | 85 < | 18 < | 21 < | 65 < | Median | Total |
|--------------|---------|---------|---------|---------|---------|---------|------|-------|-------|-------|--------|-------|
| Knox County | 1,111 | 1,152 | 1,043 | 2,174 | 1,242 | 1,611 | 368 | 6,605 | 6,384 | 1,979 | 46.6 | 8,701 |
| | 12.8% | 13.2% | 12.0% | 25.0% | 14.3% | 18.5% | 4.2% | 75.9% | 73.4% | 22.7% | | 100% |
| Center | 13 | 11 | 11 | 26 | 14 | 18 | 1 | 72 | 69 | 19 | 49.5 | 94 |
| | 13.8% | 11.7% | 11.7% | 27.7% | 14.9% | 19.1% | 1.1% | 76.6% | 73.4% | 20.2% | | 100% |
| Creighton | 145 | 137 | 142 | 265 | 117 | 270 | 78 | 895 | 865 | 348 | 47.7 | 1,154 |
| | 12.6% | 11.9% | 12.3% | 23.0% | 10.1% | 23.4% | 6.8% | 77.6% | 75.0% | 30.2% | | 100% |
| Niobrara | 27 | 43 | 31 | 85 | 76 | 96 | 12 | 308 | 298 | 108 | 54.87 | 370 |
| | 7.3% | 11.6% | 8.4% | 23.0% | 20.5% | 25.9% | 3.2% | 83.2% | 80.5% | 29.2% | | 100% |

Source: United States Census Bureau.

Overall, Knox County’s median age is 46.6. The largest age cohort of 35-54 represents 25.0 percent of the total population or 2,174 persons. The smallest age cohort of 85 and greater represents 4.2 percent or 368 persons.

HOUSING

TABLE 6.69: HOUSING OCCUPANCY AND TENURE [CENSUS] KNOX COUNTY

| Jurisdiction | Total Housing Units | | | | Occupied Housing Units | | | |
|--------------|---------------------|---------|--------|---------|------------------------|---------|--------|---------|
| | Occupied | | Vacant | | Owner | | Renter | |
| | Number | Percent | Number | Percent | Number | Percent | Number | Percent |
| Knox County | 3,647 | 76.2% | 1,141 | 23.8% | 2,759 | 75.7% | 888 | 24.3% |
| Center | 39 | 76.5% | 12 | 23.5% | 36 | 92.3% | 3 | 7.70% |
| Creighton | 538 | 89.8% | 61 | 10.2% | 416 | 77.3% | 122 | 22.7% |
| Niobrara | 193 | 76.9% | 58 | 23.1% | 125 | 64.8% | 68 | 35.2% |

Source: United States Census Bureau.

Overall, the housing occupancy and tenure in Knox County is owner-occupied units. Of the total housing units, 3,647 units or 76.2 percent are occupied units and 2,759 units or 75.7 percent are owner-occupied units.

ASSETS INVENTORY

Each jurisdiction has a unique set of assets and capabilities available. By reviewing the existing assets and capabilities, each jurisdiction can identify assets and capabilities that currently reduce disaster losses or could be used to reduce losses in the future, as well as capabilities that inadvertently increase risks. This is especially useful for multi-jurisdictional plans where local capability varies widely. Assessing the jurisdictions’ existing assets and capabilities available is a critical step to accomplish mitigation, and how to leverage resources for long-term vulnerability reduction in the mitigation strategy.

CRITICAL FACILITIES AND INFRASTRUCTURE

Critical facilities are structures and institutions necessary for a community’s response to and recovery from emergencies. Critical facilities must continue to operate during and following a disaster to reduce the severity of impacts and accelerate recovery. When identifying vulnerabilities, consider both the structural integrity and content value of critical facilities and the effects of interrupting their services to the community.

Infrastructure systems are critical for life, safety, and economic viability and include transportation, power, communication, and water and wastewater systems. Many critical facilities depend on infrastructure to function. For example, hospitals need electricity, water, and sewer to continue helping patients. As with critical facilities, the continued operations of infrastructure systems during and following a disaster are key factors in the severity of impacts and the speed of recovery.

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.

Each participating jurisdiction identified critical facilities vital for disaster response, providing shelter to the public, and essential for returning the jurisdiction’s functions to normal during and after a disaster. Critical facilities were identified at the ‘mitigation alternative’ public meetings through the meeting worksheets (refer to Appendix C). Table 6.90 below summarizes the critical facilities and infrastructure identified by participants. This is a total summary list and not broken into individual counties or jurisdictions.

TABLE 6.70: CRITICAL FACILITIES AND INFRASTRUCTURE [FEMA] KNOX COUNTY

| CRITICAL FACILITY | TYPE | NUMBER IDENTIFIED | CRITICAL FACILITY | TYPE | NUMBER IDENTIFIED |
|-----------------------------|----------------|-------------------|----------------------------|----------|-------------------|
| Communication Towers | Infrastructure | 8 | Elevator | Facility | 1 |
| Gas Pipeline Connection | Infrastructure | 1 | Fairgrounds | Facility | 1 |
| Internet Provider | Infrastructure | 1 | Fire Department | Facility | 9 |
| Lift Station | Infrastructure | 9 | Fuel Station | Facility | 2 |
| Light Plant Generator | Infrastructure | 1 | Golf Club | Facility | 1 |
| NPPD Substation | Infrastructure | 5 | Hospital | Facility | 11 |
| Phone Exchange | Infrastructure | 1 | Knox County District 9 | Facility | 1 |
| Waste Processing Facility | Infrastructure | 1 | Library/Museum | Facility | 7 |
| Waste Water Treatment | Infrastructure | 11 | Main Shop | Facility | 6 |
| Water Storage Facility | Infrastructure | 1 | Motel | Facility | 1 |
| Water Tower | Infrastructure | 10 | Mr. S's | Facility | 1 |
| Well | Infrastructure | 16 | NeDOT | Facility | 1 |
| Agronomy Center | Facility | 1 | Newspaper | Facility | 1 |
| Arboretum | Facility | 1 | Nursing Home/Senior Center | Facility | 9 |
| Ball Field | Facility | 9 | Nutrition Center | Facility | 1 |
| Bank | Facility | 3 | Park | Facility | 9 |
| Campground | Facility | 1 | Police Station | Facility | 2 |
| Church | Facility | 34 | Pool | Facility | 3 |
| City/Village/Tribal Office | Facility | 8 | Post Office | Facility | 11 |
| Community Center/Hub | Facility | 23 | Road Department | Facility | 2 |
| County Bard | Facility | 1 | School/Day Care | Facility | 39 |
| County Maintenance Building | Facility | 2 | Siren | Facility | 1 |
| Courthouse | Facility | 3 | Tribal Building | Facility | 1 |
| Eastern Township Building | Facility | 1 | -- | -- | -- |

VULNERABLE AREAS AND POPULATIONS

People are your most important asset. The risk assessment can identify areas of greater population density, as well as populations that may have unique vulnerabilities or be less able to respond and recover during a disaster. These include visiting populations and access and functional needs populations. In addition, the risk assessment can identify locations that provide health or social services that are critical to post-disaster response or recovery capabilities.

Section Six [Participant Profiles | Knox County]

Visiting populations include students, second home owners, migrant farm workers, and visitors for special events. Special events could include large sporting events and festivals where large numbers of people are concentrated and vulnerable to hazards and threats. Visiting populations may be less familiar with the local environment and hazards and less prepared to protect themselves during an event.

The term “access and functional needs populations” describes groups that may not comfortably or safely access the standard resources offered in emergencies. These populations may include children, the elderly, the physically or mentally disabled, non-English speakers, or the medically or chemically dependent. Facility locations and support service operations for these populations (e.g., hospitals, dependent care facilities, oxygen delivery, and accessible transportation) also need to be considered.

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

Each participating jurisdiction identified highly vulnerable areas and populations where residents and visitors to the plan area may be more open or exposed to hazards both during and after an event and require additional response. Highly vulnerable areas and populations were identified at the ‘mitigation alternative’ public meetings through the meeting worksheets (Appendix C).

NATIONAL HISTORIC REGISTRY

The National Register of Historic Places is the official list of the Nation's historic places worthy of preservation. Authorized by the National Historic Preservation Act of 1966, the National Park Service's National Register of Historic Places is part of a national program to coordinate and support public and private efforts to identify, evaluate, and protect America's historic and archeological resources.

The historic sites located within Knox County, according to the National Historic Registry, are listed in Table 6.92 below. These sites were not evaluated for proximity to hazard prone areas.

TABLE 6.71: NATIONAL HISTORIC REGISTRY [NPS] KNOX COUNTY

| Site Name | Date Listed | Location | Site Name | Date Listed | Location |
|-------------------------------------|-------------|----------|---|-------------|------------|
| Argo | 05/05/1999 | Crofton | Ponca Fort Site | 04/03/1973 | Verdel |
| The Commercial Hotel | 04/05/1990 | Verdigre | Ponca Tribal Self-Help Community Building Historic District | 03/13/2003 | Niobrara |
| Congregational Church and Manse | 03/16/1972 | Santee | Pospeshil Theatre | 09/28/1988 | Bloomfield |
| Episcopal Church | 03/16/1972 | Santee | Rad Sladkovsky | 06/29/1982 | Verdigre |
| Gross State Aid Bridge | 06/29/1992 | Verdigre | St. Rose of Lima Catholic Church and School Complex | 03/21/2011 | Crofton |
| Knox County Courthouse | 07/05/1990 | Center | Winnetoon Jail | 02/27/1995 | Winnetoon |
| Niobrara River Bridge | 11/12/1992 | Niobrara | Z.X.B.J. Opera House | 07/06/1998 | Verdigre |
| Ponca Agency Archeological District | 07/12/2006 | Niobrara | | | |

Source: National Park Service.

CAPABILITIES ASSESSMENT

Local mitigation capabilities are existing resources that reduce hazard impacts or that could be used to implement hazard mitigation activities. Each participating jurisdiction completed a capabilities assessment at the 'hazard identification' public meetings through the meeting worksheets (refer to Appendix C). The sections below summarize the primary types of capabilities for reducing long-term vulnerability through mitigation planning including planning and regulatory, administrative and technical, financial, and education and outreach identified by participants.

PLANNING AND REGULATORY

Planning and regulatory capabilities are based on the implementation of ordinances, policies, local laws and State statutes, and plans and programs that relate to guiding and managing growth and development. Examples of planning capabilities that can either enable or inhibit mitigation include comprehensive land use plans, capital improvements programs, transportation plans, small area development plans, disaster recovery and reconstruction plans, and emergency preparedness and response plans. Plans describe specific actions or policies that support goals and drive decisions. Likewise, examples of regulatory capabilities include the enforcement of zoning ordinances, subdivision regulations, and building codes that regulate how and where land is developed and structures are built. Planning and regulatory capabilities refer not only to the current plans and regulations, but also to the jurisdictions' ability to change and improve those plans and regulations as needed.

Tables 6.72-6.74 below summarize the planning and regulatory capabilities currently available in the participating jurisdictions to help prevent and reduce the impacts of hazards.

TABLE 6.72: PLANNING AND REGULATORY [CAPABILITY ASSESSMENT] KNOX COUNTY

| Plans | Knox County | Center | Creighton | Niobrara |
|---|-------------|--------|-----------|----------|
| Comprehensive/ Master Plan | Yes | Yes | Yes | No |
| Capital Improvements Plan | Yes | No | Yes | No |
| Economic Development Plan | Yes | No | No | No |
| Local Emergency Operations Plan | Yes | Yes | Yes | No |
| Continuity of Operations Plan | No | Yes | No | No |
| Transportation Plan | No | No | Yes | No |
| Stormwater Management Plan | No | No | No | No |
| Community Wildfire Protection Plan | No | No | No | No |
| Other special plans (e.g., brownfields redevelopment, disaster recovery, climate change adaptation, etc.) | No | No | No | No |

Questions to consider for future updates: Does the plan address hazards? Does the plan identify projects to include in the mitigation strategy? Can the plan be used to implement mitigation actions?

TABLE 6.73: BUILDING CODE, PERMITTING, AND INSPECTIONS [CAPABILITY ASSESSMENT] KNOX COUNTY

| Building Code, Permitting, and Inspections | Knox County | Center | Creighton | Niobrara |
|--|-------------|--------|-----------|----------|
| Building Code | No | No | Yes | No |
| Building Code Effectiveness Grading Schedule (BCEGS) Score | No | No | No | No |
| Fire Department ISO Rating | No | No | Yes | No |
| Site Plan Review Requirements | No | No | Yes | No |

Questions to consider for future updates: Are codes adequately enforced?

TABLE 6.74: LAND USE PLANNING AND ORDINANCES [CAPABILITY ASSESSMENT] KNOX COUNTY

| Land Use Planning and Ordinances | Knox County | Center | Creighton | Niobrara |
|---|-------------|--------|-----------|----------|
| Zoning Ordinance | Yes | No | Yes | No |
| Subdivision Ordinance | Yes | No | Yes | No |
| Floodplain Ordinance | Yes | No | Yes | No |
| Natural hazard specific ordinance (stormwater, steep slope, wildfire) | No | No | No | No |
| Flood Insurance Rate Maps | Yes | No | Yes | No |
| Acquisition of land for open space and public recreation uses | Nos | No | Yes | No |
| Other | No | No | No | No |

Questions to consider for future updates: Is the ordinance an effective measure for reducing hazard impacts? Is the ordinance adequately administered and enforced? How can these capabilities be expanded and improved to reduce risk?

ADMINISTRATIVE AND TECHNICAL

Administrative and technical capability refers to the jurisdictions' staff and their skills and tools that can be used for mitigation planning and to implement specific mitigation actions. It also refers to the ability to access and coordinate these resources effectively. These include engineers, planners, emergency managers, GIS analysts, building inspectors, grant writers, floodplain managers, and more. The level of knowledge and technical expertise from personnel employed by each jurisdiction, the public and private sector, or resources available through other government entities, such as counties or special districts, may be accessed to implement mitigation activities in the jurisdiction or provide assistance with limited resources. The degree of intergovernmental coordination among departments also affects administrative capability.

Tables 6.75-6.77 below summarize the administrative and technical capabilities currently available in the participating jurisdictions, including staff and their skills and tools, that can be used for mitigation planning and to implement specific mitigation actions. For smaller jurisdictions without local staff resources, there may be public resources at the next higher-level government that can provide technical assistance.

TABLE 6.75: ADMINISTRATION [CAPABILITY ASSESSMENT] KNOX COUNTY

| Administration | Knox County | Center | Creighton | Niobrara |
|--|-------------|--------|-----------|----------|
| Planning Commission | Yes | No | Yes | No |
| Mitigation Planning Committee | No | No | No | No |
| Maintenance programs to reduce risk (e.g., tree trimming, clearing drainage systems, etc.) | Yes | No | Yes | No |
| Mutual Aid Agreements | Yes | No | Yes | No |

Questions to consider for future updates: Describe capability. Is coordination effective?

TABLE 6.76: STAFF [CAPABILITY ASSESSMENT] KNOX COUNTY

| Staff | Knox County | Center | Creighton | Niobrara |
|--------------------------|-------------|--------|-----------|----------|
| Chief Building Official | No | No | Yes | No |
| Floodplain Administrator | Yes | No | Yes | No |
| Emergency Manager | Yes | No | Yes | No |
| Community Planner | No | No | Yes | No |
| Civil Engineer | No | No | Yes | No |
| GIS Coordinator | Yes | No | Yes | No |
| Other | No | No | No | No |

Questions to consider for future updates: Is staffing adequate to enforce regulations? Is staff trained on hazards and mitigation? Is coordination between agencies and staff effective?

TABLE 6.77: TECHNICAL [CAPABILITY ASSESSMENT] KNOX COUNTY

| Technical | Knox County | Center | Creighton | Niobrara |
|--|-------------|--------|-----------|----------|
| Warning systems/ services (Reverse 911, outdoor warning signals) | Yes | Yes | Yes | No |
| Hazard Data and Information | Yes | No | No | No |
| Grant Writing | No | No | Yes | No |
| HAZUS Analysis | No | No | No | No |
| Other | No | No | No | No |

Questions to consider for future updates: Describe capability. Has capability been used to assess/ mitigate risk in the past? How can these capabilities be expanded and improved to reduce risk?

FINANCIAL

Financial capabilities are the resources that a jurisdiction has access to or is eligible to use to fund mitigation actions. The costs associated with implementing mitigation activities vary. Some mitigation actions such as building assessment or outreach efforts

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require little to no costs other than staff time and existing operating budgets. Other actions, such as the acquisition of flood-prone properties, could require a substantial monetary commitment from local, State, and Federal funding sources.

Local governments may have access to a recurring source of revenue beyond property, sales, and income taxes, such as stormwater utility or development impact fees. These jurisdictions may be able to use the funds to support local mitigation efforts independently or as the local match or cost-share often required for grant funding.

Table 6.78 below summarizes the financial capabilities currently available in the participating jurisdictions to help fund hazard mitigation activities.

TABLE 6.78: FUNDING RESOURCE [CAPABILITY ASSESSMENT] KNOX COUNTY

| Funding Resource | Knox County | Center | Creighton | Niobrara |
|---|-------------|--------|-----------|----------|
| Capital improvements project funding | No | No | Yes | No |
| Authority to levy taxes for specific purposes | No | Yes | Yes | No |
| Fees for water, sewer, gas, or electric services | No | Yes | Yes | No |
| Impact fees for new development | No | No | No | No |
| Storm water utility fee | No | No | No | No |
| Incur debt through general obligation bonds and/ or special tax bonds | No | No | Yes | No |
| Incur debt through private activities | No | No | Yes | No |
| Community Development Block Grant | No | No | Yes | No |
| Other federal funding programs | No | Yes | Yes | No |
| State funding programs | Yes | Yes | Yes | No |
| Other | Yes | No | No | No |

Questions to consider for future updates: Has the funding resource been used in the past and for what type of activities? Could the resource be used to fund future mitigation actions? How can these capabilities be expanded and improved to reduce risk?

EDUCATION AND OUTREACH

This type of capability refers to education and outreach programs, methods, and initiatives already in place to implement mitigation activities and communicate hazard-related information. Examples include fire safety programs that fire departments deliver to students at local schools; participation in community programs, such as Firewise or StormReady; and activities conducted as part of hazard awareness campaigns, such as Tornado or Flood Awareness Month.

Table 6.79 below identifies the education and outreach capabilities currently available in the participating jurisdictions to increase hazard mitigation awareness.

TABLE 6.79: EDUCATION AND OUTREACH [CAPABILITY ASSESSMENT] KNOX COUNTY

| Program/ Organization | Knox County | Center | Creighton | Niobrara |
|---|-------------|--------|-----------|----------|
| Local citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc. | No | No | Yes | No |
| Ongoing public education or information program (e.g., responsible water use, fire safety, household preparedness, environmental education, etc.) | Yes | No | Yes | No |
| Natural disaster or safety related school programs | No | No | No | No |
| Storm Ready Certification | No | No | No | No |
| Fire Wise Communities Certification | No | No | No | No |
| Public-private partnership initiatives addressing disaster-related issues | No | No | Yes | No |
| Other | No | No | No | No |

Questions to consider for future updates: Describe the program/ organization and how it relates to disaster resilience and mitigation. Could the program/ organization help implement future mitigation activities? How can these capabilities be expanded and improved to reduce risk?

SAFE GROWTH

One way to assess the impact of planning and regulatory capabilities is to complete a safe growth audit. The purpose of the safe growth audit is to analyze the impacts of current policies, ordinances, and plans on community safety from hazard risks due to growth. A safe growth audit helps identify gaps in jurisdictions’ growth guidance instruments and improvements that could be made to reduce vulnerability to future development.

Tables 6.80-6.87 below summarize the safe growth audit in terms of land use, transportation, environmental management, public safety, zoning ordinances, subdivision regulations, and capital improvements currently available in the participating jurisdictions to help prevent and reduce the impacts of hazards.

TABLE 6.80: LAND USE [SAFE GROWTH] KNOX COUNTY

| Comprehensive Plan (Land Use) | Knox County | Center | Creighton | Niobrara |
|--|-------------|--------|-----------|----------|
| Does the Future Land Use Map clearly identify natural hazard areas? | No | No | Yes | No |
| Do the land-use policies discourage development or redevelopment within natural hazard areas? | No | No | Yes | No |
| Does the plan provide adequate space for expected future growth in areas located outside natural hazard areas? | Yes | Yes | Yes | No |

TABLE 6.81: TRANSPORTATION [SAFE GROWTH] KNOX COUNTY

| Comprehensive Plan (Transportation) | Knox County | Center | Creighton | Niobrara |
|---|-------------|--------|-----------|----------|
| Does the Transportation Plan limit access to hazard areas? | No | No | No | No |
| Is transportation policy used to guide growth to safe locations? | No | No | No | No |
| Are movement systems designed to function under disaster conditions (e.g., evacuation)? | No | No | No | No |

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TABLE 6.82: ENVIRONMENTAL MANAGEMENT [SAFE GROWTH] KNOX COUNTY

| Comprehensive Plan (Environmental Management) | Knox County | Center | Creighton | Niobrara |
|--|-------------|--------|-----------|----------|
| Are environmental systems that protect development from hazards identified and mapped? | Yes | No | Yes | No |
| Do environmental policies maintain and restore protective ecosystems? | No | No | Yes | No |
| Do environmental policies provide incentives to development that is located outside protective ecosystems? | No | No | No | No |

TABLE 6.83: PUBLIC SAFETY [SAFE GROWTH] KNOX COUNTY

| Comprehensive Plan (Public Safety) | Knox County | Center | Creighton | Niobrara |
|---|-------------|--------|-----------|----------|
| Are the goals and policies of the Comprehensive Plan related to those of the FEMA Local Hazard Mitigation Plan? | Yes | No | Yes | No |
| Is safety explicitly included in the plan's growth and development policies? | No | No | Yes | No |
| Does the monitoring and implementation section of the plan cover safe growth objectives? | No | No | Yes | No |

TABLE 6.84: ZONING ORDINANCE [SAFE GROWTH] KNOX COUNTY

| Zoning Ordinance | Knox County | Center | Creighton | Niobrara |
|--|-------------|--------|-----------|----------|
| Does the Zoning Ordinance conform to the Comprehensive Plan in terms of discouraging development or redevelopment within natural hazard areas? | Yes | No | Yes | No |
| Does the ordinance contain natural hazard overlay zones that set conditions for land uses within such zones? | Yes | No | Yes | No |
| Do rezoning procedures recognize natural hazard areas as limits on zoning changes that allow greater intensity or density of use? | Yes | No | Yes | No |
| Does the ordinance prohibit development within, or filling of, wetlands, floodways, and floodplains? | No | No | Yes | No |

TABLE 6.85: SUBDIVISION REGULATIONS [SAFE GROWTH] KNOX COUNTY

| Subdivision Regulations | Knox County | Center | Creighton | Niobrara |
|--|-------------|--------|-----------|----------|
| Do the Subdivision Regulations restrict the subdivision of land within or adjacent to natural hazard areas? | No | No | Yes | No |
| Do the regulations provide for conservation subdivisions or cluster subdivisions in order to conserve environmental resources? | Yes | No | Yes | No |
| Do the regulations allow density transfers where hazard areas exist? | No | No | No | No |

TABLE 6.86: CAPITAL IMPROVEMENTS [SAFE GROWTH] KNOX COUNTY

| Capital Improvement Program and Infrastructure Policies | Knox County | Center | Creighton | Niobrara |
|---|-------------|--------|-----------|----------|
| Does the Capital Improvement Program limit expenditures on projects that would encourage development in areas vulnerable to natural hazards? | N/A | No | Yes | No |
| Do Infrastructure Policies limit extension of existing facilities and services that would encourage development in areas vulnerable to natural hazards? | N/A | No | Yes | No |
| Does the Capital Improvement Program provide funding for hazard mitigation projects identified in the FEMA Mitigation Plan? | N/A | No | Yes | No |

TABLE 6.87: ADDITIONAL PLANNING MECHANISMS [SAFE GROWTH] KNOX COUNTY

| Additional Planning Mechanisms | Knox County | Center | Creighton | Niobrara |
|---|-------------|--------|-----------|----------|
| Do small area or corridor plans recognize the need to avoid or mitigate natural hazards? | No | No | No | No |
| Does the Building Code contain provisions to strengthen or elevate construction to withstand hazard forces? | No | No | Yes | No |
| Do economic development or redevelopment strategies include provisions for mitigating natural hazards? | No | No | No | No |
| Is there an adopted evacuation and shelter plan to deal with emergencies from natural hazards? | No | No | No | No |

CLIMATE SUMMARY

The monthly climate normals information displayed in the figures and table below is taken from weather station near Creighton. The data from this station is provided by the High Plains Regional Climate Center.

Normals are produced by the National Climatic Data Center (NCDC). Climate normals are an arithmetic average of a variable such as temperature over a prescribed 30-year period. This base period changes every 10 years to reflect the previous 30 years of data. The current period is 1985-2015. Note that NCDC normals may not be the same as a straight average over the 30-year period, due to adjustments for discontinuities such as station moves or changes in observation time.

TABLE 6.88: GENERAL CLIMATE STATISTICS [HPRCC] MONTHLY COMPARISONS

| Month | Mean Maximum Temperature (F) | Mean Minimum Temperature (F) | Mean Average Temperature (F) | Total Precipitation (in.) | Total Snowfall (in.) |
|----------|------------------------------|------------------------------|------------------------------|---------------------------|----------------------|
| January | 33.8 | 12.7 | 23.1 | 0.02 | 0.2 |
| February | 37.5 | 16.2 | 26.7 | 0.02 | 0.3 |
| March | 49.8 | 26.0 | 37.8 | 0.06 | 0.2 |
| April | 62.7 | 37.1 | 49.8 | 0.10 | 0.1 |
| May | 73.6 | 48.8 | 61.0 | 0.13 | 0.0 |
| June | 83.2 | 58.7 | 70.9 | 0.13 | 0.0 |
| July | 87.5 | 63.6 | 75.6 | 0.11 | 0.0 |

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| | | | | | |
|-----------|------|------|------|------|-----|
| August | 85.6 | 61.2 | 73.3 | 0.12 | 0.0 |
| September | 77.7 | 51.5 | 64.4 | 0.10 | 0.2 |
| October | 65.2 | 38.9 | 52.0 | 0.06 | 0.0 |
| November | 47.0 | 26.0 | 36.4 | 0.03 | 0.1 |
| December | 34.5 | 15.3 | 24.8 | 0.02 | 0.2 |

Source: High Plains Regional Climate Center.

HAZARD IDENTIFICATION AND RISK ASSESSMENT SUMMARY

The hazard identification was conducted to determine the hazards that threaten Antelope, Holt, and Knox Counties. It was established through public input and information provided by elected officials, key stakeholders, and residents throughout the planning area, as well as conducting research on each hazard type identified in the State of Nebraska Hazard Mitigation Plan. For the purpose of this plan update, nine natural hazards were initially considered, including severe winter storms (including extreme cold and severe winter weather), tornados, severe thunderstorms (including hail, lightning, and severe wind), 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 exceptions of dam failure and levee failure, were not included in this plan. Using existing hazards data and input gained through planning and public meetings, Antelope, Holt, and Knox Counties identified the hazards that could affect the planning area.

To best describe the hazards that affect the jurisdictions, Antelope, Holt, and Knox Counties utilized the following activities for identifying hazards in the planning area:

- ❑ Reviewed the State Hazard Mitigation Plan for information on hazards affecting the planning area.
- ❑ Documented the disaster declaration history.
- ❑ Downloaded weather-related events from online resources, such as the National Climatic Data Center.
- ❑ Reviewed existing studies, reports, and plans related to hazards in the planning area.
- ❑ Used flood insurance rate maps (FIRM) and non-regulatory flood risk assessment products developed for the planning area by FEMA as part of the National Flood Insurance Program (NFIP) and the RiskMAP program.
- ❑ Contacted colleges or universities that have hazard-related academic programs or extension services.
- ❑ Interviewed the planning team and stakeholders about which hazards affect the planning area and should be described in the mitigation plan.
- ❑ Consulted local resources such as the newspaper, chamber of commerce, local historical society, or other resources with records of past occurrences.
- ❑ Referenced hazards previously identified to determine if they were still relevant.

Hazards data from the Nebraska Emergency Management Agency (NEMA) State of Nebraska Mitigation Plan, Federal Emergency Management Agency (FEMA), National Oceanic and Atmospheric Administration (NOAA), National Climatic Data Center (NCDC), as well as other sources were analyzed to gage the overall significance of the hazards to Hayes, Frontier, and Knox Counties. Overall significance was calculated based on risk assessment criteria such as frequency and damage, including deaths and injuries, as well as property, crop, and economic damage. Hazards that occur relatively infrequent or have minimal to no impact on the planning area were deemed to be of low significance. This evaluation was used by Antelope, Holt, and Knox Counties to identify the hazards of greatest overall significance, allowing the Counties to concentrate resources where they are needed most.

The mitigation plan update focuses on how risk has changed since the previous plans were completed, particularly changes related to land use development and new hazard information. New development in hazard-prone areas, areas affected by recent disasters, and new data and reports were incorporated into the plan in order to analyze the current risk and update mitigation actions. The Nebraska State Hazard Mitigation Plan was consulted to assess the potential of new hazards for Antelope, Holt, and Knox Counties. The previous Knox County Plan was also reevaluated, and the comments in Table 6.110 detail how hazards were updated.

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TABLE 6.89: KNOX COUNTY HAZARD IDENTIFICATION [COMPARISON] 2010-2016

| 2016 Hazards | 2010 Hazards* | 2016 Comment |
|-----------------------|---|---|
| Dam Failure | Hazard identified and evaluated. | Hazard identified and evaluated with updated data, analysis, and risk assessment. |
| Drought | Hazard identified but not evaluated. | New hazard. |
| Earthquake | Hazard identified but not evaluated. | Hazard identified but not evaluated. |
| Extreme Cold | Hazard not identified. | New hazard (included under Severe Winter Storms). |
| Extreme Heat | Hazard not identified. | New hazard. |
| Flood | Hazard identified and evaluated. | Hazard identified and evaluated with updated data, analysis, and risk assessment. |
| Hail | Hazard identified and evaluated (included under Thunderstorms/ High Wind/ Lightning/ Hail). | Hazard identified and evaluated with updated data, analysis, and risk assessment (included under Severe Thunderstorms). |
| Landslide | Hazard not identified. | Hazard identified but not evaluated. |
| Lightning | Hazard identified and evaluated (included under Thunderstorms/ High Wind/ Lightning/ Hail). | Hazard identified and evaluated with updated data, analysis, and risk assessment (included under Severe Thunderstorms). |
| Severe Wind | Hazard identified and evaluated (included under Thunderstorms/ High Wind/ Lightning/ Hail). | Hazard identified and evaluated with updated data, analysis, and risk assessment (included under Severe Thunderstorms). |
| Severe Winter Weather | Hazard identified and evaluated. | Hazard identified and evaluated with updated data, analysis, and risk assessment. |
| Tornado | Hazard identified and evaluated. | Hazard identified and evaluated with updated data, analysis, and risk assessment. |
| Wildfire | Hazard identified and evaluated. | Hazard identified but not evaluated. |
| Levee Failure | Hazard identified but not evaluated. | Hazard identified but not evaluated. |

Source: Knox County Hazard Mitigation Plan, 2010.

The Disaster Mitigation Act requires that Antelope, Holt, and Knox Counties evaluate the risks associated with each hazard identified in the planning process. Refer to Section Three for additional explanations on which hazards were evaluated and why certain hazards were not evaluated in this plan. The overall risk assessment for the identified hazard types represents the presence and vulnerability to each hazard type throughout the planning area. The individual hazard identification tables, based on the public input and information received, identify those hazard types which have occurred, have a significant likelihood to occur again, or have reason to potentially occur in Antelope, Holt, and Knox Counties. These tables were compiled after receiving responses from the public, discussing the public responses with the State Hazard Mitigation Officer, and conducting detailed research on the presence and risk of each hazard type. The individual participant hazard identification tables and responses may or may not reflect the consensus for risk and vulnerability to each hazard type for the planning area.

Tables 6.90-6.93 summarizes the results of the hazard identification and risk assessment for Knox County, based on the hazard data and input from the public. For each hazard identified, this table includes the location, maximum probable extent, probability of future events, and overall significance for the County and incorporated jurisdictions.

TABLE 6.90: HAZARD IDENTIFICATION & RISK ASSESSMENT [KNOX COUNTY] 2016

| Hazard | Location | Maximum Probable Extent | Probability of Future Events | Overall Significance |
|----------------------|-------------|-------------------------|------------------------------|----------------------|
| Severe Winter Storms | Extensive | Moderate | Highly Likely | Medium |
| Severe Thunderstorms | Significant | Moderate | Highly Likely | Medium |
| Tornados | Negligible | Severe | Highly Likely | Medium |
| Floods | Significant | Moderate | Highly Likely | Medium |
| Extreme Heat | Extensive | Severe | Unlikely | Medium |
| Drought | Extensive | Severe | Likely | High |
| Dam Failure | Significant | Severe | Unlikely | Low |

TABLE 6.91: HAZARD IDENTIFICATION & RISK ASSESSMENT [CENTER COUNTY] 2016

| Hazard | Location | Maximum Probable Extent | Probability of Future Events | Overall Significance |
|----------------------|-------------|-------------------------|------------------------------|----------------------|
| Severe Winter Storms | Extensive | Moderate | Highly Likely | Medium |
| Severe Thunderstorms | Significant | Moderate | Highly Likely | Medium |
| Tornados | Negligible | Severe | Highly Likely | Medium |
| Floods | Significant | Moderate | Highly Likely | Medium |
| Extreme Heat | Extensive | Severe | Unlikely | Medium |
| Drought | Extensive | Severe | Likely | High |
| Dam Failure | Significant | Severe | Unlikely | Low |

TABLE 6.92: HAZARD IDENTIFICATION & RISK ASSESSMENT [CREIGHTON COUNTY] 2016

| Hazard | Location | Maximum Probable Extent | Probability of Future Events | Overall Significance |
|----------------------|-------------|-------------------------|------------------------------|----------------------|
| Severe Winter Storms | Extensive | Moderate | Highly Likely | Medium |
| Severe Thunderstorms | Significant | Moderate | Highly Likely | Medium |
| Tornados | Negligible | Severe | Highly Likely | Medium |
| Floods | Significant | Moderate | Highly Likely | Medium |
| Extreme Heat | Extensive | Severe | Unlikely | Medium |
| Drought | Extensive | Severe | Likely | High |
| Dam Failure | Significant | Severe | Unlikely | Low |

TABLE 6.93: HAZARD IDENTIFICATION & RISK ASSESSMENT [NIOBRARA COUNTY] 2016

| Hazard | Location | Maximum Probable Extent | Probability of Future Events | Overall Significance |
|----------------------|-------------|-------------------------|------------------------------|----------------------|
| Severe Winter Storms | Extensive | Moderate | Highly Likely | Medium |
| Severe Thunderstorms | Significant | Moderate | Highly Likely | Medium |
| Tornados | Negligible | Severe | Highly Likely | Medium |
| Floods | Significant | Moderate | Highly Likely | Medium |
| Extreme Heat | Extensive | Severe | Unlikely | Medium |
| Drought | Extensive | Severe | Likely | High |
| Dam Failure | Significant | Severe | Unlikely | Low |

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THE ACTION PLAN – KNOX COUNTY

The action plan lays the groundwork for implementation. The plan was developed to present the recommendations established by Antelope, Holt, and Knox Counties on how the participating jurisdictions can reduce risk and vulnerability of people, property, infrastructure, and natural resources to future disaster losses. The action plan identifies how mitigation actions will be implemented, including who is responsible for which actions, what funding mechanisms and other resources are available or will be pursued, when actions will be completed, and how they are prioritized.

Plan updates reflect progress in local mitigation efforts. The integration of the plan into existing planning mechanisms and the implementation of mitigation actions demonstrate progress in risk reduction. Details describing how the current mitigation strategy, including goals and actions, will be incorporated into existing mechanisms are discussed in *Section Five: Review, Evaluation, and Implementation*.

The action plan detailed below contains both new actions developed for this plan update, as well as viable actions that had yet to be completed from the previous Knox County Plan.

- **New – Mitigation Action Items that are new in the 2016 plan**
- **Continued Action (Ongoing Action) – These 2010 action items have been completed to a certain point but require continued review and work on them**
- **Continued Action (Insufficient Funding) – These 2010 action items have not been completed due to insufficient funding. The jurisdictions still intend to complete these action items if funding becomes available.**

The actions are also listed by Priority with High being listed first. Each jurisdiction ranked the chosen action items by priority during the planning process and that ranking will be utilized if and when funding becomes available. The selected action item will be determined from discussions between the individual jurisdiction, specific county and pertinent Emergency Manager. Priority rankings, available funding, local needs, and other specific criteria will be used to select which action items will be completed.

LOCAL PLANS AND REGULATIONS

These actions include government authorities, policies, or codes that influence the way land and buildings are developed and built.

The Emergency Managers for each county will ultimately be responsible for the implementation of each mitigation action.

Liz Doerr (Zoning Administrator) – Antelope County
Deb Hilker (Emergency Manager) – Holt County
Laura Hintz (Emergency Manager) – Knox County

KNOX COUNTY

KNOX COUNTY

Knox County determined that existing or future flooding potential was a high concern. They wanted to make sure properties in flood prone areas were reduced or removed. They also wanted to improve warning and safety systems as well backup systems such as generators. These concerns were discussed and used to create most of the Mitigation Action Items. These Mitigation Action Items are fairly similar to the items listed in the 2010 Plan for Knox County.

PARTICIPATE OR MAINTAIN GOOD STANDING IN THE NATIONAL FLOOD INSURANCE PROGRAM

[Background] Participate in the National Flood Insurance Program (NFIP) or maintain good standing with the NFIP including floodplain management practices/requirements and regulation enforcements and updates.

[Benefits] Enable property owners to purchase insurance protection against flood losses. Good standing enables participants to apply for Pre-Disaster Mitigation Grant Program and Hazard Mitigation Grant Program cost-share.

[Responsible Agency & Partners] Knox County Staff

[Cost Estimate & Funding] \$5,000, Tax Revenue, grants, bequeaths

[Timeline] Continuous

[Priority] High

[Status] Continued Action from previous plan that requires ongoing action.

FLOOD-PRONE PROPERTY ACQUISITION

[Background] Voluntary acquisition and demolition of properties prone to flooding will reduce the general threat of flooding for communities. Additionally, this can provide flood insurance benefits to those communities within the National Flood Insurance Program. Repetitive loss structures are typically highest priority.

[Benefits] Voluntary acquisition and demolition of properties prone to flooding will reduce the damages associated with flooding for communities. Additionally, this can provide flood insurance benefits to those communities within the National Flood Insurance Program. Communities must be in good standing with National Flood Insurance Program to be eligible for Hazard Mitigation Grant Program.

[Responsible Agency & Partners] Knox County, Public Works, Utility, and/or Floodplain Management Department

[Cost Estimate & Funding] \$10,000+; Hazard Mitigation Assistance Grant Programs, Community Development Block Grant, Natural Resources Districts

[Timeline] 1-3 years

[Priority] High

[Status] Continued Action from previous plan that requires ongoing action.

STORM SHELTER AND SAFE ROOMS

[Background] Assess, design and construct fully supplied safe rooms in highly vulnerable urban and rural areas such as mobile home parks, campgrounds, schools, and other such areas throughout the planning area. Assess the adequacy of current public buildings to be used as safe rooms. Construct safe rooms in areas of greatest need, either as new construction or retrofitting.

[Benefits] Reduce the risk of death or injury in areas vulnerable to tornados, severe thunderstorms and other hazards.

[Responsible Agency & Partners] Knox County Administration, Planning, and/or Emergency Management Departments

[Cost Estimate & Funding] \$400 to \$500/square foot (stand-alone), \$350 to 400/square foot (addition/retrofit); Hazard Mitigation Assistance Grant Programs

[Timeline] 1-3 years

[Priority] High

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[Status] Continued Action from previous plan that has not been completed yet due to insufficient funding.

BACKUP GENERATORS

[Background] Provide a portable or stationary source of backup power to redundant power supplies, municipal wells, lift stations, and other critical facilities and shelters.

[Benefits] Reduce the danger to human life/health by keeping utilities operating. Reduce the economic downtime associated with utility loss.

[Responsible Agency & Partners] Knox County Administration

[Cost Estimate & Funding] \$20,000 to \$35,000/generator; Hazard Mitigation Assistance Grant Programs

[Timeline] 1-3 years

[Priority] High

[Status] Continued Action from previous plan that has not been completed yet due to insufficient funding.

NEW WATER WELL, TOWER, AND STAND PIPE

[Background] Evaluate the need to expand water storage capacity through a new water tower, stand pipe, etc. to provide a safe water supply for the community and additional water for fire protection. Communities can evaluate the need to install a new well to provide a safe backup water supply for the community, replace existing wells affected by drought, and additional water for fire protection.

[Benefits] Establish back-up supplies of municipal water to supply the needs of citizens. Identify adequate water sources to mitigate potential damages or expenses due to drought. Provide a dependable and ready supply of water so fire districts don't have to rely on equipment and personnel to move water from local water sources to the fire.

[Responsible Agency & Partners] Knox County

[Cost Estimate & Funding] \$150,000 to \$450,000; Hazard Mitigation Assistance Grant Programs, Community Development Block Grant, State Revolving Loan Fund

[Timeline] 3-5 years

[Priority] Medium

[Status] Continued Action from previous plan that has not been completed yet due to insufficient funding.

ROAD AND EMBANKMENT IMPROVEMENTS

[Background] Identify, design, and construct road and embankment improvements as necessary for proper drainage and to adequately manage the traffic load.

[Benefits] Properly designed and constructed roads and embankments promote safer travel and allow for increased emergency response.

[Responsible Agency & Partners] Knox County Board of Commissioners and Planning and Zoning Commission

[Cost Estimate & Funding] \$50,000+; Hazard Mitigation Assistance Grant Programs

[Timeline] 1-3 years

[Priority] Medium

[Status] This a continued action from past plan that is an ongoing action.

ALERT AND WARNING SIRENS

[Background] Perform an evaluation of existing alert sirens to determine sirens which should be replaced or upgraded. Install new sirens where lacking and remote activation.

[Benefits] Reduces the risk of death/injury associated with severe weather; promoting awareness and ensures people take shelter when needed.

[Responsible Agency & Partners] Knox County, Individual City or Villages Public Works Departments and/or Emergency Management Departments, Natural Resources Districts

[Cost Estimate & Funding] \$25,000+; Hazard Mitigation Assistance Grant Programs, Natural Resources Districts

[Timeline] 1-3 years

[Priority] Medium

[Status] Continued Action from previous plan that has not been completed yet due to insufficient funding.

CIVIL SERVICE IMPROVEMENTS

[Background] Improve emergency rescue and response equipment and facilities by providing additional, or updating existing emergency response equipment. This could include fire equipment, ATVs, water tanks/truck, snow removal equipment, pumps, etc. This would also include developing backup systems for emergency vehicles, identifying and training additional personnel for emergency response, or continuing educational opportunities for current personnel.

[Benefits] Having appropriate and up to date equipment along with adequately trained and numbered personnel increases safety and reduces the risk of damage.

[Responsible Agency & Partners] Knox County, Individual City or Villages Public Works Departments and/or Emergency Management Departments

[Cost Estimate & Funding] \$5,000+; Hazard Mitigation Assistance Grant Programs

[Timeline] 1-3 years

[Priority] Medium

[Status] Continued Action from previous plan that requires ongoing action.

PUBLIC AWARENESS AND EDUCATION CAMPAIGNS

[Background] Through activities such as outreach projects, distribution of maps and environmental education increase public awareness of natural hazards to both public and private property owners, renters, businesses, and local officials about hazards and ways to protect people and property from these hazards. In addition, educate citizens on erosion control and water conservation methods.

[Benefits] Public awareness reduces the risk of property loss and damage, injury and death. It increases knowledge on emergency procedures, facilities, conservation, and is key to preparedness.

[Responsible Agency & Partners] Knox County, Individual City or Villages Departments (Fire, Police, Administration, Public Works, Parks, Floodplain Management, Utility, Roads, and/or Emergency Management Department(s); School Boards; Neighborhood/Homeowner Associations), Natural Resources Districts, Nebraska Emergency Management Agency, Nebraska Department of Environmental Quality, Nebraska Department of Natural Resources

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[Cost Estimate & Funding] \$1,000+; Hazard Mitigation Assistance Grant Programs

[Timeline] 1-3 years

[Priority] Medium

[Status] Continued Action from previous plan that requires ongoing action.

DRAINAGE ASSESSMENT FOR BRIDGE AND CULVERT IMPROVEMENTS

[Background] Preliminary drainage studies and assessments can be conducted to identify and prioritize design improvements to address site specific localized flooding/drainage issues to reduce and/or alleviate flooding. Stormwater master plans can be conducted to perform a community-wide stormwater evaluation, identifying multiple problem areas and potential drainage improvements.

[Benefits] Proactive steps to identify all potential problems/issues can lead to effectively addressing improvements and prioritizing the projects to improve conditions. These improvements can serve to more effectively convey runoff within jurisdictions, preventing interior localized flooding resulting in damages. This ensures that the most beneficial projects are done first and could possibly eliminate the need for others.

[Responsible Agency & Partners] Knox County, Public Works, Utility, and/or Floodplain Management Department

[Cost Estimate & Funding] \$10,000 to \$100,000+; Hazard Mitigation Assistance Grant Programs, Community Development Block Grant, Natural Resources Districts

[Timeline] 1-3 years

[Priority] Low

[Status] Continued Action from previous plan that requires ongoing action.

FLOODPLAIN DEVELOPMENT ORDINANCE ENFORCEMENT

[Background] Continue or improve floodplain management practices such as adoption and enforcement of floodplain management requirements (regulation of construction in significant flood hazard areas), floodplain identification and mapping (local requests for map updates), description of community assistance and monitoring activities, explanation for failure to participate in the National Flood Insurance Program, Community Rating System (CRS), and participation in Federal Emergency Management Agency's Cooperating Technical Partners Program (CTP) to increase local involvement in the flood mapping process. Continue to enforce local floodplain regulations for structures located in the 100-year floodplain. Strict enforcement of the type of development and elevations of structures should be considered through issuance of floodplain development permits by any community or County. Continue education of building inspectors or Certified Floodplain Managers. Encourage building regulations for storm resistance structures.

[Benefits] Continue compliance with the National Flood Insurance Program. Good standing enables participants to apply for Pre-Disaster Mitigation Grant Program and Hazard Mitigation Grant Program cost-share. Ensures that no new structures built will be vulnerable to flooding. Reducing damages and health risks associated with flooding.

[Responsible Agency & Partners] Knox County Administration and/or Floodplain Management Departments, Nebraska Department of Natural Resources

[Cost Estimate & Funding] \$5,000+; Hazard Mitigation Assistance Grant Programs, Community Development Block Grant

[Timeline] 1-3 years

[Priority] Low

[Status] Continued Action from previous plan that requires ongoing action.

STREAM BANK STABILIZATION

[Background] Stream bank/bed degradation can occur along many rivers and creeks. Stabilization improvements including rock rip rap, vegetative cover, j-hooks, boulder vanes, etc. can be implemented to reestablish the channel banks. Grade control structures including sheet-pile weirs, rock weirs, ponds, road dams, etc. can be implemented and improved to maintain the channel bed. Channel stabilization can protect structures, increase conveyance and provide flooding benefits. Flood protection for critical and/or highly vulnerable facilities, areas, populations, and infrastructure is key.

[Benefits] Stream bed/grade stabilization improvements can serve to more effectively protect structures, increase conveyance, prevent down cutting, and provide flooding benefits.

[Responsible Agency & Partners] Knox County, Public Works, Utility, and/or Floodplain Management Department

[Cost Estimate & Funding] \$50,000 to \$100,000+; Hazard Mitigation Assistance Grant Programs, Natural Resources Districts

[Timeline] 1-3 years

[Priority] Low

[Status] Continued Action from previous plan that requires ongoing action.

WARNING SYSTEMS

[Background] Improve city cable TV interrupt warning system and implement telephone interrupt system such as Reverse 911.

[Benefits] Reduces the risk of death/injury associated with severe weather; promoting awareness and ensures people take shelter when needed.

[Responsible Agency & Partners] Knox County, Public Works, Utility, and/or Floodplain Management Department,

[Cost Estimate & Funding] \$5,000+; Hazard Mitigation Assistance Grant Programs, Natural Resources Districts

[Timeline] 1-3 years

[Priority] Low

[Status] Continued Action from previous plan that has not been completed yet due to insufficient funding.

WEATHER RADIOS

[Background] Conduct an inventory of weather radios at schools and other critical facilities and provide new radios as needed.

[Benefits] Reduces the risk of death/injury associated with severe weather conditions by communication.

[Responsible Agency & Partners] Knox County, Individual City or Villages Public Works Departments and/or Emergency Management Departments

[Cost Estimate & Funding] \$75/radio; Hazard Mitigation Assistance Grant Programs

[Timeline] 1-3 years

[Priority] Low

Section Six [Participant Profiles | Knox County]

[Status] Continued Action from previous plan that has not been completed yet due to insufficient funding.

FLOOD-PRONE PROPERTY ACQUISITION

[Background] Voluntary acquisition and demolition of properties prone to flooding will reduce the general threat of flooding for communities. Additionally, this can provide flood insurance benefits to those communities within the National Flood Insurance Program. Repetitive loss structures are typically highest priority.

[Benefits] Voluntary acquisition and demolition of properties prone to flooding will reduce the damages associated with flooding for communities. Additionally, this can provide flood insurance benefits to those communities within the National Flood Insurance Program. Communities must be in good standing with National Flood Insurance Program to be eligible for Hazard Mitigation Grant Program.

[Responsible Agency & Partners] Knox County, Public Works, Utility, and/or Floodplain Management Department

[Cost Estimate & Funding] \$10,000+; Hazard Mitigation Assistance Grant Programs, Community Development Block Grant, Natural Resources Districts

[Timeline] 1-3 years

[Priority] Low

[Status] Continued Action from previous plan that requires ongoing action.

CENTER

Center's main concerns were their existing warning and safety systems. They were also concerned with infrastructure and flooding. These concerns were discussed and used to create most of the Mitigation Action Items. Center listed similar Mitigation Action Items in the 2010 plan with similar priorities.

PARTICIPATE OR MAINTAIN GOOD STANDING IN THE NATIONAL FLOOD INSURANCE PROGRAM

[Background] Participate in the National Flood Insurance Program (NFIP) or maintain good standing with the NFIP including floodplain management practices/requirements and regulation enforcements and updates.

[Benefits] Enable property owners to purchase insurance protection against flood losses. Good standing enables participants to apply for Pre-Disaster Mitigation Grant Program and Hazard Mitigation Grant Program cost-share.

[Responsible Agency & Partners] Center Administration (Village Board)

[Cost Estimate & Funding] \$5,000, Tax Revenue, grants, bequeaths

[Timeline] Continuous

[Priority] High

[Status] Continued Action from previous plan that requires ongoing action.

STORM SHELTER AND SAFE ROOMS

[Background] Assess, design and construct fully supplied safe rooms in highly vulnerable urban and rural areas such as mobile home parks, campgrounds, schools, and other such areas throughout the planning area. Assess the adequacy of current public buildings to be used as safe rooms. Construct safe rooms in areas of greatest need, either as new construction or retrofitting.

[Benefits] Reduce the risk of death or injury in areas vulnerable to tornados, severe thunderstorms and other hazards.

[Responsible Agency & Partners] Center Administration, Planning, and/or Emergency Management Departments

[Cost Estimate & Funding] \$400 to \$500/square foot (stand-alone), \$350 to 400/square foot (addition/retrofit); Hazard Mitigation Assistance Grant Programs

[Timeline] 1-3 years

[Priority] High

[Status] Continued Action from previous plan that has not been completed yet due to insufficient funding.

DRAINAGE ASSESSMENT FOR BRIDGE AND CULVERT IMPROVEMENTS

[Background] Preliminary drainage studies and assessments can be conducted to identify and prioritize design improvements to address site specific localized flooding/drainage issues to reduce and/or alleviate flooding. Stormwater master plans can be conducted to perform a community-wide stormwater evaluation, identifying multiple problem areas and potential drainage improvements.

[Benefits] Proactive steps to identify all potential problems/issues can lead to effectively addressing improvements and prioritizing the projects to improve conditions. These improvements can serve to more effectively convey runoff within jurisdictions, preventing interior localized flooding resulting in damages. This ensures that the most beneficial projects are done first and could possibly eliminate the need for others.

[Responsible Agency & Partners] Center Administration (Village Board)

[Cost Estimate & Funding] \$10,000 to \$100,000+; Hazard Mitigation Assistance Grant Programs, Community Development Block Grant, Natural Resources Districts

[Timeline] 1-3 years

[Priority] Medium

[Status] Continued Action from previous plan that requires ongoing action.

STREAM BANK STABILIZATION

[Background] Stream bank/bed degradation can occur along many rivers and creeks. Stabilization improvements including rock rip rap, vegetative cover, j-hooks, boulder vanes, etc. can be implemented to reestablish the channel banks. Grade control structures including sheet-pile weirs, rock weirs, ponds, road dams, etc. can be implemented and improved to maintain the channel bed. Channel stabilization can protect structures, increase conveyance and provide flooding benefits. Flood protection for critical and/or highly vulnerable facilities, areas, populations, and infrastructure is key.

[Benefits] Stream bed/grade stabilization improvements can serve to more effectively protect structures, increase conveyance, prevent down cutting, and provide flooding benefits.

[Responsible Agency & Partners] Center Public Works, Utility, and/or Floodplain Management Department, and Lower Niobrara Natural Resources District

[Cost Estimate & Funding] \$50,000 to \$100,000+; Hazard Mitigation Assistance Grant Programs, Natural Resources Districts

[Timeline] 1-3 years

[Priority] Medium

[Status] Continued Action from previous plan that requires ongoing action.

Section Six [Participant Profiles | Knox County]

WEATHER RADIOS

[Background] Conduct an inventory of weather radios at schools and other critical facilities and provide new radios as needed.

[Benefits] Reduces the risk of death/injury associated with severe weather conditions by communication.

[Responsible Agency & Partners] Center Administration (Village Board), Public Works, and/or Emergency Management Departments

[Cost Estimate & Funding] \$75/radio; Hazard Mitigation Assistance Grant Programs

[Timeline] 1-3 years

[Priority] Medium

[Status] Continued Action from previous plan that has not been completed yet due to insufficient funding.

BACKUP GENERATORS

[Background] Provide a portable or stationary source of backup power to redundant power supplies and other critical facilities and shelters.

[Benefits] Reduce the danger to human life/health by keeping utilities operating. Reduce the economic downtime associated with utility loss.

[Responsible Agency & Partners] Center Administration (Village Board), Public Works, and/or Emergency Management Departments

[Cost Estimate & Funding] \$20,000 to \$35,000/generator; Hazard Mitigation Assistance Grant Programs

[Timeline] 1-3 years

[Priority] Medium

[Status] Continued Action from previous plan that has not been completed yet due to insufficient funding.

ALERT AND WARNING SIRENS

[Background] Perform an evaluation of existing alert sirens to determine sirens which should be replaced or upgraded. Install new sirens where lacking and remote activation.

[Benefits] Reduces the risk of death/injury associated with severe weather; promoting awareness and ensures people take shelter when needed.

[Responsible Agency & Partners] Center Administration (Village Board), Public Works, and/or Emergency Management Departments, Lower Niobrara Natural Resources District

[Cost Estimate & Funding] \$25,000+; Hazard Mitigation Assistance Grant Programs, Middle Republican Natural Resources District

[Timeline] 1-3 years

[Priority] Medium

[Status] Continued Action from previous plan that has not been completed yet due to insufficient funding.

CREIGHTON

Creighton's main concerns were flooding areas and their existing warning and safety systems. They were also concerned with infrastructure and potential flooding hazards. These concerns were discussed and used to create the majority of their Mitigation Action Items. Ewing listed similar Mitigation Action Items in the 2010 plan with priorities also being similar.

PARTICIPATE OR MAINTAIN GOOD STANDING IN THE NATIONAL FLOOD INSURANCE PROGRAM

[Background] Participate in the National Flood Insurance Program (NFIP) or maintain good standing with the NFIP including floodplain management practices/requirements and regulation enforcements and updates.

[Benefits] Enable property owners to purchase insurance protection against flood losses. Good standing enables participants to apply for Pre-Disaster Mitigation Grant Program and Hazard Mitigation Grant Program cost-share.

[Responsible Agency & Partners] Creighton Administration (City Board)

[Cost Estimate & Funding] \$5,000, Tax Revenue, grants, bequeaths

[Timeline] Continuous

[Priority] High

[Status] Continued Action from previous plan that requires ongoing action.

FLOODPLAIN DEVELOPMENT ORDINANCE ENFORCEMENT

[Background] Continue or improve floodplain management practices such as adoption and enforcement of floodplain management requirements (regulation of construction in significant flood hazard areas), floodplain identification and mapping (local requests for map updates), description of community assistance and monitoring activities, explanation for failure to participate in the National Flood Insurance Program, Community Rating System (CRS), and participation in Federal Emergency Management Agency's Cooperating Technical Partners Program (CTP) to increase local involvement in the flood mapping process. Continue to enforce local floodplain regulations for structures located in the 100-year floodplain. Strict enforcement of the type of development and elevations of structures should be considered through issuance of floodplain development permits by any community or County. Continue education of building inspectors or Certified Floodplain Managers. Encourage building regulations for storm resistance structures.

[Benefits] Continue compliance with the National Flood Insurance Program. Good standing enables participants to apply for Pre-Disaster Mitigation Grant Program and Hazard Mitigation Grant Program cost-share. Ensures that no new structures built will be vulnerable to flooding. Reducing damages and health risks associated with flooding.

[Responsible Agency & Partners] Creighton Administration and/or Floodplain Management Departments, Nebraska Department of Natural Resources

[Cost Estimate & Funding] \$5,000+; Hazard Mitigation Assistance Grant Programs, Community Development Block Grant

[Timeline] 1-3 years

[Priority] High

[Status] Continued Action from previous plan that requires ongoing action.

STORM SHELTER AND SAFE ROOMS

[Background] Assess, design and construct fully supplied safe rooms in highly vulnerable urban and rural areas such as mobile home parks, campgrounds, schools, and other such areas throughout the planning area. Assess the adequacy of current public buildings to be used as safe rooms. Construct safe rooms in areas of greatest need, either as new construction or retrofitting.

Section Six [Participant Profiles | Knox County]

[Benefits] Reduce the risk of death or injury in areas vulnerable to tornados, severe thunderstorms and other hazards.

[Responsible Agency & Partners] Creighton Administration, Planning, and/or Emergency Management Departments

[Cost Estimate & Funding] \$400 to \$500/square foot (stand-alone), \$350 to 400/square foot (addition/retrofit); Hazard Mitigation Assistance Grant Programs

[Timeline] 1-3 years

[Priority] High

[Status] Continued Action from previous plan that has not been completed yet due to insufficient funding.

ALERT AND WARNING SIRENS

[Background] Perform an evaluation of existing alert sirens to determine sirens which should be replaced or upgraded. Install new sirens where lacking and remote activation.

[Benefits] Reduces the risk of death/injury associated with severe weather; promoting awareness and ensures people take shelter when needed.

[Responsible Agency & Partners] Creighton Administration (City Board), Public Works, and/or Emergency Management Departments,

[Cost Estimate & Funding] \$25,000+; Hazard Mitigation Assistance Grant Programs, Middle Republican Natural Resources District

[Timeline] 1-3 years

[Priority] High

[Status] Continued Action from previous plan that has not been completed yet due to insufficient funding.

DRAINAGE ASSESSMENT FOR BRIDGE AND CULVERT IMPROVEMENTS

[Background] Preliminary drainage studies and assessments can be conducted to identify and prioritize design improvements to address site specific localized flooding/drainage issues to reduce and/or alleviate flooding. Stormwater master plans can be conducted to perform a community-wide stormwater evaluation, identifying multiple problem areas and potential drainage improvements.

[Benefits] Proactive steps to identify all potential problems/issues can lead to effectively addressing improvements and prioritizing the projects to improve conditions. These improvements can serve to more effectively convey runoff within jurisdictions, preventing interior localized flooding resulting in damages. This ensures that the most beneficial projects are done first and could possibly eliminate the need for others.

[Responsible Agency & Partners] Creighton Administration (City Board)

[Cost Estimate & Funding] \$10,000 to \$100,000+; Hazard Mitigation Assistance Grant Programs, Community Development Block Grant, Natural Resources Districts

[Timeline] 1-3 years

[Priority] Medium

[Status] Continued Action from previous plan that requires ongoing action.

STREAM BANK STABILIZATION

[Background] Stream bank/bed degradation can occur along many rivers and creeks. Stabilization improvements including rock rip rap, vegetative cover, j-hooks, boulder vanes, etc. can be implemented to reestablish the channel banks. Grade control structures including sheet-pile weirs, rock weirs, ponds, road dams, etc. can be implemented and improved to maintain the channel bed. Channel stabilization can protect structures, increase conveyance and provide flooding benefits. Flood protection for critical and/or highly vulnerable facilities, areas, populations, and infrastructure is key.

[Benefits] Stream bed/grade stabilization improvements can serve to more effectively protect structures, increase conveyance, prevent down cutting, and provide flooding benefits.

[Responsible Agency & Partners] Creighton Public Works, Utility, and/or Floodplain Management Department, and Lower Niobrara Natural Resources District

[Cost Estimate & Funding] \$50,000 to \$100,000+; Hazard Mitigation Assistance Grant Programs, Natural Resources Districts

[Timeline] 1-3 years

[Priority] Medium

[Status] Continued Action from previous plan that requires ongoing action.

BACKUP GENERATORS

[Background] Provide a portable or stationary source of backup power to redundant power supplies for existing wells and Village office.

[Benefits] Reduce the danger to human life/health by keeping utilities operating. Reduce the economic downtime associated with utility loss.

[Responsible Agency & Partners] City of Creighton (City Board)

[Cost Estimate & Funding] \$20,000 to \$35,000/generator; Hazard Mitigation Assistance Grant Programs, Tax Revenue

[Timeline] 1 year

[Priority] Medium

[Status] Continued Action from previous plan that has not been completed yet due to insufficient funding.

PUBLIC AWARENESS AND EDUCATION CAMPAIGNS

[Background] Through activities such as outreach projects, distribution of maps and environmental education increase public awareness of natural hazards to both public and private property owners, renters, businesses, and local officials about hazards and ways to protect people and property from these hazards. In addition, educate citizens on erosion control and water conservation methods.

[Benefits] Public awareness reduces the risk of property loss and damage, injury and death. It increases knowledge on emergency procedures, facilities, conservation, and is key to preparedness.

[Responsible Agency & Partners] Creighton Fire, Police, Administration (City Board), Public Works, Parks, Floodplain Management, Utility, Roads, and/or Emergency Management Departments; School Boards; Neighborhood/Homeowner Associations), Lower Niobrara Natural Resources District, Nebraska Emergency Management Agency, Nebraska Department of Environmental Quality, Nebraska Department of Natural Resources

[Cost Estimate & Funding] \$1,000+; Hazard Mitigation Assistance Grant Programs

Section Six [Participant Profiles | Knox County]

[Timeline] 1-3 years

[Priority] Medium

[Status] Continued Action from previous plan that requires ongoing action.

NIOBRARA

Niobrara's main concerns were their existing warning and safety systems as well as maintain their NFIP program. These concerns were discussed and used to create most of the Mitigation Action Items. Niobrara listed similar Mitigation Action Items in the 2010 plan.

PARTICIPATE OR MAINTAIN GOOD STANDING IN THE NATIONAL FLOOD INSURANCE PROGRAM

[Background] Participate in the National Flood Insurance Program (NFIP) or maintain good standing with the NFIP including floodplain management practices/requirements and regulation enforcements and updates.

[Benefits] Enable property owners to purchase insurance protection against flood losses. Good standing enables participants to apply for Pre-Disaster Mitigation Grant Program and Hazard Mitigation Grant Program cost-share.

[Responsible Agency & Partners] Niobrara Administration (Village Board)

[Cost Estimate & Funding] \$5,000, Tax Revenue, grants, bequeaths

[Timeline] Continuous

[Priority] High

[Status] Continued Action from previous plan that requires ongoing action.

ALERT AND WARNING SIRENS

[Background] Perform an evaluation of existing alert sirens to determine sirens which should be replaced or upgraded. Install new sirens where lacking and remote activation.

[Benefits] Reduces the risk of death/injury associated with severe weather; promoting awareness and ensures people take shelter when needed.

[Responsible Agency & Partners] Niobrara Administration (Village Board), Public Works, and/or Emergency Management Departments, Lower Niobrara Natural Resources District

[Cost Estimate & Funding] \$25,000+; Hazard Mitigation Assistance Grant Programs, Middle Republican Natural Resources District

[Timeline] 1-3 years

[Priority] Medium

[Status] Continued Action from previous plan that has not been completed yet due to insufficient funding.

NATIONAL CLIMATIC DATA CENTER [NCDC]

HAZARD EVENT DETAILS

TABLE 6.94: NCDC EVENTS [SEVERE WINTER STORMS] JANUARY 1, 1950 – JANUARY 31, 2016

| Location | County/ Zone | Date | Type | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|----------|--------------|------------|-------------------------|-----------|--------|----------|-----------------|-------------|
| | KNOX (ZONE) | 1/26/1996 | Winter Storm | | 0 | 0 | 0 | 0 |
| | KNOX (ZONE) | 3/24/1996 | Blizzard | | 0 | 0 | 0 | 0 |
| | KNOX (ZONE) | 11/14/1996 | Winter Storm | | 0 | 0 | 0 | 0 |
| | KNOX (ZONE) | 12/25/1996 | Winter Storm | | 0 | 0 | 0 | 0 |
| | KNOX (ZONE) | 1/15/1997 | Blizzard | | 0 | 0 | 0 | 0 |
| | KNOX (ZONE) | 2/3/1997 | Winter Storm | | 0 | 0 | 0 | 0 |
| | KNOX (ZONE) | 4/9/1997 | Winter Storm | | 0 | 0 | 0 | 0 |
| | KNOX (ZONE) | 11/10/1998 | Winter Storm | | 0 | 0 | 0 | 0 |
| | KNOX (ZONE) | 2/22/1999 | Winter Storm | | 0 | 0 | 0 | 0 |
| | KNOX (ZONE) | 3/8/1999 | Winter Storm | | 0 | 0 | 0 | 0 |
| | KNOX (ZONE) | 11/23/1999 | Winter Storm | | 0 | 0 | 0 | 0 |
| | KNOX (ZONE) | 11/11/2000 | Winter Storm | | 0 | 0 | 0 | 0 |
| | KNOX (ZONE) | 12/16/2000 | Winter Storm | | 0 | 0 | 0 | 0 |
| | KNOX (ZONE) | 12/16/2000 | Extreme Cold/Wind Chill | | 0 | 0 | 0 | 0 |
| | KNOX (ZONE) | 12/18/2000 | Extreme Cold/Wind Chill | | 0 | 0 | 0 | 0 |
| | KNOX (ZONE) | 1/13/2001 | Winter Storm | | 0 | 0 | 0 | 0 |
| | KNOX (ZONE) | 1/29/2001 | Winter Storm | | 0 | 0 | 0 | 0 |
| | KNOX (ZONE) | 2/23/2001 | Winter Storm | | 0 | 0 | 0 | 0 |
| | KNOX (ZONE) | 11/26/2001 | Winter Storm | | 0 | 0 | 0 | 0 |
| | KNOX (ZONE) | 2/9/2002 | Winter Storm | | 0 | 0 | 0 | 0 |
| | KNOX (ZONE) | 1/15/2003 | Winter Storm | | 0 | 0 | 0 | 0 |
| | KNOX (ZONE) | 1/22/2003 | Extreme Cold/Wind Chill | | 0 | 0 | 0 | 0 |
| | KNOX (ZONE) | 4/6/2003 | Winter Storm | | 0 | 0 | 0 | 0 |
| | KNOX (ZONE) | 12/8/2003 | Winter Storm | | 0 | 0 | 0 | 0 |
| | KNOX (ZONE) | 2/1/2004 | Winter Storm | | 0 | 0 | 0 | 0 |
| | KNOX (ZONE) | 2/4/2004 | Winter Storm | | 0 | 0 | 0 | 0 |
| | KNOX (ZONE) | 3/15/2004 | Winter Storm | | 0 | 0 | 0 | 0 |
| | KNOX (ZONE) | 11/28/2005 | Winter Storm | | 0 | 0 | 3000000 | 0 |
| | KNOX (ZONE) | 11/28/2005 | Blizzard | | 0 | 0 | 0 | 0 |
| | KNOX (ZONE) | 2/16/2006 | Winter Storm | | 0 | 0 | 0 | 0 |
| | KNOX (ZONE) | 3/20/2006 | Winter Storm | | 0 | 0 | 0 | 0 |
| | KNOX (ZONE) | 12/29/2006 | Winter Storm | | 0 | 0 | 500000 | 0 |
| | KNOX (ZONE) | 2/24/2007 | Winter Storm | | 0 | 0 | 0 | 0 |

Section Six [Participant Profiles | Knox County]

| Location | County/ Zone | Date | Type | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|-------------|--------------|------------|-------------------------|-----------|--------|----------|-----------------|-------------|
| | KNOX (ZONE) | 3/2/2007 | Blizzard | | 0 | 0 | 0 | 0 |
| | KNOX (ZONE) | 1/20/2008 | Heavy Snow | | 0 | 0 | 0 | 0 |
| | KNOX (ZONE) | 3/31/2008 | Heavy Snow | | 0 | 0 | 0 | 0 |
| | KNOX (ZONE) | 4/10/2008 | Winter Storm | | 0 | 0 | 0 | 0 |
| | KNOX (ZONE) | 12/15/2008 | Extreme Cold/Wind Chill | | 0 | 0 | 0 | 0 |
| | KNOX (ZONE) | 1/12/2009 | Blizzard | | 0 | 0 | 0 | 0 |
| | KNOX (ZONE) | 3/31/2009 | Winter Storm | | 0 | 0 | 0 | 0 |
| | KNOX (ZONE) | 4/4/2009 | Blizzard | | 0 | 0 | 0 | 0 |
| | KNOX (ZONE) | 12/8/2009 | Winter Storm | | 0 | 0 | 0 | 0 |
| | KNOX (ZONE) | 12/8/2009 | Blizzard | | 0 | 0 | 0 | 0 |
| | KNOX (ZONE) | 12/24/2009 | Winter Storm | | 0 | 0 | 0 | 0 |
| | KNOX (ZONE) | 12/25/2009 | Blizzard | | 0 | 0 | 0 | 0 |
| | KNOX (ZONE) | 1/6/2010 | Winter Storm | | 0 | 0 | 0 | 0 |
| | KNOX (ZONE) | 1/7/2010 | Extreme Cold/Wind Chill | | 0 | 0 | 0 | 0 |
| | KNOX (ZONE) | 1/24/2010 | Blizzard | | 0 | 0 | 0 | 0 |
| | KNOX (ZONE) | 2/14/2010 | Blizzard | | 0 | 0 | 0 | 0 |
| | KNOX (ZONE) | 12/11/2010 | Blizzard | | 0 | 0 | 0 | 0 |
| | KNOX (ZONE) | 1/9/2011 | Winter Storm | | 0 | 0 | 0 | 0 |
| | KNOX (ZONE) | 2/1/2011 | Extreme Cold/Wind Chill | | 0 | 0 | 0 | 0 |
| | KNOX (ZONE) | 4/15/2011 | Winter Storm | | 0 | 0 | 0 | 0 |
| | KNOX (ZONE) | 12/27/2012 | Heavy Snow | | 0 | 0 | 0 | 0 |
| | KNOX (ZONE) | 4/9/2013 | Winter Storm | | 0 | 0 | 0 | 0 |
| | KNOX (ZONE) | 1/5/2014 | Extreme Cold/Wind Chill | | 0 | 0 | 0 | 0 |
| | KNOX (ZONE) | 12/15/2014 | Winter Storm | | 0 | 0 | 0 | 0 |
| | KNOX (ZONE) | 1/31/2015 | Winter Storm | | 0 | 0 | 0 | 0 |
| | KNOX (ZONE) | 2/1/2015 | Winter Storm | | 0 | 0 | 0 | 0 |
| | KNOX (ZONE) | 11/20/2015 | Heavy Snow | | 0 | 0 | 0 | 0 |
| | KNOX (ZONE) | 11/30/2015 | Winter Storm | | 0 | 0 | 0 | 0 |
| | KNOX (ZONE) | 12/25/2015 | Heavy Snow | | 0 | 0 | 0 | 0 |
| Totals [62] | | | | | 0 | 0 | 3.50M | 0.00K |
| | | | | | | | 3.50M | |

TABLE 6.95: NCDC EVENTS [SEVERE THUNDERSTORMS] JANUARY 1, 1950 – JANUARY 31, 2016

| Location | County/ Zone | Date | Type | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|----------|--------------|-----------|------|-----------|--------|----------|-----------------|-------------|
| | KNOX CO. | 7/12/1957 | Hail | 2 in. | 0 | 0 | 0 | 0 |
| | KNOX CO. | 7/17/1960 | Hail | 1.5 in. | 0 | 0 | 0 | 0 |
| | KNOX CO. | 6/21/1963 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| | KNOX CO. | 8/14/1966 | Hail | 1.5 in. | 0 | 0 | 0 | 0 |
| | KNOX CO. | 8/14/1967 | Hail | 2 in. | 0 | 0 | 0 | 0 |

Section Six [Participant Profiles | Knox County]

| Location | County/ Zone | Date | Type | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|----------|--------------|-----------|-------------------|-----------|--------|----------|-----------------|-------------|
| | KNOX CO. | 7/29/1968 | Hail | 3 in. | 0 | 0 | 0 | 0 |
| | KNOX CO. | 6/6/1971 | Hail | 1.5 in. | 0 | 0 | 0 | 0 |
| | KNOX CO. | 4/28/1973 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| | KNOX CO. | 4/28/1973 | Thunderstorm Wind | 51 kts. | 0 | 0 | 0 | 0 |
| | KNOX CO. | 6/21/1974 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| | KNOX CO. | 5/19/1977 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| | KNOX CO. | 6/25/1978 | Thunderstorm Wind | 87 kts. | 0 | 0 | 0 | 0 |
| | KNOX CO. | 6/19/1979 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| | KNOX CO. | 7/14/1979 | Hail | 1.5 in. | 0 | 0 | 0 | 0 |
| | KNOX CO. | 7/19/1979 | Hail | 1.5 in. | 0 | 0 | 0 | 0 |
| | KNOX CO. | 9/8/1979 | Thunderstorm Wind | 52 kts. | 0 | 0 | 0 | 0 |
| | KNOX CO. | 5/25/1980 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| | KNOX CO. | 5/25/1980 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| | KNOX CO. | 5/26/1980 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| | KNOX CO. | 5/26/1980 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| | KNOX CO. | 5/29/1980 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| | KNOX CO. | 5/29/1980 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| | KNOX CO. | 6/14/1980 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| | KNOX CO. | 6/26/1980 | Thunderstorm Wind | 70 kts. | 0 | 0 | 0 | 0 |
| | KNOX CO. | 8/10/1980 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| | KNOX CO. | 9/1/1980 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| | KNOX CO. | 6/13/1981 | Hail | 4.5 in. | 0 | 0 | 0 | 0 |
| | KNOX CO. | 6/13/1981 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| | KNOX CO. | 6/21/1981 | Hail | 1.5 in. | 0 | 0 | 0 | 0 |
| | KNOX CO. | 9/28/1982 | Hail | 2 in. | 0 | 0 | 0 | 0 |
| | KNOX CO. | 9/28/1982 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| | KNOX CO. | 6/7/1984 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| | KNOX CO. | 6/11/1984 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| | KNOX CO. | 6/24/1984 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| | KNOX CO. | 7/5/1984 | Hail | 2.5 in. | 0 | 5 | 0 | 0 |
| | KNOX CO. | 7/5/1984 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| | KNOX CO. | 4/20/1985 | Hail | 4 in. | 0 | 0 | 0 | 0 |
| | KNOX CO. | 4/20/1985 | Hail | 4 in. | 0 | 0 | 0 | 0 |
| | KNOX CO. | 4/20/1985 | Hail | 4 in. | 0 | 0 | 0 | 0 |
| | KNOX CO. | 7/21/1985 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| | KNOX CO. | 7/21/1985 | Hail | 1.5 in. | 0 | 0 | 0 | 0 |
| | KNOX CO. | 7/21/1985 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| | KNOX CO. | 7/21/1985 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| | KNOX CO. | 8/20/1985 | Hail | 1.5 in. | 0 | 0 | 0 | 0 |

Section Six [Participant Profiles | Knox County]

| Location | County/ Zone | Date | Type | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|------------|--------------|------------|-------------------|-----------|--------|----------|-----------------|-------------|
| | KNOX CO. | 8/20/1985 | Hail | 1.5 in. | 0 | 0 | 0 | 0 |
| | KNOX CO. | 5/7/1986 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| | KNOX CO. | 5/7/1986 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| | KNOX CO. | 5/7/1986 | Hail | 1.5 in. | 0 | 0 | 0 | 0 |
| | KNOX CO. | 7/18/1986 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| | KNOX CO. | 5/23/1989 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| | KNOX CO. | 5/18/1990 | Thunderstorm Wind | 63 ks. | 0 | 0 | 0 | 0 |
| | KNOX CO. | 6/16/1990 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| | KNOX CO. | 6/4/1991 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| | KNOX CO. | 6/4/1991 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| | KNOX CO. | 5/15/1992 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| | KNOX CO. | 5/15/1992 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| Lindy | KNOX CO. | 8/14/1993 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| Crofton | KNOX CO. | 4/25/1994 | Thunderstorm Wind | 59 kts. | 0 | 0 | 0 | 0 |
| Verdigre | KNOX CO. | 6/12/1994 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| Crofton | KNOX CO. | 7/1/1994 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| Niobrara | KNOX CO. | 7/4/1994 | Thunderstorm Wind | 52 kts. | 0 | 0 | 0 | 0 |
| Crofton | KNOX CO. | 7/4/1994 | Thunderstorm Wind | 52 kts. | 0 | 0 | 0 | 0 |
| Creighton | KNOX CO. | 8/7/1994 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| Niobrara | KNOX CO. | 7/21/1995 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| Crofton | KNOX CO. | 7/21/1995 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| Crofton | KNOX CO. | 7/21/1995 | Thunderstorm Wind | 59 kts. | 0 | 0 | 0 | 0 |
| Creighton | KNOX CO. | 8/18/1995 | Thunderstorm Wind | 50 kts. | 0 | 0 | 0 | 0 |
| | KNOX (ZONE) | 2/10/1996 | High Wind | 56 kts. | 0 | 0 | 5.00K | 0 |
| | KNOX (ZONE) | 4/25/1996 | High Wind | 61 kts. | 0 | 1 | 6.00K | 0 |
| CREIGHTON | KNOX CO. | 6/14/1996 | Hail | 0.75 in. | 0 | 0 | 0 | 2.00M |
| CREIGHTON | KNOX CO. | 6/14/1996 | Thunderstorm Wind | 52 kts. | 0 | 0 | 0 | 0 |
| CROFTON | KNOX CO. | 7/16/1996 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| CROFTON | KNOX CO. | 7/16/1996 | Hail | 1 in. | 0 | 0 | 25.00K | 100.00K |
| NIOBRARA | KNOX CO. | 7/26/1996 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| CROFTON | KNOX CO. | 8/3/1996 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| VERDIGRE | KNOX CO. | 8/6/1996 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| VERDEL | KNOX CO. | 8/11/1996 | Lightning | | 0 | 0 | 0.50K | 0 |
| BLOOMFIELD | KNOX CO. | 10/16/1996 | Hail | 1.75 kts. | 0 | 0 | 0 | 0 |
| | KNOX (ZONE) | 10/26/1996 | High Wind | 54 kts. | 0 | 0 | 12.00K | 0 |
| | KNOX (ZONE) | 10/29/1996 | High Wind | 54 kts. | 0 | 0 | 0 | 0 |
| | KNOX (ZONE) | 4/6/1997 | High Wind | 54 kts. | 0 | 0 | 0 | 0 |
| CROFTON | KNOX CO. | 7/7/1997 | Hail | 1 in. | 0 | 0 | 0 | 0 |

Section Six [Participant Profiles | Knox County]

| Location | County/ Zone | Date | Type | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|------------|--------------|------------|-------------------|-----------|--------|----------|-----------------|-------------|
| CROFTON | KNOX CO. | 7/7/1997 | Hail | 2.75 in. | 0 | 0 | 0 | 80.00K |
| CROFTON | KNOX CO. | 7/27/1997 | Thunderstorm Wind | 52 kts. | 0 | 0 | 0 | 0 |
| CENTER | KNOX CO. | 8/14/1997 | Hail | 2.5 kts. | 0 | 0 | 0 | 2.00M |
| VERDEL | KNOX CO. | 8/14/1997 | Hail | 2.5 kts. | 0 | 0 | 0 | 0 |
| VERDIGRE | KNOX CO. | 8/14/1997 | Thunderstorm Wind | 61 kts. | 0 | 0 | 0 | 0 |
| CENTER | KNOX CO. | 8/14/1997 | Thunderstorm Wind | 61 kts. | 0 | 0 | 0 | 0 |
| VERDIGRE | KNOX CO. | 8/14/1997 | Thunderstorm Wind | 61 kts. | 0 | 0 | 6.00K | 0 |
| BLOOMFIELD | KNOX CO. | 8/14/1997 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| WAUSA | KNOX CO. | 8/14/1997 | Thunderstorm Wind | 52 kts. | 0 | 0 | 0 | 0 |
| CENTER | KNOX CO. | 8/14/1997 | Thunderstorm Wind | 61 kts. | 0 | 0 | 3.00K | 0 |
| NIOBRARA | KNOX CO. | 8/19/1997 | Thunderstorm Wind | 52 kts. | 0 | 0 | 0 | 0 |
| BLOOMFIELD | KNOX CO. | 8/19/1997 | Thunderstorm Wind | 52 kts. | 0 | 0 | 0 | 0 |
| VERDEL | KNOX CO. | 8/29/1997 | Thunderstorm Wind | 52 kts. | 0 | 0 | 0 | 0 |
| LINDY | KNOX CO. | 8/29/1997 | Thunderstorm Wind | 52 kts. | 0 | 0 | 0 | 0 |
| SANTEE | KNOX CO. | 8/29/1997 | Thunderstorm Wind | 52 kts. | 0 | 0 | 0 | 0 |
| CROFTON | KNOX CO. | 8/29/1997 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| BLOOMFIELD | KNOX CO. | 9/8/1997 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| CROFTON | KNOX CO. | 9/18/1997 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| | KNOX (ZONE) | 11/2/1997 | High Wind | 57 kts. | 0 | 0 | 30.00K | 0 |
| | KNOX (ZONE) | 12/30/1997 | High Wind | 52 kts. | 0 | 0 | 0 | 0 |
| NIOBRARA | KNOX CO. | 5/11/1998 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| CREIGHTON | KNOX CO. | 5/30/1998 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| WAUSA | KNOX CO. | 6/23/1998 | Hail | 4.5 in. | 0 | 0 | 0 | 0 |
| WAUSA | KNOX CO. | 6/23/1998 | Thunderstorm Wind | 56 kts. | 0 | 0 | 0 | 0 |
| VERDIGRE | KNOX CO. | 6/24/1998 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| NIOBRARA | KNOX CO. | 6/24/1998 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| VERDEL | KNOX CO. | 6/29/1998 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| CENTER | KNOX CO. | 6/29/1998 | Thunderstorm Wind | 70 kts. | 0 | 0 | 0 | 0 |
| WAUSA | KNOX CO. | 6/29/1998 | Hail | 2 in. | 0 | 0 | 0 | 0 |
| NIOBRARA | KNOX CO. | 7/6/1998 | Thunderstorm Wind | 52 kts. | 0 | 0 | 0 | 0 |
| CREIGHTON | KNOX CO. | 7/6/1998 | Thunderstorm Wind | 70 kts. | 0 | 0 | 0 | 0 |
| LINDY | KNOX CO. | 7/6/1998 | Thunderstorm Wind | 65 kts. | 0 | 0 | 0 | 0 |
| CREIGHTON | KNOX CO. | 8/14/1998 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |

Section Six [Participant Profiles | Knox County]

| Location | County/ Zone | Date | Type | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|------------|--------------|-----------|-------------------|-----------|--------|----------|-----------------|-------------|
| CREIGHTON | KNOX CO. | 8/14/1998 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| CREIGHTON | KNOX CO. | 8/14/1998 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| CROFTON | KNOX CO. | 9/25/1998 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| VERDIGRE | KNOX CO. | 9/28/1998 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| CENTER | KNOX CO. | 9/28/1998 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| | KNOX (ZONE) | 2/11/1999 | High Wind | 50 kts. | 0 | 0 | 0 | 0 |
| | KNOX (ZONE) | 3/30/1999 | High Wind | 55 kts. | 0 | 0 | 0 | 0 |
| BLOOMFIELD | KNOX CO. | 5/3/1999 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| VERDIGRE | KNOX CO. | 5/3/1999 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| CROFTON | KNOX CO. | 5/3/1999 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| CROFTON | KNOX CO. | 6/5/1999 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| VERDEL | KNOX CO. | 7/2/1999 | Hail | 1.5 in. | 0 | 0 | 0 | 0 |
| VERDIGRE | KNOX CO. | 7/15/1999 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| NIOBRARA | KNOX CO. | 5/7/2000 | Thunderstorm Wind | 65 kts. | 0 | 0 | 0 | 0 |
| CREIGHTON | KNOX CO. | 5/7/2000 | Thunderstorm Wind | 70 kts. | 0 | 0 | 20.00K | 0 |
| WAUSA | KNOX CO. | 5/7/2000 | Thunderstorm Wind | 60 kts. | 0 | 0 | 0 | 0 |
| VERDEL | KNOX CO. | 6/3/2000 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| VERDIGRE | KNOX CO. | 6/3/2000 | Hail | 1.5 in. | 0 | 0 | 0 | 0 |
| CREIGHTON | KNOX CO. | 6/3/2000 | Hail | 1.25 in. | 0 | 0 | 0 | 0 |
| VERDIGRE | KNOX CO. | 6/3/2000 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| VERDIGRE | KNOX CO. | 6/3/2000 | Hail | 2 in. | 0 | 0 | 50.00K | 0 |
| CENTER | KNOX CO. | 6/3/2000 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| CROFTON | KNOX CO. | 6/23/2000 | Hail | 1.75 in. | 0 | 0 | 1.50M | 50.00K |
| CROFTON | KNOX CO. | 6/23/2000 | Hail | 2.75 in. | 0 | 0 | 0 | 0 |
| VERDEL | KNOX CO. | 8/7/2000 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| VERDIGRE | KNOX CO. | 8/7/2000 | Lightning | | 0 | 0 | 0 | 0 |
| LINDY | KNOX CO. | 8/16/2000 | Thunderstorm Wind | 60 kts. | 0 | 0 | 0 | 0 |
| CROFTON | KNOX CO. | 8/16/2000 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| | KNOX (ZONE) | 4/6/2001 | High Wind | 50 kts. | 0 | 0 | 0 | 0 |
| CROFTON | KNOX CO. | 5/31/2001 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| CREIGHTON | KNOX CO. | 7/2/2001 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| NIOBRARA | KNOX CO. | 7/2/2001 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| WAUSA | KNOX CO. | 7/2/2001 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| BLOOMFIELD | KNOX CO. | 7/2/2001 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| CROFTON | KNOX CO. | 7/7/2001 | Thunderstorm Wind | 55 kts. | 0 | 0 | 0 | 0 |
| SANTEE | KNOX CO. | 7/7/2001 | Thunderstorm Wind | 55 kts. | 0 | 0 | 0 | 0 |
| CREIGHTON | KNOX CO. | 7/16/2001 | Thunderstorm Wind | 50 kts. | 0 | 0 | 0 | 0 |
| WAUSA | KNOX CO. | 8/29/2001 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |

Section Six [Participant Profiles | Knox County]

| Location | County/ Zone | Date | Type | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|------------|--------------|-----------|-------------------|-----------|--------|----------|-----------------|-------------|
| BLOOMFIELD | KNOX CO. | 10/9/2001 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| VERDIGRE | KNOX CO. | 6/6/2002 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| VERDIGRE | KNOX CO. | 6/6/2002 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| CREIGHTON | KNOX CO. | 6/6/2002 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| VERDEL | KNOX CO. | 6/7/2002 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| CENTER | KNOX CO. | 6/19/2002 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| SANTEE | KNOX CO. | 6/25/2002 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| NIOBRARA | KNOX CO. | 6/25/2002 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| VENUS | KNOX CO. | 6/25/2002 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| CROFTON | KNOX CO. | 7/10/2002 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| CROFTON | KNOX CO. | 7/24/2002 | Thunderstorm Wind | 55 kts. | 0 | 0 | 0 | 0 |
| VERDIGRE | KNOX CO. | 7/30/2002 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| VERDIGRE | KNOX CO. | 8/9/2002 | Thunderstorm Wind | 55 kts. | 0 | 0 | 0 | 0 |
| VERDIGRE | KNOX CO. | 8/9/2002 | Hail | 1.25 in. | 0 | 0 | 0 | 0 |
| CREIGHTON | KNOX CO. | 8/9/2002 | Thunderstorm Wind | 50 kts. | 0 | 0 | 0 | 0 |
| CROFTON | KNOX CO. | 8/16/2002 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| CROFTON | KNOX CO. | 8/16/2002 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| NIOBRARA | KNOX CO. | 8/16/2002 | Hail | 2 in. | 0 | 0 | 0 | 0 |
| CROFTON | KNOX CO. | 8/16/2002 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| VERDIGRE | KNOX CO. | 5/13/2003 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| SANTEE | KNOX CO. | 6/9/2003 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| SANTEE | KNOX CO. | 6/9/2003 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| BLOOMFIELD | KNOX CO. | 6/9/2003 | Thunderstorm Wind | 55 kts. | 0 | 0 | 0 | 0 |
| SANTEE | KNOX CO. | 6/9/2003 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| CROFTON | KNOX CO. | 6/9/2003 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| BLOOMFIELD | KNOX CO. | 6/23/2003 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| CREIGHTON | KNOX CO. | 6/23/2003 | Thunderstorm Wind | 55 kts. | 0 | 0 | 0 | 0 |
| WAUSA | KNOX CO. | 6/23/2003 | Thunderstorm Wind | 50 kts. | 0 | 0 | 0 | 0 |
| WAUSA | KNOX CO. | 6/24/2003 | Thunderstorm Wind | 50 kts. | 0 | 0 | 0 | 0 |
| VERDIGRE | KNOX CO. | 6/24/2003 | Thunderstorm Wind | 50 kts. | 0 | 0 | 0 | 0 |
| NIOBRARA | KNOX CO. | 6/24/2003 | Thunderstorm Wind | 50 kts. | 0 | 0 | 0 | 0 |
| NIOBRARA | KNOX CO. | 6/24/2003 | Thunderstorm Wind | 55 kts. | 0 | 0 | 0 | 0 |
| CENTER | KNOX CO. | 6/24/2003 | Thunderstorm Wind | 50 kts. | 0 | 0 | 0 | 0 |
| SANTEE | KNOX CO. | 6/24/2003 | Thunderstorm Wind | 55 kts. | 0 | 0 | 0 | 0 |

Section Six [Participant Profiles | Knox County]

| Location | County/ Zone | Date | Type | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|------------|--------------|-----------|-------------------|-----------|--------|----------|-----------------|-------------|
| CREIGHTON | KNOX CO. | 7/3/2003 | Thunderstorm Wind | 55 kts. | 0 | 0 | 0 | 0 |
| BLOOMFIELD | KNOX CO. | 7/3/2003 | Thunderstorm Wind | 55 kts. | 0 | 0 | 0 | 0 |
| VERDIGRE | KNOX CO. | 7/5/2003 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| CREIGHTON | KNOX CO. | 7/5/2003 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| BLOOMFIELD | KNOX CO. | 7/5/2003 | Thunderstorm Wind | 50 kts. | 0 | 0 | 0 | 0 |
| BLOOMFIELD | KNOX CO. | 7/5/2003 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| WAUSA | KNOX CO. | 7/5/2003 | Thunderstorm Wind | 50 kts. | 0 | 0 | 0 | 0 |
| CREIGHTON | KNOX CO. | 7/5/2003 | Thunderstorm Wind | 55 kts. | 0 | 0 | 0 | 0 |
| CREIGHTON | KNOX CO. | 7/5/2003 | Hail | 2.75 in. | 0 | 0 | 0 | 0 |
| BLOOMFIELD | KNOX CO. | 7/29/2003 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| CROFTON | KNOX CO. | 5/8/2004 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| VERDIGRE | KNOX CO. | 5/9/2004 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| VERDIGRE | KNOX CO. | 5/9/2004 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| CROFTON | KNOX CO. | 5/9/2004 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| NIOBRARA | KNOX CO. | 5/9/2004 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| CREIGHTON | KNOX CO. | 5/16/2004 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| NIOBRARA | KNOX CO. | 5/24/2004 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| CROFTON | KNOX CO. | 5/29/2004 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| CROFTON | KNOX CO. | 5/29/2004 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| SANTEE | KNOX CO. | 5/29/2004 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| CROFTON | KNOX CO. | 5/29/2004 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| CENTER | KNOX CO. | 5/29/2004 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| VERDIGRE | KNOX CO. | 6/14/2004 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| CENTER | KNOX CO. | 6/14/2004 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| CROFTON | KNOX CO. | 7/3/2004 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| CENTER | KNOX CO. | 7/15/2004 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| CREIGHTON | KNOX CO. | 7/15/2004 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| NIOBRARA | KNOX CO. | 8/1/2004 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| CROFTON | KNOX CO. | 8/22/2004 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| | KNOX (ZONE) | 3/10/2005 | High Wind | 50 tks | 0 | 0 | 0 | 0 |
| VERDEL | KNOX CO. | 4/10/2005 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| VERDIGRE | KNOX CO. | 4/10/2005 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| VERDIGRE | KNOX CO. | 6/4/2005 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| BLOOMFIELD | KNOX CO. | 6/4/2005 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| WAUSA | KNOX CO. | 6/4/2005 | Thunderstorm Wind | 50 tks. | 0 | 0 | 0 | 0 |
| BLOOMFIELD | KNOX CO. | 6/4/2005 | Hail | 2.75 in. | 0 | 0 | 0 | 0 |
| CROFTON | KNOX CO. | 6/4/2005 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| VERDIGRE | KNOX CO. | 6/4/2005 | Thunderstorm Wind | 55 tks. | 0 | 0 | 0 | 0 |

Section Six [Participant Profiles | Knox County]

| Location | County/ Zone | Date | Type | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|------------|--------------|-----------|-------------------|-----------|--------|----------|-----------------|-------------|
| NIOBRARA | KNOX CO. | 6/4/2005 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| CROFTON | KNOX CO. | 6/20/2005 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| CROFTON | KNOX CO. | 6/20/2005 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| BLOOMFIELD | KNOX CO. | 6/20/2005 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| CREIGHTON | KNOX CO. | 6/20/2005 | Thunderstorm Wind | 60 tks. | 0 | 0 | 0 | 0 |
| VERDIGRE | KNOX CO. | 6/27/2005 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| VERDIGRE | KNOX CO. | 6/28/2005 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| VERDEL | KNOX CO. | 7/5/2005 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| NIOBRARA | KNOX CO. | 7/20/2005 | Thunderstorm Wind | 50 tks. | 0 | 0 | 0 | 0 |
| CREIGHTON | KNOX CO. | 7/20/2005 | Thunderstorm Wind | 50 tks. | 0 | 0 | 0 | 0 |
| WINNETOON | KNOX CO. | 7/28/2005 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| CREIGHTON | KNOX CO. | 7/28/2005 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| CREIGHTON | KNOX CO. | 8/9/2005 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| CREIGHTON | KNOX CO. | 9/12/2005 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| CREIGHTON | KNOX CO. | 9/12/2005 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| BLOOMFIELD | KNOX CO. | 3/30/2006 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| BLOOMFIELD | KNOX CO. | 5/23/2006 | Thunderstorm Wind | 50 tks. | 0 | 0 | 0 | 0 |
| WINNETOON | KNOX CO. | 6/5/2006 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| CENTER | KNOX CO. | 6/5/2006 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| BLOOMFIELD | KNOX CO. | 6/5/2006 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| NIOBRARA | KNOX CO. | 6/5/2006 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| WAUSA | KNOX CO. | 6/5/2006 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| CROFTON | KNOX CO. | 6/5/2006 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| BLOOMFIELD | KNOX CO. | 6/5/2006 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| CREIGHTON | KNOX CO. | 6/15/2006 | Thunderstorm Wind | 50 tks. | 0 | 0 | 0 | 0 |
| CROFTON | KNOX CO. | 6/15/2006 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| CROFTON | KNOX CO. | 6/15/2006 | Thunderstorm Wind | 50 tks. | 0 | 0 | 0 | 0 |
| NIOBRARA | KNOX CO. | 6/16/2006 | Thunderstorm Wind | 60 tks. | 0 | 0 | 0 | 0 |
| VERDEL | KNOX CO. | 6/16/2006 | Thunderstorm Wind | 55 tks. | 0 | 0 | 0 | 0 |
| CROFTON | KNOX CO. | 6/16/2006 | Thunderstorm Wind | 55 tks. | 0 | 0 | 0 | 0 |
| CROFTON | KNOX CO. | 6/24/2006 | Thunderstorm Wind | 55 tks. | 0 | 0 | 0 | 0 |
| CROFTON | KNOX CO. | 6/24/2006 | Hail | 1.5 in. | 0 | 0 | 0 | 0 |
| CROFTON | KNOX CO. | 6/24/2006 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| CREIGHTON | KNOX CO. | 7/13/2006 | Hail | 1.25 in. | 0 | 0 | 0 | 0 |
| CREIGHTON | KNOX CO. | 8/1/2006 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| VERDEL | KNOX CO. | 8/5/2006 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |

Section Six [Participant Profiles | Knox County]

| Location | County/ Zone | Date | Type | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|----------------------|--------------|-----------|-------------------|-----------|--------|----------|-----------------|-------------|
| VERDEL | KNOX CO. | 8/18/2006 | Thunderstorm Wind | 50 tks. | 0 | 0 | 0 | 0 |
| VERDIGRE | KNOX CO. | 9/15/2006 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| VERDEL | KNOX CO. | 5/4/2007 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| CROFTON | KNOX CO. | 5/5/2007 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| CENTER | KNOX CO. | 5/5/2007 | Thunderstorm Wind | 50 tks. | 0 | 0 | 0 | 0 |
| WAUSA | KNOX CO. | 5/5/2007 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| CROFTON | KNOX CO. | 5/5/2007 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| BLOOMFIELD | KNOX CO. | 5/5/2007 | Hail | 4.25 in. | 0 | 0 | 0 | 0 |
| WAUSA | KNOX CO. | 7/15/2007 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| CREIGHTON | KNOX CO. | 8/9/2007 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| CREIGHTON | KNOX CO. | 8/9/2007 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| VERDEL | KNOX CO. | 8/10/2007 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| VERDEL | KNOX CO. | 8/10/2007 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| VERDEL | KNOX CO. | 8/10/2007 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| VERDIGRE | KNOX CO. | 8/10/2007 | Thunderstorm Wind | 50 tks. | 0 | 0 | 0 | 0 |
| VERDEL | KNOX CO. | 8/21/2007 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| CROFTON | KNOX CO. | 8/21/2007 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| WAUSA | KNOX CO. | 9/30/2007 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| CROFTON | KNOX CO. | 5/1/2008 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| CROFTON | KNOX CO. | 5/6/2008 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| BLOOMFIELD MUNI ARPT | KNOX CO. | 5/24/2008 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| VERDEL | KNOX CO. | 5/29/2008 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| CROFTON | KNOX CO. | 5/29/2008 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| WAUSA | KNOX CO. | 6/3/2008 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| VENUS | KNOX CO. | 6/5/2008 | Thunderstorm Wind | 61 tks. | 0 | 0 | 0 | 0 |
| CENTER | KNOX CO. | 6/5/2008 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| CENTER | KNOX CO. | 6/19/2008 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| VERDIGRE | KNOX CO. | 6/21/2008 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| WINNETOON | KNOX CO. | 6/21/2008 | Thunderstorm Wind | 52 tks. | 0 | 0 | 0 | 0 |
| CREIGHTON | KNOX CO. | 6/21/2008 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| VERDEL | KNOX CO. | 9/28/2008 | Hail | 1.25 in. | 0 | 0 | 0 | 0 |
| CREIGHTON | KNOX CO. | 9/28/2008 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| CROFTON | KNOX CO. | 9/28/2008 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| CREIGHTON | KNOX CO. | 9/28/2008 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| CREIGHTON ARPT | KNOX CO. | 3/23/2009 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| VERDIGRE | KNOX CO. | 5/20/2009 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| CENTER | KNOX CO. | 5/20/2009 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |

Section Six [Participant Profiles | Knox County]

| Location | County/ Zone | Date | Type | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|----------------------|--------------|-----------|-------------------|-----------|--------|----------|-----------------|-------------|
| CREIGHTON ARPT | KNOX CO. | 6/17/2009 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| WAUSA | KNOX CO. | 6/17/2009 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| VERDEL | KNOX CO. | 6/18/2009 | Thunderstorm Wind | 55 tks. | 0 | 0 | 0 | 0 |
| CREIGHTON | KNOX CO. | 6/18/2009 | Thunderstorm Wind | 52 tks. | 0 | 0 | 0 | 0 |
| CREIGHTON | KNOX CO. | 6/18/2009 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| BLOOMFIELD | KNOX CO. | 6/18/2009 | Hail | 2.5 in. | 0 | 0 | 0 | 0 |
| WAUSA | KNOX CO. | 6/18/2009 | Thunderstorm Wind | 56 tks. | 0 | 0 | 0 | 0 |
| BLOOMFIELD | KNOX CO. | 6/18/2009 | Thunderstorm Wind | 60 tks. | 0 | 0 | 0 | 0 |
| LINDY | KNOX CO. | 6/25/2009 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| VERDEL | KNOX CO. | 6/26/2009 | Thunderstorm Wind | 52 tks. | 0 | 0 | 0 | 0 |
| CROFTON | KNOX CO. | 7/9/2009 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| BLOOMFIELD | KNOX CO. | 7/10/2009 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| VERDEL | KNOX CO. | 8/15/2009 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| BLOOMFIELD | KNOX CO. | 8/19/2009 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| SANTEE | KNOX CO. | 4/24/2010 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| CROFTON | KNOX CO. | 6/3/2010 | Thunderstorm Wind | 52 tks. | 0 | 0 | 0 | 0 |
| CROFTON | KNOX CO. | 6/3/2010 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| CROFTON | KNOX CO. | 6/22/2010 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| CROFTON | KNOX CO. | 6/26/2010 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| VERDIGRE | KNOX CO. | 8/8/2010 | Thunderstorm Wind | 55 tks. | 0 | 0 | 0 | 0 |
| BLOOMFIELD MUNI ARPT | KNOX CO. | 8/8/2010 | Thunderstorm Wind | 52 tks. | 0 | 0 | 0 | 0 |
| VERDEL | KNOX CO. | 8/30/2010 | Thunderstorm Wind | 60 tks. | 0 | 0 | 0 | 0 |
| BLOOMFIELD | KNOX CO. | 9/22/2010 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| BLOOMFIELD | KNOX CO. | 9/22/2010 | Hail | 3 in. | 0 | 0 | 0 | 0 |
| CROFTON | KNOX CO. | 9/22/2010 | Hail | 4.25 in. | 0 | 0 | 0 | 0 |
| VERDEL | KNOX CO. | 9/22/2010 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| VENUS | KNOX CO. | 9/22/2010 | Hail | 1.25 in. | 0 | 0 | 0 | 0 |
| VERDIGRE | KNOX CO. | 9/22/2010 | Hail | 1.5 in. | 0 | 0 | 0 | 0 |
| VERDIGRE | KNOX CO. | 9/22/2010 | Thunderstorm Wind | 52 tks. | 0 | 0 | 0 | 0 |
| SANTEE | KNOX CO. | 5/29/2011 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| BLOOMFIELD | KNOX CO. | 6/20/2011 | Thunderstorm Wind | 60 tks. | 0 | 0 | 0 | 0 |
| CROFTON | KNOX CO. | 6/20/2011 | Thunderstorm Wind | 60 tks. | 0 | 0 | 0 | 0 |
| NIOBRARA | KNOX CO. | 8/18/2011 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| NIOBRARA | KNOX CO. | 8/18/2011 | Hail | 1 in. | 0 | 0 | 0 | 0 |

Section Six [Participant Profiles | Knox County]

| Location | County/ Zone | Date | Type | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|----------------|--------------|------------|-------------------|-----------|--------|----------|-----------------|-------------|
| BLOOMFIELD | KNOX CO. | 8/18/2011 | Hail | 4.25 in. | 0 | 0 | 0 | 0 |
| BLOOMFIELD | KNOX CO. | 8/18/2011 | Thunderstorm Wind | 52 tks. | 0 | 0 | 0 | 0 |
| VENUS | KNOX CO. | 8/18/2011 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| CENTER | KNOX CO. | 8/22/2011 | Hail | 1.25 in. | 0 | 0 | 0 | 0 |
| VERDIGRE | KNOX CO. | 4/15/2012 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| NIOBRARA | KNOX CO. | 5/4/2012 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| NIOBRARA | KNOX CO. | 5/4/2012 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| | KNOX (ZONE) | 10/18/2012 | High Wind | 52 tks. | 0 | 0 | 0 | 0 |
| VENUS | KNOX CO. | 5/26/2013 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| VERDEL | KNOX CO. | 5/29/2013 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| VERDEL | KNOX CO. | 5/29/2013 | Thunderstorm Wind | 52 tks. | 0 | 0 | 0 | 0 |
| SANTEE | KNOX CO. | 6/21/2013 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| WAUSA | KNOX CO. | 8/1/2013 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| VERDIGRE | KNOX CO. | 8/10/2013 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| CREIGHTON | KNOX CO. | 8/10/2013 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| WAUSA | KNOX CO. | 8/10/2013 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| | KNOX (ZONE) | 1/16/2014 | High Wind | 54 tks. | 0 | 0 | 0 | 0 |
| BLOOMFIELD | KNOX CO. | 6/1/2014 | Hail | 1.25 in. | 0 | 0 | 0 | 0 |
| WINNETOON | KNOX CO. | 6/3/2014 | Thunderstorm Wind | 50 tks | 0 | 0 | 0 | 0 |
| CROFTON | KNOX CO. | 7/26/2014 | Hail | 1.5 in. | 0 | 0 | 0 | 0 |
| CROFTON | KNOX CO. | 7/26/2014 | Thunderstorm Wind | 55 tks. | 0 | 0 | 0 | 0 |
| WINNETOON | KNOX CO. | 7/26/2014 | Thunderstorm Wind | 52 tks. | 0 | 0 | 0 | 0 |
| CREIGHTON | KNOX CO. | 7/26/2014 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| CREIGHTON | KNOX CO. | 7/26/2014 | Thunderstorm Wind | 52 tks. | 0 | 0 | 0 | 0 |
| BLOOMFIELD | KNOX CO. | 9/19/2014 | Hail | 1.5 in. | 0 | 0 | 0 | 0 |
| VERDEL | KNOX CO. | 6/20/2015 | Thunderstorm Wind | 52t ks. | 0 | 0 | 0 | 0 |
| NIOBRARA | KNOX CO. | 6/20/2015 | Thunderstorm Wind | 52 tks. | 0 | 0 | 0 | 0 |
| SANTEE | KNOX CO. | 7/5/2015 | Hail | 1.5 in. | 0 | 0 | 0 | 0 |
| VENUS | KNOX CO. | 7/17/2015 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| VERDIGRE | KNOX CO. | 7/17/2015 | Hail | 1.5 in. | 0 | 0 | 0 | 0 |
| CREIGHTON ARPT | KNOX CO. | 7/17/2015 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| VERDIGRE | KNOX CO. | 7/28/2015 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| VERDEL | KNOX CO. | 9/9/2015 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| VERDEL | KNOX CO. | 9/9/2015 | Thunderstorm Wind | 52 tks. | 0 | 0 | 0 | 0 |
| WAUSA | KNOX CO. | 9/22/2015 | Hail | 1 in. | 0 | 0 | 0 | 0 |
| BLOOMFIELD | KNOX CO. | 9/22/2015 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |

Section Six [Participant Profiles | Knox County]

| | | | | |
|--------------|---|---|--------|--------|
| Totals [368] | 0 | 6 | 1.657M | 4.230M |
| | | | 5.887M | |

TABLE 6.96: NCDCEVENTS [TORNADOS] JANUARY 1, 1950 – JANUARY 31, 2016

| Location | County/ Zone | Date | Type | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|------------|--------------|------------|---------|-----------|--------|----------|-----------------|-------------|
| | KNOX CO. | 6/13/1950 | Tornado | F2 | 0 | 101 | 25.00K | 0 |
| | KNOX CO. | 8/6/1956 | Tornado | F0 | 0 | 0 | 2.50K | 0 |
| | KNOX CO. | 5/30/1959 | Tornado | F1 | 0 | 0 | 25.00K | 0 |
| | KNOX CO. | 5/30/1959 | Tornado | F2 | 1 | 2 | 250.00K | 0 |
| | KNOX CO. | 5/18/1960 | Tornado | F0 | 0 | 0 | 2.50K | 0 |
| | KNOX CO. | 5/18/1960 | Tornado | F0 | 0 | 0 | 2.50K | 0 |
| | KNOX CO. | 6/22/1968 | Tornado | | 0 | 0 | 0 | 0 |
| | KNOX CO. | 6/9/1971 | Tornado | F0 | 0 | 0 | 25.00K | 0 |
| | KNOX CO. | 8/1/1972 | Tornado | F0 | 0 | 0 | 0 | 0 |
| | KNOX CO. | 5/6/1975 | Tornado | F0 | 0 | 0 | 25.00K | 0 |
| | KNOX CO. | 6/21/1975 | Tornado | F2 | 0 | 0 | 2.50K | 0 |
| | KNOX CO. | 6/11/1976 | Tornado | F1 | 0 | 0 | 25.00K | 0 |
| | KNOX CO. | 6/22/1977 | Tornado | F1 | 0 | 0 | 2.50K | 0 |
| | KNOX CO. | 10/16/1980 | Tornado | F1 | 0 | 0 | 250.00K | 0 |
| | KNOX CO. | 10/16/1980 | Tornado | F1 | 0 | 0 | 250.00K | 0 |
| | KNOX CO. | 6/21/1981 | Tornado | F1 | 0 | 0 | 250.00K | 0 |
| | KNOX CO. | 6/22/1984 | Tornado | F0 | 0 | 0 | 0 | 0 |
| | KNOX CO. | 4/20/1985 | Tornado | F1 | 0 | 0 | 25.00K | 0 |
| | KNOX CO. | 4/20/1985 | Tornado | F2 | 0 | 0 | 2.50M | 0 |
| | KNOX CO. | 5/10/1986 | Tornado | F0 | 0 | 0 | 0.03K | 0 |
| | KNOX CO. | 6/28/1986 | Tornado | F0 | 0 | 0 | 0.03K | 0 |
| | KNOX CO. | 5/15/1992 | Tornado | F1 | 0 | 0 | 25.00K | 0 |
| | KNOX CO. | 5/15/1992 | Tornado | F1 | 0 | 0 | 250.00K | 0 |
| | KNOX CO. | 5/15/1992 | Tornado | F1 | 0 | 0 | 250.00K | 0 |
| | KNOX CO. | 5/15/1992 | Tornado | F1 | 0 | 0 | 25.00K | 0 |
| Bloomfield | KNOX CO. | 4/25/1994 | Tornado | F0 | 0 | 0 | 0 | 0 |
| Bloomfield | KNOX CO. | 4/25/1994 | Tornado | F1 | 0 | 1 | 500.00K | 0 |
| VERDIGRE | KNOX CO. | 6/19/1996 | Tornado | F0 | 0 | 0 | 0 | 0 |
| VERDIGRE | KNOX CO. | 10/26/1996 | Tornado | F0 | 0 | 0 | 0 | 0 |
| WAUSA | KNOX CO. | 7/6/1998 | Tornado | F0 | 0 | 0 | 0 | 0 |
| CREIGHTON | KNOX CO. | 5/3/1999 | Tornado | F0 | 0 | 0 | 10.00K | 0 |
| VERDIGRE | KNOX CO. | 5/3/1999 | Tornado | F0 | 0 | 0 | 0 | 0 |
| NIOBRARA | KNOX CO. | 5/3/1999 | Tornado | F0 | 0 | 0 | 0 | 0 |
| LINDY | KNOX CO. | 6/9/2003 | Tornado | F0 | 0 | 0 | 0 | 0 |
| VERDIGRE | KNOX CO. | 7/15/2004 | Tornado | F0 | 0 | 0 | 0 | 0 |
| CENTER | KNOX CO. | 5/5/2007 | Tornado | EFO | 0 | 0 | 10.00K | 0 |
| BLOOMFIELD | KNOX CO. | 5/5/2007 | Tornado | EFO | 0 | 0 | 0 | 0 |

Section Six [Participant Profiles | Knox County]

| Location | County/ Zone | Date | Type | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|-------------|--------------|-----------|---------|-----------|--------|----------|-----------------|-------------|
| WAUSA | KNOX CO. | 5/5/2007 | Tornado | EF0 | 0 | 0 | 0 | 0 |
| BLOOMFIELD | KNOX CO. | 5/5/2007 | Tornado | EF0 | 0 | 0 | 0 | 0 |
| BLOOMFIELD | KNOX CO. | 5/5/2007 | Tornado | EF1 | 0 | 0 | 0 | 0 |
| CROFTON | KNOX CO. | 5/5/2007 | Tornado | EF2 | 0 | 3 | 1.00M | 0 |
| CROFTON | KNOX CO. | 5/5/2007 | Tornado | EF0 | 0 | 0 | 0 | 0 |
| SANTEE | KNOX CO. | 3/23/2009 | Tornado | EF1 | 0 | 0 | 0 | 0 |
| VERDIGRE | KNOX CO. | 4/15/2012 | Tornado | EF0 | 0 | 0 | 0 | 0 |
| SANTEE | KNOX CO. | 4/15/2012 | Tornado | EF0 | 0 | 0 | 0 | 0 |
| CREIGHTON | KNOX CO. | 10/4/2013 | Tornado | EF3 | 0 | 0 | 0 | 0 |
| Totals [46] | | | | | 1 | 107 | 5.7330M | 0.00K |
| | | | | | | | 5.733M | |

TABLE 6.97: NCDCEVENTS [DROUGHT] JANUARY 1, 1950 – JANUARY 31, 2016

| Location | County/ Zone | Date | Type | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|-------------|--------------|-----------|---------|-----------|--------|----------|-----------------|-------------|
| | KNOX (ZONE) | 11/1/1999 | Drought | | 0 | 0 | 0.00K | 0.00K |
| | KNOX (ZONE) | 7/17/2012 | Drought | | 0 | 0 | 0.00K | 0.00K |
| | KNOX (ZONE) | 8/1/2012 | Drought | | 0 | 0 | 0.00K | 0.00K |
| | KNOX (ZONE) | 9/1/2012 | Drought | | 0 | 0 | 0.00K | 0.00K |
| | KNOX (ZONE) | 10/1/2012 | Drought | | 0 | 0 | 0.00K | 0.00K |
| | KNOX (ZONE) | 11/1/2012 | Drought | | 0 | 0 | 0.00K | 0.00K |
| | KNOX (ZONE) | 12/1/2012 | Drought | | 0 | 0 | 0.00K | 0.00K |
| | KNOX (ZONE) | 1/1/2013 | Drought | | 0 | 0 | 0.00K | 0.00K |
| | KNOX (ZONE) | 2/1/2013 | Drought | | 0 | 0 | 0.00K | 0.00K |
| | KNOX (ZONE) | 3/1/2013 | Drought | | 0 | 0 | 0.00K | 0.00K |
| | KNOX (ZONE) | 4/1/2013 | Drought | | 0 | 0 | 0.00K | 0.00K |
| | KNOX (ZONE) | 5/1/2013 | Drought | | 0 | 0 | 0.00K | 0.00K |
| | KNOX (ZONE) | 8/1/2013 | Drought | | 0 | 0 | 0.00K | 0.00K |
| | KNOX (ZONE) | 11/1/1999 | Drought | | 0 | 0 | 0.00K | 0.00K |
| | KNOX (ZONE) | 7/17/2012 | Drought | | 0 | 0 | 0.00K | 0.00K |
| | KNOX (ZONE) | 8/1/2012 | Drought | | 0 | 0 | 0.00K | 0.00K |
| Totals [13] | | | | | 0 | 0 | 0.00K | 0.00K |
| | | | | | | | 0.00K | |

TABLE 6.98: NCDCEVENTS [FLOODS] JANUARY 1, 1950 – JANUARY 31, 2016

| Location | County/ Zone | Date | Type | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|------------|--------------|-----------|-------------|-----------|--------|----------|-----------------|-------------|
| CREIGHTON | KNOX CO. | 6/14/1996 | Flash Flood | | 0 | 0 | 0 | 0 |
| | KNOX (ZONE) | 2/18/1997 | Flood | | 0 | 0 | 0 | 0 |
| | KNOX (ZONE) | 5/5/1999 | Flood | | 0 | 0 | 0 | 0 |
| BLOOMFIELD | KNOX CO. | 7/21/1999 | Flash Flood | | 0 | 0 | 0 | 0 |
| | KNOX (ZONE) | 3/15/2001 | Flood | | 0 | 0 | 0 | 0 |

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| Location | County/ Zone | Date | Type | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|-------------|--------------|-----------|-------------|-----------|--------|----------|-----------------|-------------|
| | KNOX (ZONE) | 3/19/2001 | Flood | | 0 | 0 | 0 | 0 |
| LINDY | KNOX CO. | 6/24/2003 | Flash Flood | | 0 | 0 | 0 | 0 |
| COUNTYWIDE | KNOX CO. | 5/29/2004 | Flash Flood | | 0 | 0 | 0 | 0 |
| COUNTYWIDE | KNOX CO. | 6/5/2005 | Flash Flood | | 0 | 0 | 0 | 0 |
| CROFTON | KNOX CO. | 6/20/2005 | Flash Flood | | 0 | 0 | 0 | 0 |
| BLOOMFIELD | KNOX CO. | 6/20/2005 | Flash Flood | | 0 | 0 | 0 | 0 |
| VERDIGRE | KNOX CO. | 6/28/2005 | Flash Flood | | 0 | 0 | 0 | 0 |
| VERDEL | KNOX CO. | 2/21/2007 | Flood | | 0 | 0 | 0 | 0 |
| NIOBRARA | KNOX CO. | 3/10/2007 | Flood | | 0 | 0 | 0 | 0 |
| VERDIGRE | KNOX CO. | 5/29/2008 | Flash Flood | | 0 | 0 | 0 | 0 |
| NIOBRARA | KNOX CO. | 5/29/2008 | Flood | | 0 | 0 | 0 | 0 |
| VERDEL | KNOX CO. | 6/6/2008 | Flood | | 0 | 0 | 0 | 0 |
| VERDEL | KNOX CO. | 6/11/2010 | Flood | | 0 | 0 | 15.00K | 0 |
| CREIGHTON | KNOX CO. | 6/22/2010 | Flash Flood | | 0 | 0 | 2.00K | 0 |
| VERDEL | KNOX CO. | 7/22/2010 | Flash Flood | | 0 | 0 | 20.00K | 0 |
| VERDEL | KNOX CO. | 7/22/2010 | Flash Flood | | 0 | 0 | 15.00K | 0 |
| VERDEL | KNOX CO. | 7/22/2010 | Flood | | 0 | 0 | 15.00K | 0 |
| NIOBRARA | KNOX CO. | 7/22/2010 | Flood | | 0 | 0 | 35.00K | 0 |
| NIOBRARA | KNOX CO. | 7/22/2010 | Flood | | 0 | 0 | 10.00K | 0 |
| CROFTON | KNOX CO. | 9/22/2010 | Flash Flood | | 0 | 0 | 10.00K | 0 |
| SANTEE | KNOX CO. | 9/23/2010 | Flash Flood | | 0 | 0 | 2.00K | 0 |
| VERDEL | KNOX CO. | 3/12/2011 | Flood | | 0 | 0 | 0 | 0 |
| VERDEL | KNOX CO. | 5/26/2011 | Flood | | 0 | 0 | 25.00K | 0 |
| VERDEL | KNOX CO. | 6/1/2011 | Flood | | 0 | 0 | 150.00K | 0 |
| VERDEL | KNOX CO. | 7/1/2011 | Flood | | 0 | 0 | 50.00K | 0 |
| VERDEL | KNOX CO. | 8/1/2011 | Flood | | 0 | 0 | 50.00K | 0 |
| VERDEL | KNOX CO. | 9/1/2011 | Flood | | 0 | 0 | 5.00K | 0 |
| WINNETOON | KNOX CO. | 8/21/2013 | Flash Flood | | 0 | 0 | 0 | 0 |
| Totals [33] | | | | | 0 | 0 | 404.00K | 0.00K |
| | | | | | | | 404.00K | |