JEO

Engineering Architecture Surveying Planning

# Lower Platte South Natural Resources District, Nebraska

## Multi-Jurisdictional Hazard Mitigation Plan

November, 2008

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# Lower Platte South Natural Resources District (LPSNRD)

# Multi-Jurisdiction Hazard Mitigation Plan

## Upfront: Sections 1-5

## November 2008

# LPSNRD Multi-Jurisdiction Hazard Mitigation Plan

| LPSNRD Board of Directors | Subdistrict |
|---|---|
| Don Jacobson | 1 |
| David Potter | 1 |
| Marsha Babcock | 2 |
| David Nielsen | 2 |
| Larry Swanson | 3 |
| Ronald Case | 3 |
| Phyllis Hergenrader | 4 |
| Dean Petersen | 4 |
| Kristin Yates | 5 |
| Steven Larrick | 5 |
| Doug Samuelson | 6 |
| Elaine Hammer | 6 |
| Russell Barger | 7 |
| Dan Steinkruger | 7 |
| Larry Hall | 8 |
| Ron Svoboda | 8 |
| Larry Zimmerman | 9 |
| Bob Andersen | 9 |
| Ken Reitan | 10 |
| Jason Hayes | 10 |
| David Landis | At Large |

| Planning Process Key Personnel | Title |
|---|---|
| Glenn Johnson, LPSNRD | General Manager |
| Paul Zillig, LPSNRD | Assistant General Manager |
| Ed Ubben, LPSNRD | Projects Coordinator |
| Mike Mascoe, LPSNRD | Public Information Specialist |
| Ed Kouma, City of Lincoln | Associate Engineer, Watershed Management |
| Doug Ahlberg, Lancaster County | Emergency Manager |
| Bill Cover, Cass County | Emergency Manager |
| Steve McMaster, NDNR | Water Resources Planner |
| Lori Moore / Jennifer Williams, NEMA | State Hazard Mitigation Officer |
| *Lalit Jha | JEO Consulting Group, Inc. |
| *Jared Nelson | JEO Consulting Group, Inc. |
| *Mike Schwab | JEO Consulting Group, Inc. |

**Served in an advisory or consultant role*

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City of Ashland ..... ASH-1
Village of Avoca ..... AVO-1
Village of Bennet ..... BEN-1
Village of Brainard ..... BRA-1
Cass County ..... CAS-1
Cass County Rural Water District #1 ..... CR1-1
Cass County Rural Water District #2 ..... CR2-1
Cass County Sanitary Improvement District #1 (Lake WaConDa) ..... CS1-1
Village of Cedar Creek ..... CED-1
Village Ceresco ..... CER-1
Village of Davey ..... DAV-1
Village of Denton ..... DEN-1
Village of Eagle ..... EAG-1
Village of Firth ..... FIR-1
Village of Greenwood ..... GRE-1
Village of Hallam ..... HAL-1
City of Hickman ..... HIC-1
Lancaster County ..... LAN-1
Lancaster County Rural Water District #1 ..... LR1-1
Lancaster County Sanitary Improvement District #6 (Emerald) ..... LC6-1
City of Lincoln ..... LNK-1
City of Louisville ..... LOU-1
Lower Platte South NRD ..... LPS-1
Village of Malcom ..... MAL-1
Village of Manley ..... MAN-1
Village of Murdock ..... MRD-1
Village of Murray ..... MRY-1
Village of Panama ..... PAN-1
City of Plattsmouth ..... PLA-1
Village of Raymond ..... RAY-1
Village of Roca ..... ROC-1
Village of Sprague ..... SPA-1
Village of Union ..... UNI-1
Village of Valparaiso ..... VAL-1
City of Waverly ..... WAV-1
City of Weeping Water ..... WEP-1

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# PLAN SUMMARY

The goal of the Lower Platte South Natural Resource District hazard mitigation planning project is to make residents, businesses, property owners, operators of critical infrastructure, and jurisdictions less susceptible to the affects of future disasters by increasing the disaster resistance of the district and the jurisdictions located within its boundary. After suffering the effects of floods, severe winter weather, and summer storms, the District's Board of Directors initiated a multi-jurisdictional hazard mitigation planning effort. This process identified the hazards that affect the district and prioritizes mitigation strategies to reduce potential loss of life and property damage from those hazards.

This Multi-Jurisdictional Hazard Mitigation Plan serves as a framework for saving lives, protecting assets, and preserving the economic viability within the district. This planning initiative resulted in a comprehensive Plan that meets all Federal Emergency Management Agency and Nebraska Emergency Management Agency requirements established in the Disaster Mitigation Act of 2000. The Plan will help the district and jurisdictions maintain their eligibility for certain future federal funding, especially the Hazard Mitigation Grant Program, and an approved Plan is also required to participate in the Emergency Management Performance Grant program and in projects funded under the Pre-Disaster Mitigation grant program.

Jurisdictions within the Lower Platte South Natural Resources District have experienced hazards at varying degrees in the past, and are certainly susceptible to emergency situations caused by hazards in the future. The value of a hazard mitigation plan lies in reducing future emergencies to events. Through implementing mitigation strategies set forth in this Plan, the expectation is for hazard occurrences to result in fewer deaths and injuries to people, and lessened damage or destruction to structures and the environment. Response and recovery costs should also be reduced.

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

## ORGANIZATION OF THE PLAN

Section 1 – Introduction: This section summarizes the Plan, including the purpose and funding of the Plan and the benefits of using the multi-jurisdictional approach.

Section 2 – Planning Process: This section includes a description of the methodology for the planning process, risk assessment (including the structural inventory), establishment of a mitigation strategy, and Plan implementation. Also included is a list of general plans, documents and other information utilized in the preparation of this Plan.

Section 3 – Risk Assessment: This section contains discussion of the risk assessment for the Planning Area. Discussion on the hazard identification is followed by hazard profiles, historical occurrences, vulnerability assessment and potential losses for the Planning Area and participants.

Section 4 – Mitigation Strategy: This section discusses the establishment of goals and objectives for each participant. Goals and objectives provide a framework in establishing action items, the on-the-ground activities which ultimately reduce the impact of natural hazards. Each action item was evaluated by the participants using the FEMA recommended "STAPLEE" process.

Section 5 – Plan Implementation and Maintenance: This section of the Plan includes a discussion and recommendation of the implementation program and Plan maintenance process. Discussion includes the procedures for monitoring hazards, establishing an advisory panel, conducting annual reviews of the Plan, and the process of updating the Plan in the future.

Section 6 – Participant Sections: Each participant section includes specific information concerning each individual Plan participant. Information found in each participant section provides background information for that participant, including history and development, location, geography, climate, demographics, future development trends, specific documents and information sources used. The risk assessment includes a participant specific hazard identification summary of public input, description of structural inventory, maps and specific risk assessment information related to the jurisdiction.

# SECTION 1: INTRODUCTION

## LOWER PLATTE SOUTH NATURAL RESOURCES DISTRICT

The Nebraska Legislature, in 1972, created 24 Natural Resource Districts (NRD) by combining 154 special purpose resources management entities. These newly created local government entities were formed based upon major river systems, thereby enabling the district to respond more efficiently to local needs. NRDs are managed by elected boards, and entrusted with a broad range of responsibilities to protect and enhance Nebraska's many natural resources. Nebraska's system of natural resource management through these districts is unique within the United States; no other state has a system for management of natural resources such as Nebraska's. Over the years, the number of districts decreased by one when two districts were merged, but the authority and responsibility given to them has grown tremendously.

Many of the resource management programs and projects conducted by the NRDs are funded by property taxes from within the NRD boundary area. Typically, these funds equal approximately one percent of total property taxes from within the NRD area. NRDs also regularly work with other local, state, and federal agencies to combine resources and funding to cooperate on projects of mutual interest and benefit. The Lower Platte South Natural Resources District (LPSNRD) office is located in Lincoln.

The LPSNRD district includes the majority of Lancaster County, Cass County, and parts of Seward, Butler, Saunders, and Otoe counties. There are 31 incorporated communities located within the district. For the purposes of this plan and to effectively address the fact that the NRD boundaries split counties, the planning area for this plan was adjusted.

For this Plan, Lancaster and Cass Counties proper, communities within Lancaster County, as well as the majority of communities within Cass County were included in the planning area. Several communities within the LPSNRD that are in Butler County and Saunders County were also included. However, no communities from Seward or Otoe Counties were included in this plan, nor were Seward, Otoe, Butler or Saunders Counties proper. In addition, several special districts were included in the planning effort, such as Rural Water Districts (RWD) and Sanitary Improvement Districts (SID) and one school district. A total of 38 villages, cities, counties, and special districts participated in this planning effort, along with LPSNRD itself. Figure 1 displays each of the participants who joined this multi-jurisdictional Plan.

## PURPOSE OF THE PLAN

Hazard mitigation planning is a process for State, local, and other governments to identify policies, activities, and tools to implement mitigation actions. Mitigation refers to any sustained action taken to reduce or eliminate long-term risk to life and property from a hazard event. Mitigation activities may be implemented prior to, during, or after an incident. 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. The hazard mitigation planning process has four general steps, which include organizing resources, assessing risks, developing a mitigation plan, and implementing the plan and monitoring progress.

The Disaster Mitigation Act of 2000 (DMA 2000) was passed as a result of escalating disaster costs that were occurring throughout the United States. DMA 2000 challenges cities to identify methods and implementation procedures they can use to prevent damage from a disaster before the disaster hits. The intent of DMA 2000 is to facilitate cooperation between state and local authorities across a broad spectrum of mitigation activities. The focus of DMA 2000 is on emphasizing the importance of pre-disaster mitigation planning and promoting

sustainability as a strategy for disaster resistance. The outline for Plan development and authorization to complete the Plan is based upon requirements in Section 322 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act), 42 U.S.C. 5156, enacted under Section 104 of DMA 2000.

DMA 2000 requires local governments that wish to seek federal disaster mitigation funds to adopt a mitigation plan that describes their process of identifying hazards, risks, and vulnerabilities. Based upon the requirements of DMA 2000, this Plan establishes specific goals and objectives based on the hazards with a potential to impact LPSNRD, and identifies mitigation activities that are appropriate and specific to each participating jurisdiction.

The purpose of this LPSNRD Multi-Jurisdiction Hazard Mitigation Plan is to identify hazards, assess the potential for loss associated with the hazards, assess the vulnerability of each planning participant to different hazards, and develop sound mitigation alternatives to reduce these vulnerabilities. The potential for substantial damages as a result of a disaster presents a large potential for impacts to the health, safety, and welfare of all citizens residing with the district. Consistent with the Federal Emergency Management Agency (FEMA) planning process guidelines, the purpose of this Plan is to accomplish the following objectives:

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

## PLAN FINANCING AND PREPARATION

The Pre-Disaster Mitigation (PDM) program provides funds to states, counties, territories, Indian Tribal governments, communities, and even universities for hazard mitigation planning and the implementation of mitigation projects prior to a disaster event. Funding from these plans and projects reduces overall risks to the population and structures, while also reducing reliance on funding from actual disaster declarations. The Federal Emergency Management Agency (FEMA) provides the funding which is administered by the Nebraska Emergency Management Agency (NEMA). Nebraska receives approximately $250,000 annually from this program to provide funds at a 75% cost-share ratio to local jurisdictions for the development of hazard mitigation plans and projects.

LPSNRD applied for a PDM grant in 2006 to provide funding for the completion of a ‘multi-jurisdictional’ hazard mitigation plan. In 2007, funding was received by the District to begin a multi-jurisdictional project that encompasses the LPSNRD boundaries and includes many of the cities, counties, villages, school districts, and other special districts within its area.

This LPSNRD Multi-Jurisdictional Hazard Mitigation Plan was prepared by JEO Consulting Group, Inc. of Lincoln, Nebraska with direction and assistance from identified key personnel, consisting primarily of LPSNRD staff, municipal representatives, emergency managers, the Nebraska Emergency Management Agency (NEMA), and Nebraska Department of Natural Resources (NDNR).

## UTILIZING THE MULTI-JURISDICTIONAL APPROACH

According to FEMA, a multi-jurisdictional hazard mitigation plan is jointly prepared by more than one jurisdiction, or local government. A local government is defined in 44 CFR 201 as any county, municipality, city, town, township, public authority, school district, special district, intrastate district, council of governments, regional or interstate government entity, or agency or instrumentality of a local government; any Indian tribe or authorized tribal organization, any rural community, unincorporated town or village, or other public entity." LPSNRD and the various county and municipal jurisdictions, as well as the special district that took part in this Plan are local governments for the purposes of preparing a multi-jurisdictional hazard mitigation plan. LPSNRD, the counties, and municipalities were strongly encouraged to participate. Other special districts, such as Rural Water Districts, Sanitary Improvement Districts, and school districts were also invited to participate. In Nebraska, public power districts are considered a 'quasi-state government' and are required to submit an individual plan as an annex to the Nebraska State Hazard Mitigation Plan.

In Nebraska, NEMA recommends a multi-jurisdictional approach by counties, municipalities, NRDs, regional emergency management districts, or a combination thereof. FEMA asserts that jurisdictions can benefit in numerous ways when they choose to participate in a multi-jurisdictional approach. Several benefits of the process include that it:

- Enables a comprehensive approach to mitigation of hazards that affect multiple jurisdictions;
- Allow economies of scale by leveraging individual capabilities and sharing cost and resources
- Avoids duplication of efforts; and
- Imposes an external discipline on the process.

A multi-jurisdictional planning approach may have certain complications as well. This process has been conducted in such a way as to ensure each participant has met their individual planning requirements. The Plan itself has been organized to maximize ease of use and implementation by reducing redundant provisions and specifying individual participant elements where appropriate. In addition, the selection of key personnel and the project management structure were developed in a way that minimized the following concerns that can arise during multi-jurisdictional processes:

- Having less individual control over the process;
- Needing strong, centralized leadership and organizational skills;
- Dealing with conflict that may arise among participants; and,
- Requiring consistent participation by each jurisdiction throughout the planning process so that the plan stays on schedule.

## RESOLUTIONS APPROVING THE PLAN

Based upon a FEMA requirement, the multi-jurisdictional hazard mitigation plan must be formally adopted by each participant through approval of a resolution. This approval will legitimize the plan and create 'individual ownership' by each participant. Formal adoption provides evidence of a participant's full commitment to implement the Plan's goals, objectives, and action items, and authorizes the appropriate responsible agencies to perform their responsibilities.

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

Once adopted, participants are responsible to implement and update the Plan every 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 participant. Copies of resolutions approved by each participant are located in Appendix A. Other appendices include information on public participation and implementation materials.

# SECTION 2: PLANNING PROCESS

## METHODOLOGY

The methodology used for the development of this Plan included addressing the following Plan components:

- Resource Organization
  - Coordination with local agencies and organizations
  - Identification of key personnel to be involved in the planning process
  - Public involvement strategy
- Risk Assessment
  - Hazard identification
  - Hazard profiling
  - Vulnerability assessment
- Mitigation Strategy
  - Review mitigation goals
  - Identify mitigation actions
  - Implementation of mitigation actions
- Plan Maintenance
  - Plan adoption
  - Monitoring, evaluating, and updating the Plan
  - Incorporation of Plan into local planning efforts

> Requirement §201.6(b): Planning process. An open public involvement process is essential to the development of an effective plan. In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include:
> (1) An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;
> (2) An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia and other private and non-profit interests to be involved in the planning process; and
> (3) Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.

### *DOCUMENTING THE PLANNING PROCESS*

Resource Organization

LPSNRD began the process of developing this Multi Jurisdictional Hazard Mitigation Plan on October 10th, 2007. LPSNRD was responsible for the development of the Plan, and partnered with JEO Consulting Group, Inc. (JEO) as an external contributor and consultant to provide professional services for this project. Paul Zillig, LPSNRD Assistant General Manager, managed the development of the Plan and served as the primary point-of-contact throughout the project. The first project meeting provided an overview of the work to be completed over the next 10 months, including the number and location of meetings, attendance requirements, potential participants, establishment of a planning team, and a discussion of what types of information needed to be provided to the consultant to successfully complete the Plan.

Throughout the process, LPSNRD served as the primary local contact to planning participants. Any questions, comments, or information received by the NRD was delivered to JEO. The majority of the research was conducted by JEO, including the collection of data surrounding historical occurrences and necessary to complete community profiles. Planning participants provided key documents, completed meeting worksheets, and provided input at public meetings. JEO worked with the NRD to organize public meetings, key personnel meetings, and one-on-one meetings throughout the duration of the project. All information collected during the planning process was organized and assembled to develop the LPSNRD Multi-Jurisdictional Hazard Mitigation Plan.

The initial Plan task was to coordinate the planning process with other agencies and organizations to initiate the Plan across multiple jurisdictions. This task involved introducing the Nebraska Department of Natural Resources (NDNR), NEMA, and JEO to the Plan concept and securing their assistance. The planning process itself began when LPSNRD and JEO staff worked together to identify key personnel to lead the project. This group of elected officials and other key personnel served as a liaison to participants, directed the consultant, and was responsible for review of the plan in the draft stages and to provide additional input as needed.

Key personnel, working with JEO, established a public involvement strategy outlining requirements and guidelines, including the number and location of meetings, minimal participation rules, and general project timeline. In order to adequately gather information unique to each participant, two sets of public meetings were scheduled, one set of meetings to identify hazards and another set to discuss mitigation alternatives. Participants received handouts at each meeting and were instructed to return them to the NRD. Furthermore, the planning team and JEO recorded additional public input throughout the entire process. As the project progressed, ample opportunity was given to jurisdictions to participate in the Plan. A strategy was developed and followed to get communities and public on board and participating.

Risk Assessment

Information was gathered from the all participants either through hazard identification meetings or hazard identification questionnaires. Participants also provided existing reports, studies, and plans that identified potential hazard threats. Each participating community also had a structural inventory completed in order to determine the types and number of structures within their jurisdiction. This inventory provided valuable information on the vulnerability and potential for losses to each participant. Structural inventories were completed through three different methods; 1) the "window survey" method conducted by LPSNRD staff, 2) through utilization of existing Geographical Information System (GIS) information collected and analyzed by JEO, and 3) using FEMA's HAZUS-MH loss estimation software. HAZUS-MH stands for 'Hazard U.S. – Multi-Hazard.'

*Method 1: Window Survey*
JEO trained LPSNRD staff to complete a structural inventory through a window survey in order to ensure a consistent methodology was used for each participant. Inventories were completed by using base maps created in GIS from 2006 aerial photography. Many structures within the Planning Area were identifiable on the base maps alone. However, when structures or areas were not readily identifiable, each was covered through the use of a window survey. Structures were categorized into the following classifications for purposes of consistency through the window survey.

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

*Method 2: Existing GIS Information*
JEO provided a building footprint and parcel coverage map with available information from throughout the LPSNRD area. Once the data was compiled, the tabular data describing the parcel coverage was spatially joined to the location of the building footprint, thereby combining property information from the assessor database with a physical representation of the buildings. Once this was completed, a series of spatial and tabular queries were performed to determine the appropriate property type. In order to maintain consistency, the property types used in this analysis were those developed for the Window Survey.

The property information data obtained through the GIS method was used to supplement the information generated by the Window Survey method when multiple data seta existed for a property. Within the Planning Area, JEO was able to obtain the data needed to use the GIS method for all of Lancaster and Cass counties. The municipalities and participants located outside of Lancaster and Cass counties were documented using the Window Survey method. The City of Lincoln, due to its size, was completed using FEMA's HAZUS-MH software.

Using the assessor property data and GIS output, JEO calculated an estimated loss for each hazard as identified by that participant by using the assessed valuation for each property category. The estimations used in this Plan are based upon the 2007 property assessments. For example, average residential valuation was calculated by dividing the total number of residential structures identified in the structural inventory by the total residential valuation as reported for 2007. Developing a common understanding of the structures in the Planning Area and a simplified approach to determining their values helped establish the level of vulnerability each participant was exposed to for each hazard.

*Method 3: Using HAZUS-MH Loss Estimation Software*
Due to the sheer size and area covered by the City of Lincoln, JEO used FEMA's HAZUS-MH Flood MR3, build 8.10.51 (HAZUS) software. The HAZUS software employs a Digital Elevation Model (DEM) and performs hydrologic and hydraulic calculations to create a standardized floodplain elevation and determine anticipated flood depths for a study area. All losses, whether structural or financial, were calculated at the Census Tract level. Upon completion of the HAZUS structural inventory and loss valuation process, the total values were compared to the property values obtained from the Lancaster County Assessor's Office for the City of Lincoln and were determined to be within an acceptable range. All reports generated from the HAZUS software are included in this report in Appendix C.

Mitigation Strategy

A summary of each participant's risk assessment was then used to help establish mitigation alternatives, which ultimately lead to 'action items.' Action items describe the on-the-ground concepts that will be used to mitigate damages from future events. Mitigation alternatives were evaluated using the seven STAPLEE criteria (Social, Technical, Administrative, Political, Legal, Economic, and Environmental) recommended by FEMA.

The risk assessment and mitigation strategy was combined with a community profile to create individual participant sections of the Plan. Each participant section uniquely distinguishes one participant's needs from another, based upon public input and risk assessment. The community profile includes location, geography, history, climate, demographic information, and general development trends.

All information pertaining to each participant was reviewed in total and used to develop appropriate mitigation actions for each participant. These mitigation actions will assist the participant in the preparation for and response to each identified hazard. Implementing these actions will enable the participant to minimize the impacts of a hazard occurrence, and protect to the greatest extent possible the lives and property within their jurisdiction.

Plan Maintenance

JEO combined the aforementioned materials into a draft Plan, which was carefully reviewed by the key personnel. The draft Plan was then made available to the public for review and comment. Once the Plan was reviewed against public comment and any revision made, it was delivered to NEMA for an initial review and then onto FEMA for a final review and approval.

After the final Plan was written and completed, it was submitted to each participant that joined in the Plan. The Board or Council of each participant presented the Plan for a public hearing and adoption procedure. Table 3 shows which participants adopted the Plan, and the date they did so. Appendix A displays copies of each participant's adoption letter. With this formal adoption of this plan came the commitment from each participant to review and update the Plan every five years. Should a hazard event occur that significantly affects a participant, the Plan will be reviewed and updated if deemed necessary. Appendix D contains worksheets provided to assist each participant with updating the Plan.

## KEY PERSONNEL, AND MEMBERS OF THE PUBLIC INVOLVED

When the project was initiated in Fall 2007, a group of key personnel was established. These key personnel were assigned the responsibility of monitoring and directing the process of developing and preparing this Plan. This group of individuals consisted of staff from LPSNRD, Lancaster County, Cass County, the City of Lincoln, and JEO. Additional technical support to these key personnel was provided by staff from the Nebraska Emergency Management Agency and the Nebraska Department of Natural Resources. Key personnel worked directly with JEO and technical support personnel to guide the planning process, review the Plan, and will continue to serve as a liaison to participants throughout the Planning Area. They are indicated in the table below with an asterisk*. All of the individuals involved in the development of this Plan, including elected officials, members of the public and others who provided information or attended public meetings, are listed below.

In the initial stages of the planning process, the Village of Nehawka was invited to participate. Daryl Meisinger, the Village Chairman, attended one of the public meetings, but afterwards the Village decided not to participate thereafter. It should also be noted that School District #145 sent their superintendent Phil Warrick to a public meeting to keep the District informed of the plan development process although School District #145 had limited capability to participate in the planning process.

**Table 1: Individuals Involved in Plan Development**

| Name | Jurisdiction | Title |
|---|---|---|
| *Bill Cover | Cass County | Director of Emergency Management |
| James Ruhge | Cass County | Resident |
| Joshua Groleau | Cass County | Resident |
| Roseann Dobesh-DeGraff | Cass County | Administrative Officer |
| Dennis Hoback | Cass County RWD #1 | Manager |
| Scott Sparks | Cass County RWD #1 | Customer |
| Dale Miller | Cass County RWD #2 | Assistant Manager |
| Gary Kaplan | Cass County SID #1 - Lake Waconda | Clerk |
| Larry Hathaway | Cass County SID #1 - Lake Waconda | Resident |
| Robert Scheer | Cass County SID #1 - Lake Waconda | SID Board Member |
| Jessica Preister | City of Ashland | City Administrator |
| Emily Bausch | City of Hickman | City Clerk / Treasurer |
| *Ed Kouma | City of Lincoln | Watershed Management Engineer |
| Dan Schlitt | City of Lincoln | Resident |
| Dave Thurber | City of Lincoln | Security Manager (Lincoln Water System) |
| Gary Thalken | City of Lincoln | Sanitary Engineer |
| John Miriovsky | City of Lincoln | Resident |
| Larry D. Worth | City of Lincoln | Transit Manager |
| Marge Schlitt | City of Lincoln | Resident |

| Name | Jurisdiction | Title |
|---|---|---|
| Kevin Larson | City of Plattsmouth | Building Inspector |
| Glenda Wood | City of Waverly | Building Inspector |
| Kay Gerdes | City of Weeping Water | City Clerk |
| Ray Frew | City of Weeping Water | City Council member |
| *Jared Nelson | JEO Consulting Group, Inc. | Consultant |
| *Lalit Jha | JEO Consulting Group, Inc. | Consultant |
| *Mike Schwab | JEO Consulting Group, Inc. | Consultant |
| *Doug Ahlberg | Lancaster County | Director of Emergency Management |
| Ken Halvorsen | Lancaster County RWD #1 | Customer |
| Becky Vandenberg | Lancaster County SID #6 - Emerald | Board President |
| Steve Vandenberg | Lancaster County SID #6 - Emerald | Customer |
| *Ed Ubben | LPSNRD | Projects Coordinator |
| *Glenn Johnson | LPSNRD | General Manager |
| *Mike Mascoe | LPSNRD | Public information Specialist |
| *Paul Zillig | LPSNRD | Assistant Manager |
| Doug Samuelson | LPSNRD | LPSNRD Board member |
| Larry Swanson | LPSNRD | LPSNRD Board member |
| Phil Warrick | School District 145 | Superintendent |
| *Steve McMaster | State of Nebraska Department of Natural Resources | Natural Resources Planning Coordinator |
| *Jennifer Williams | State of Nebraska Emergency Management Agency | Nebraska Hazard Mitigation Officer |
| *Lori Moore | State of Nebraska Emergency Management Agency | Nebraska Hazard Mitigation Officer |
| Dave Morgan | Village of Alvo | Rescue Captain |
| Marilyn Kirchhoff | Village of Avoca | Village Clerk |
| Patricia Rule | Village of Bennet | Village Clerk / Treasurer |
| Robin Sullivan | Village of Brainard | Village Clerk |
| Chuck Paukert | Village of Cedar Creek | Floodplain Manager |
| Mary Terry | Village of Cedar Creek | Resident |
| Sheri Henderson | Village of Ceresco | Village Clerk |
| Bryan Kubicek | Village of Davey | Resident |
| Lori Streeter | Village of Davey | Resident |
| Ruth Anderson | Village of Davey | Resident |
| Bill Edwards | Village of Denton | Village Board Chairman |
| Charlotte TeBrink | Village of Denton | Village Clerk |
| Donna Stevens | Village of Eagle | Village Clerk/Treasurer |
| Gayle Schukel | Village of Eagle | Maintenance staff |
| Keith Jacobsen | Village of Eagle | Village Board member |
| Michael Wenzel | Village of Eagle | Village Board Chairman |
| David W. Allen | Village of Firth | Village Board Chairman |
| Jill Hoefler | Village of Firth | Village Secretary |
| Beatrice Kellogg | Village of Greenwood | Village Clerk / Treasurer |
| Craig Schreiter | Village of Hallam | Fire Chief |
| Dawn Stimple | Village of Hallam | Deputy Director of Emergency Management |
| Gary Vocasek | Village of Hallam | Village Board Member |
| Vicky Polak | Village of Hallam | Resident |
| Alan Mueller | Village of Louisville | Resident |
| Dee Arias | Village of Louisville | Village Clerk |
| Jason McClun | Village of Louisville | Resident |
| Mike Bic | Village of Malcolm | Village Board member |
| Nadine Link | Village of Malcolm | Village Clerk |
| Roy Rasmussen | Village of Malcolm | Fire Chief / Director of Emergency Management |

| Name | Jurisdiction | Title |
|---|---|---|
| Leonard Stohlmann | Village of Manley | Chairman |
| Tracey Zeorian | Village of Manley | Village Board member |
| Jackie Barnes | Village of Murdock | Village Clerk / Treasurer |
| Tom Burmham | Village of Murdock | Resident |
| Eileen Murdoch | Village of Murray | Village Clerk |
| Eric Johnson | Village of Panama | Village Board Chairman |
| Nancy Niemann | Village of Raymond | Clerk |
| Shane K. Cuttlers | Village of Raymond | Deputy Director of Emergency Management |
| Bonnie Harms | Village of Roca | Village Board member |
| Kristi Janda | Village of Roca | Village Clerk |
| Matt Glenn | Village of Sprague | Chairperson |
| Patricia Smith | Village of Sprague | Clerk |
| Steve McWha | Village of Union | Village Manager |
| Floyd Maresh | Village of Valparaiso | Village Clerk |
| Greg Bouc | Village of Valparaiso | Utility Superintendent |

### *OPPORTUNITY FOR PUBLIC INVOLVEMENT*

Public involvement is a vital component to the development of a multi-jurisdictional hazard mitigation plan. Local officials and citizens residing in the Planning Area served an invaluable role as the local experts during the planning process. These are the individuals who experience local hazards first-hand. They were responsible for providing much of the information necessary to complete the Plan, such as the identification of potential hazard types, examples of historical occurrences, and the establishment and selection of preferred goals, objectives, and action items.

The key personnel working on this Plan agreed that the consistent, meaningful involvement of the public was the highest priority for the long-term success of this planning effort and future mitigation activities. In order to ensure this happened, meeting attendance requirements were established at the beginning of the process. In order to participate in the Plan, at least one representative from each participant was required to attend one of the two hazard identification public meetings *and* one of two mitigation alternative public meetings. Each meeting was described in a letter sent to all participants in order to distinguish the differences in intent of the two meeting types. A master database identifying each participant was established and carefully maintained to ensure each participant was notified in writing prior to each meeting and was represented at the meetings.

Hazard Identification Meetings

The two hazard identification meetings were held in Lincoln and Weeping Water during December, 2007. The focus of the hazard identification meetings was to gain insight on the types of hazards perceived by the residents of the Planning Area. At these public meetings, those in attendance were provided with worksheets designed to gather information about the potential types of hazards, personal hazard mitigation goals and objectives, and provide an opportunity for individuals to comment on the Plan. A list of potential mitigation alternatives was also distributed with a worksheet to gain input from each jurisdiction as to what projects or actions they would like to do relative to their goals and objectives. The methods used to inform participants and the public about the hazard identification meeting included:

- **Project Kick-Off Letter** – announcing the intent of the Plan
- **Hazard Identification Meeting Letter** – gave the meeting agenda, date, location, and time
- **Neighboring Community Letter** – informing neighboring communities and counties about the planning effort and this meeting
- **Key Personnel Letter & Meeting Minutes** – informing individuals involved in the process about their first meeting

- **Press Release** – sent to any local newspaper describing the intent of the Plan and encouraging public participation
- **Meeting Flyers** – 11" x 17" flyers posted throughout each participating community
- **Follow-up Phone Call** – potential participants were called to remind them about the upcoming meeting
- **Follow-up email -** potential participants were emailed to remind them of the upcoming meeting
- **Word-of-Mouth –** LPSNRD officials took opportunities to discuss the Plan with communities throughout the planning process

Mitigation Alternative Meetings

The two mitigation alternative meetings were held in Lincoln and Louisville during April, 2008. The intent of these meetings was to provide an opportunity for the public to comment on a draft Plan, specifically including the individual participant sections. Participants were asked to evaluate and prioritize mitigation alternatives using the STAPLEE process. Finally, participants were asked to identify and assist with collecting any additional information necessary to finish the Plan. At this point the draft Plan was posted on the internet to allow further public review and comment.

The techniques used to announce and promote the mitigation alternative meetings included:

- **30-day Notice of Meeting Letter** – sent to participants as a reminder to discuss the intent of the upcoming meeting
- **Mitigation Alternative Meeting Letter** – gave the meeting agenda, date, location, and time
- **Planning Team Letter** – discussing the meeting agenda, date, location, and time for the second Planning team meeting
- **Neighboring Community Letter** – reminding neighboring communities and counties about the planning effort and the upcoming meeting
- **Meeting Flyers** – 11"x17" meeting flyers were posted in each participating community
- **Press Release** – sent to each newspaper with a circulation in a participating community
- **Word-of-Mouth** – each participant was encouraged to ask people to attend the meeting

For those participants unable to attend a public meeting, an optional packet of information was made available to be sent to them. These participants were instructed to place an item on the agenda for a public meeting announcing "Participation in the LPSNRD Hazard Mitigation Plan," review the packet of information in a public setting, and take formal action to have their participation included in the Plan. The optional packet included the same information which was delivered to Plan participants at the Hazard Identification and Mitigation Alternative meetings. These participants then were instructed to return the materials along with a copy of a meeting sign-in sheet and minutes from their public meeting. This effort allowed all participants to have an opportunity to provide input and take part in the development of this Plan.

### *OPPORTUNITY FOR NEIGHBORING COMMUNITIES*

The planning effort included several public notice methods designed to inform other potential participants, such as local agencies, businesses, academic institutions, and non-profit organizations about this planning process and invite there input. Representatives from several neighboring communities and potential participants were present at the public meetings.

# PARTICIPANT JURISDICTIONS

This Plan was prepared for and with the assistance of 38 jurisdictions. The table below summarizes the involvement of each participant during the planning process, and identifies the date of Plan adoption by each participant. The actions shown in the table were established by the Key Personnel at the beginning of the planning process as the minimum amount of involvement required to be eligible for inclusion in the Plan. The last column indicates whether each participant met these criteria. All participants in this Plan met all the requirements. Following this table is Figure 1 that displays the location and land area of each Plan participant in the planning area.

### *RURAL WATER DISTRICTS (RWDS)*

There are many sparsely populated, rural areas in Nebraska. Residents in these areas are served by Rural Water Districts (RWDs) for their water supply. These special districts own, operate, and maintain complex 'long pipe' distributions systems. RWDs are not towns or villages, these special districts are set up solely for water distribution to rural areas.

Because RWDs serve very few people relative to the land area in which their infrastructure is located, it is very expensive to administer and maintain. It is not feasible to charge the residents served by the Districts the amount it actually costs to operate, as it would be simply un-affordable. Thus, various financial assistance programs for the development of these systems/districts are made available so the residents, which contribute largely to Nebraska's agricultural economy, can sustain their livelihoods. The financial assistance available for the development, maintenance and operation of RWDs comes largely from a federal grant, and low interest loan program, administered by the Rural Development Administration (RDA). Additionally, some states provide financial aid and support to RWDs. These financial assistance programs make it affordable for rural residents to get water.

During the process of this plan, three RWDs within the Lower Platte South NRD chose to participate; Cass County RWD #1, Cass County RWD #2, and Lancaster County RWD #1 . These special districts have unique characteristics that make them different from the other participating jurisdictions; the only structures/infrastructure they own are pipes, wells, water towers one or two offices or maintenance buildings. Most of their inventory is underground. Taking that into consideration, vulnerability to certain hazards vary from a standard jurisdiction which has much of their inventory exposed to the elements. Specific information about these RWDs can be found in their respective participant sections, see *Section 6: Participant Sections.*

### *SANITARY IMPROVEMENT DISTRICTS (SIDS)*

Sanitary Improvement Districts (SIDs) were established by the Nebraska Legislature in the 1940's, after World War II to help address the large amount of development that took place in Nebraska. When developers buy land for development, they can establish them as SIDs to install streets, sewers, power and even land for public parks. The developer establishes the SID with a board of trustees, who then issues bonds and assigns special assessments to individual lots in the subdivision. Sanitary Improvement Districts are beneficial for both the builder and the buyer as the cost of development is lower. Because SIDs offer tax free bonds, it is generally a very stable investment, which is attractive to investors.

Nebraska's SIDs are essentially unincorporated communities, and while they are formally identified as the county in which they lie accompanied with a number, they will also have something closer to that of an average community's nomenclature. (i.e. Lancaster County SID #6 is also recognized as Emerald, NE) SIDs often start off as small, village-like communities just outside of a city where, if development of that city encroaches the jurisdiction of the SID, it will eventually be annexed into the city. This is beneficial for residents in the city because lowers the tax burden to the city.

During the process of this plan, two SIDs within the Lower Platte South NRD chose to participate; Cass County SID #1/ Lake WaConDa, and Lancaster County SID#6/ Emerald. 'Lake WaConDa' and 'Emerald' are the common names of these SID's. Specific information about these SIDs can be found in their respective participant sections, see Section 6: Participant Sections.

### *INDIRECT PARTICIPATION*

School District #145 has chosen to participate indirectly through both the Village of Eagle and the City of Waverly, communities in which the District owns and maintains property/structures. School District #145 had limited capability to undertake extensive participation in this plan and passed two resolutions on July 7th, 2008 to authorize both the Village of Eagle and the City of Waverly to act on their behalf; Eagle acting on behalf of the District that lies within in it, and Waverly respectively. Refer to Appendix B to view a copy of these resolutions.

After the resolutions were approved, the School District submitted letters to Eagle and Waverly informing them of potential mitigation actions they identified as beneficial for their district, as well as their intent to maintain communication throughout the planning process, project implementation, and plan updates.

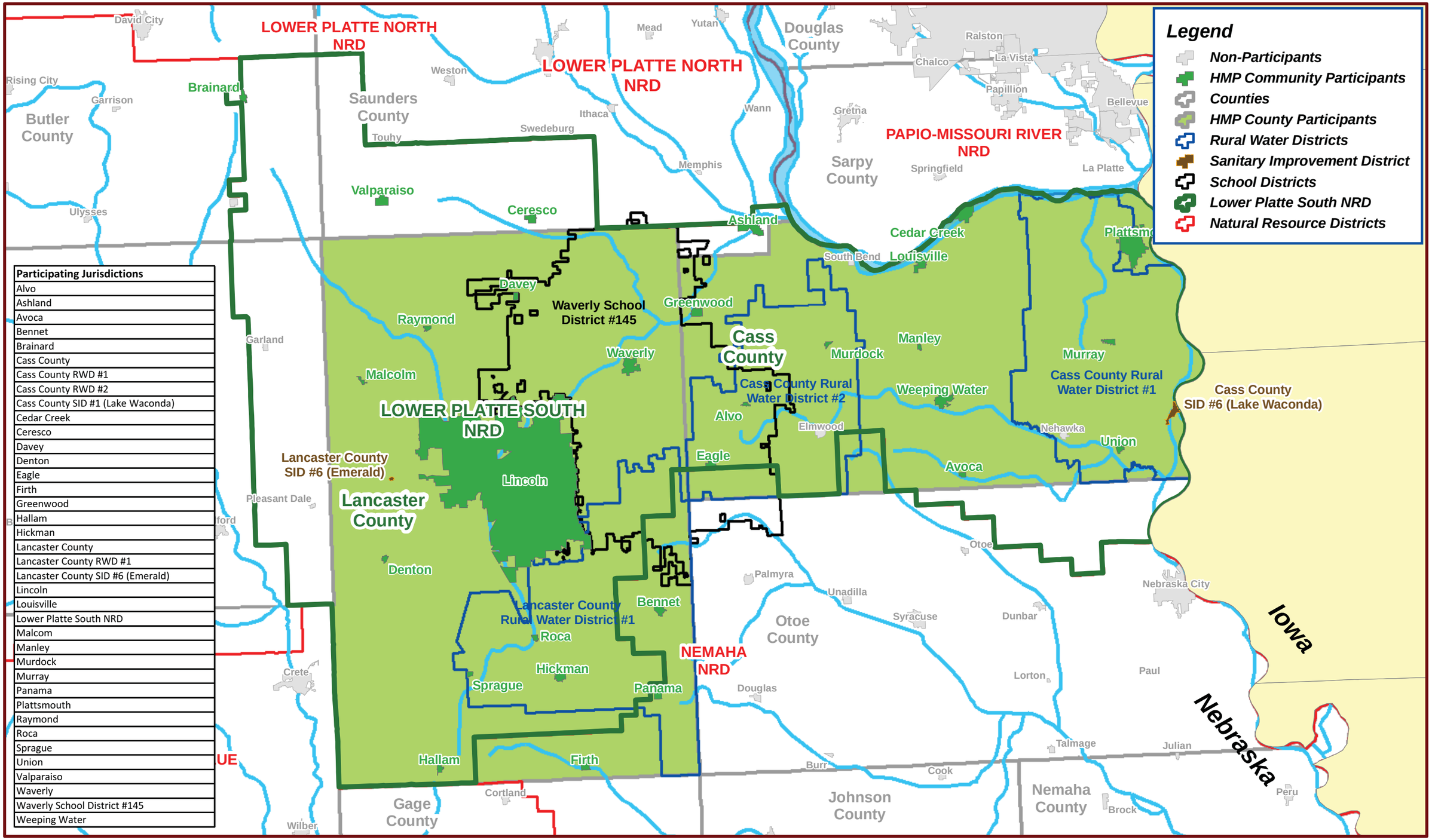
School District #145 sent their superintendent Phil Warrick to public meetings to keep the District informed of the plan development process. Research has concluded, along with discussions between School District #145, the Village of Eagle, and the City of Waverly, that the District is not unique in how hazards affect the district. Therefore the hazards, risk assessment, and vulnerability assessment completed for the Village of Eagle and the City of Waverly is applicable to the District in respect to its location. Through the planning process then, the Village of Eagle and the City of Waverly both acted in the interests of the District.

The land area that the School District #145 jurisdiction occupies is shown in Figure 1.

**Table 2: Participant Jurisdictions**

| Jurisdiction | Participated in Public Meetings | Completed Hazard ID Worksheet | Completed Mitigation Alternatives Worksheet | Plan Adopted | Date Plan Adopted | Participants (All Requirements Met) |
|---|---|---|---|---|---|---|
| Alvo | X | X | X | n/a | n/a | Yes |
| Ashland | X | X | X | n/a | n/a | Yes |
| Avoca | X | X | X | n/a | n/a | Yes |
| Bennet | X | X | X | n/a | n/a | Yes |
| Brainard | X | X | X | n/a | n/a | Yes |
| Cass County | X | X | X | n/a | n/a | Yes |
| Cass County RWD #1 | X | X | X | n/a | n/a | Yes |
| Cass County RWD #2 | X | X | X | n/a | n/a | Yes |
| Cass County SID #1 (Lake Waconda) | X | X | X | n/a | n/a | Yes |
| Cedar Creek | X | X | X | n/a | n/a | Yes |
| Ceresco | X | X | X | n/a | n/a | Yes |
| Davey | X | X | X | n/a | n/a | Yes |
| Denton | X | X | X | n/a | n/a | Yes |
| Eagle | X | X | X | n/a | n/a | Yes |
| Firth | X | X | X | n/a | n/a | Yes |
| Greenwood | X | X | X | n/a | n/a | Yes |
| Hallam | X | X | X | n/a | n/a | Yes |
| Hickman | X | X | X | n/a | n/a | Yes |
| Lancaster County | X | X | X | n/a | n/a | Yes |
| Lancaster County RWD #1 | X | X | X | n/a | n/a | Yes |
| Lancaster County SID #6 (Emerald) | X | X | X | n/a | n/a | Yes |
| Lincoln | X | X | X | n/a | n/a | Yes |
| Louisville | X | X | X | n/a | n/a | Yes |
| LPSNRD | X | X | X | Yes | 11/19/2008 | Yes |
| Malcom | X | X | X | n/a | n/a | Yes |
| Manley | X | X | X | n/a | n/a | Yes |
| Murdock | X | X | X | n/a | n/a | Yes |
| Murray | X | X | X | n/a | n/a | Yes |
| Panama | X | X | X | n/a | n/a | Yes |
| Plattsmouth | X | X | X | n/a | n/a | Yes |
| Raymond | X | X | X | n/a | n/a | Yes |
| Roca | X | X | X | n/a | n/a | Yes |
| Sprague | X | X | X | n/a | n/a | Yes |
| Union | X | X | X | n/a | n/a | Yes |
| Valparaiso | X | X | X | n/a | n/a | Yes |
| Waverly | X | X | X | n/a | n/a | Yes |
| Waverly School District #145 | X | * | * | n/a | n/a | Yes |
| Weeping Water | X | X | X | n/a | n/a | Yes |

*Participated Indirectly through the Village of Eagle and the City of Waverly




| Participating Jurisdictions |
|---|
| Alvo |
| Ashland |
| Avoca |
| Bennet |
| Brainard |
| Cass County |
| Cass County RWD #1 |
| Cass County RWD #2 |
| Cass County SID #1 (Lake Waconda) |
| Cedar Creek |
| Ceresco |
| Davey |
| Denton |
| Eagle |
| Firth |
| Greenwood |
| Hallam |
| Hickman |
| Lancaster County |
| Lancaster County RWD #1 |
| Lancaster County SID #6 (Emerald) |
| Lincoln |
| Louisville |
| Lower Platte South NRD |
| Malcom |
| Manley |
| Murdock |
| Murray |
| Panama |
| Plattsmouth |
| Raymond |
| Roca |
| Sprague |
| Union |
| Valparaiso |
| Waverly |
| Waverly School District #145 |
| Weeping Water |

Prepared By: JEO Consulting Group, Inc.
Source of Aerials and City Limits: NDNR
Software Used: ESRI ArcView 9.2 sp2

THIS MAP PREPARED USING INFORMATION FROM RECORD DRAWINGS SUPPLIED BY JEO AND/OR OTHER APPLICABLE CITY, COUNTY, STATE, FEDERAL OR PUBLIC OR PRIVATE ENTITIES. JEO DOES NOT GUARANTEE THE ACCURACY OF THIS MAP OR THE INFORMATION USED TO PREPARE THIS MAP.

Created By: M Schwab, July 24, 2008
Contact Person: Jared Nelson
JEO Project Number: 385023

**Lower Platte South NRD, Nebraska**
**- Lower Platte South NRD Hazard Mitigation Plan -**
**Figure 1 : Participating Jurisdictions in Lower Platte South NRD HMP**

JEO Consulting Group, Inc.

Figure 1

# GENERAL PLANS, DOCUMENTS, AND INFORMATION USED

During the research process of the plan development, many reliable sources of information were referenced. Existing plans, studies, reports and other technical data supplied by the jurisdictions were taken into account for and referenced, along with various internet databases, local publications, and scholarly journals. Information used in the general development of this Plan is listed below. Information from these sources was incorporated into the Plan such as historical occurrence information, community background, future development, hazard risks and locations, potential losses, and valuations. Community specific information used during the planning process can be found in the individual participant sections.

**Table 3: General Plans, Documents, and Information**

| Document / Resource | Source | Description |
|---|---|---|
| State of Nebraska Hazard Mitigation Plan | Nebraska Emergency Management Agency | The State of Nebraska Hazard Mitigation Plan identified all hazards that are common to the state and discusses the locations, losses and vulnerablitiy to these hazards. |
| National Climatic Data Center | www.ncdc.noaa.gov | World's largest active archive of weather data. |
| Conservation and Survey Division | IANR-UNL | Institute of Agriculture and Natural Resources focuses on education, research and outreach programs in the areas of food, agriculture and agribusiness systems, natural resources and human resources. |
| Flood Insurance Study | www.fema.gov | Information regarding flooding in a community and is developed in conjunction with the Flood insurance Rate Map. |
| Community Comprehensive Plan | From respective communities | City, Village or County Comprehensive Development Plan adopted by the governing bodies identifying existing and proposed growth trends and existing and future land use. |
| University of Nebraska-Lincoln | www.casde.unl.ed<br>www.snr.unl.edu | Part of the Virtual Nebraska Project. Acts as an on-line archive. |
| The Weather Channel | www.weather.com | Provides current weather reports and related news. Some of the information comes from the National Weather Service. |
| Nebraska Public Power District Service | www.sites.nppd.com | 50 years of community data, profiles and studies. |
| High Plains Regional Climate Center | www.hprcc.unl.edu | Supported by the NCDC, they provide near-real time climate data. |
| City-Data.com | www.city-data.com | Provides information about geographical date, weather, state profiles, maps, and satellite photos etc. |
| Federal Emergency Management Agency | www.fema.gov | Part of the U.S. Department of Homeland Security. Their primary mission is to reduce risks by using mitigation. |
| Nebraska Association of Resources Districts | www.nrdnet.org | Trade association for Nebraska's 23 NRDs. Their mission is to act as a liaisons between the NRDs. |
| Nebraska Department of Natural Resources | www.dnrdata.dnr.ne.us | A State agency with multiple responsibilities dealing with sustainable use and proper management of Nebraska's natural resources. |

| Document / Resource | Source | Description |
|---|---|---|
| Tornado History Project | www.tornadohistoryproject.com | Database of U.S. tornadoes from 1950 to 2007. Information is from the Storm Prediction Center's historical tornado data file. |
| Nebraska Emergency Management Agency | www.nema.ne.gov | Part of the Military Department that deals with emergency management in four phases-preparedness, response, recovery and mitigation. |
| Soil Survey of Lancaster County Nebraska 1980 | www.ne.nrcs.usda.gov/technical/soil_surveys | United States Department of Agriculture, Soil Conservation Service, in cooperation with University of Nebraska, Conservation and Survey Division. |
| Lincoln Electric System | www.les.com | Publicly owned power Utility that serves the City of Lincoln and surrounding areas. |
| Natural Resources Conservation Service | www.ne.nrcs.usda.gov | Originally the Soil Conservation Service, leads land owners and managers in conserving their soil, water and other natural resources. Programs operate on a voluntary basis. |
| Quick City Info | www.quickcityinfo.com | Data is compiled from free data sources on the world wide web i.e. USGS and the Census Bureau. |
| National Flood Insurance Program | www.dnrdata.dnr.ne.gov<br>www.fema.gov | There are three components that work to reduce cost of flood damages: Flood Insurance, Floodplain Management and Flood Hazard Mapping. |
| Dams | www.dnrdata.dnr.ne.gov | Data bank inventory of all dams under the NDNR's jurisdiction. The NDNR review and approves dam construction and maintenance. |
| Parcel data | Cass County Assessor<br>Lancaster County Assessor | The Assessor office is responsible for the valuation of parcels of real estate and personal property. |
| Corporate limits aerials | www.dnrdata.dnr.ne.gov | Photos of Political boundaries in data bank. |
| County Boundaries | www.dnrdata.dnr.ne.gov | Data bank of Political Boundaries |
| Lincoln Journal Star | Local Newspaper | Newspaper. Historical records |
| American Red Cross | Reported in LEOPs | Disaster information and historical occurrences |

# SECTION 3: RISK ASSESSMENT

## INTRODUCTION

Weather is not a hazard. However, the result of a weather event can create multiple hazards, often many hazards during one weather event; for example, one severe thunderstorm can cause flooding, tornadoes, and wildfire from lightning. For the purposes of hazard mitigation planning, natural hazards are separated by type in order to facilitate an accurate assessment of the vulnerability and potential for loss; although tornadoes often accompany severe thunderstorms, they are treated as two separate events since the effects of the two are different. A general description and background of the various hazards is presented in this section. The hazard types identified include those which have a significant likelihood of occurring in the Planning Area, or have at least some potential to occur. These hazard types include severe thunderstorm, tornados / high wind events, severe winter storm, flooding, extreme heat, drought, earthquake, wildfire, landslides, dam failures, and levee failure.

## DIFFERING DEMOGRAPHICS OR LOCAL SITUATIONS

There are three general types of jurisdictions represented in this plan. Below describes the unique characteristics, such as demographics and local situations, of different jurisdictions. The risk assessment including the probability of future events, extent of damages and vulnerability assessment varies depending on the assets of the jurisdictions.

- **Villages, Cities and Sanitary Improvement Districts:** The majority of the jurisdictions represented in this plan are Villages, Cities and SIDs. Villages and Cities are incorporated communities while SIDs are unincorporated communities. All of these jurisdictions have residential, commercial, public and quasi public structures as well as out buildings. These jurisdictions also have infrastructure including water and wastewater infrastructure, power lines, cable and telephones lines, streets, trees, and other infrastructure common to communities. Due to data limitations; infrastructure, locations of the elderly, highly vulnerable areas, and areas of low income were not assessed. This could be completed in the next plan update.

- **Rural Water Districts:** Rural Water Districts, as described earlier, only own,, operate, and maintain infrastructure that pertains to distributing water to its customers. They have no taxing authority and are considered a 'special jurisdiction' for this plan. RWD's sometimes have a few structures such as their offices or buildings that house maintenance items or wells. Their infrastructure typically consists of pipes, water towers and wells. Due to data limitations, their infrastructure was not fully assessed. This could be completed in the next plan update.

- **Counties and NRD:** The County jurisdictions as well as the NRD are not communities but districts that make up smaller incorporated communities and rural unincorporated areas. The Counties and NRDs themselves own, operate, and maintain several structures for the function of providing services to the communities. Counties are unique in that they own and maintain roads and bridges. NRDs are unique in that they own and maintain dams, recreational trails, flood control and grade stabilization structures and other natural resources. Due to data limitations, the infrastructure of bridges and roads, and structures in unincorporated areas of the County were not assessed for this plan. Furthermore, data limitations existed for infrastructure of the LPSNRD. There were data limitations concerning all the trails and grade stabilization structures of the NRD. These data limitations could be addressed and the assessment more fully completed in future updates of the plan.

## CRITICAL FACILITIES

Each participating jurisdiction identified critical facilities based on the relative importance of its various assets for the delivery of vital services, the protection of special populations, and other important functions.

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.

Critical facilities were identified during the second public meeting using the separate worksheet and instructions sheet found in Appendix C. Below is a summary of some of the critical facilities found in Cass County and Lancaster County, which makes up the majority of the entire planning area. The Cass County LEOP lists the following Key Facilities shown in Table 4 below, while Table 5 shows the breakdown of all critical infrastructure broken down by Emergency Support Functions (ESF) identified in the Lancaster County LEOP. To view jurisdiction-specific critical facilities and their locations, refer to *Section 6: Participant Sections*.

**Table 4: Key Facilities identified in Cass County**

| Community | Facility | Address |
|---|---|---|
| Alvo | Fire Department | 221 Main |
| Avoca | Fire Department | 211 Polar |
| | Village Hall | 224 House |
| Eagle | Fire Department | 701 S 1st St |
| | Fire Department Storage | 514 S 4th St |
| Elmwood | Fire Department | 601 S 4th |
| | Village Hall | 400 W 'E' St |
| | Doctor's Office | 160 N 4th St |
| Greenwood | Fire Department | 231 Broad |
| | Village Hall | 619 Main |
| Louisville | Fire Department | 122 Main |
| | Omaha Public Power | 205 Main |
| Manley | Fire Department | Manley |
| Murdock | Fire Station | 321 Nebraska |
| Murray | Fire Department | 508 Hwy 1 |
| | Rural Fire District | 508 Hwy 1 |
| Nehawka | Fire Department | 111 S Main |
| Plattsmouth | Courthouse | 4th & Main |
| | County Sheriff | 336 Main |
| | County Jail | 336 Main |
| | Cass County Emergency Management Secondary EOC | 336 Main |
| | County Maintenance Shop | Plattsmouth |
| | State Department of Roads | Plattsmouth |
| | Police | 336 Main |
| | Fire Department | 127 N 5th St |
| | City Hall | 136 N 5th St |
| | City Maintenance Shop | 13th Avenue & 4th St |
| | Nebraska Public Power | 611 Chicago Avenue |
| | Enron Liquids Pipe Line | 12909 Chicago |
| | Internal Medicine Associates | 1938 E Hwy 34 |
| | University Medical Associates | 1938 E Hwy 34 |
| | Plattsmouth Journal | 410 Main |
| | Water Treatment Plant | 17500 Schilling Refuge Rd |
| | Sewage Disposal Plant | 401 Dock Rd |
| | Alltel Communications | 645 Main |
| Union | Fire Department | 500 E Main |
| Weeping Water | Fire Department | 313 W Eldora |
| | City Offices | 203 W Eldora |
| | Water Treatment Plant | 105 N Randolph |
| | Rescue Squad | 313 W Eldora |
| | Public School | 204 W 'O' St |
| | Family Practice Clinic | 204 N Randolph |
| | Cass County Emergency Management Agency and County EOC | 8400 144th St |

**Table 5: Key Infrastructure in Lancaster County by ESF Category**

| ESF Category | # of Structures |
|---|---|
| ESF 1- Transportation | 19 |
| ESF 2- Communications | 16 |
| ESF 3- Public Works | 22 |
| ESF 4- Firefighting | 61 |
| ESF 5- Information and Planning | 290 |
| ESF 6- Mass Care | 8 |
| ESF 7- Resource Support | 14 |
| ESF 8- Health and Medical | 51 |
| ESF 9- Search and Rescue | 1 |
| ESF 10- Hazardous Materials | 11 |

## NON-OCCURRING HAZARDS

Due to geographic location, there are hazards that do not or cannot impact a given area. The following hazard types were not considered in this Plan due to their inability to occur in Nebraska: volcanic eruptions, avalanches, hurricanes, tidal surges, and tsunamis. No one in any of the participant jurisdictions has recorded these as hazards, and the Nebraska State Hazard Mitigation Plan does not indicate they are a threat.

## HAZARDS IDENTIFIED IN THE PLANNING AREA

The Planning Area's risk assessment was established through input and information provided by meeting attendees, staff of Lower Platte South NRD, and other participating jurisdictions, and by researching each hazard identified in the State of Nebraska Hazard Mitigation Plan. For each participating jurisdiction, in *Section 6: Participant Sections*, a 'Public Opinion Hazard Identification' table shows the responses (based solely on participant input) from the public and community officials.

Below, for each hazard identified in each jurisdiction within the planning area, the 'Composite Hazard Identification' tables show the final probabilities and extents. These tables, like the 'Public Opinion Hazard Identification' tables, display the likelihood of the hazard to occur again and to what extent damage may occur for each participating jurisdiction. However, these tables and rankings were compiled after receiving responses from staff, discussion of public responses with the State Hazard Mitigation Officer, and conducting research on each hazard's presence and risk.

Listed below is the definition of probability of occurrence and extent of damage as used during the planning process. These terms were applied consistently throughout the plan.

Probability of occurrence is defined as follows:

- **Highly Likely**: Near 100% probability in the next year.
- **Likely:** Between 10 and 100% probability in the next year, or at least one chance in 10 years.
- **Possible:** Between 1 and 10% probability in the next year, or at least one chance in next 100 years.
- **Unlikely:** Less than 1% probability in next 100 years.

Extent of damage is defined as follows:

- **Catastrophic:** More than 50% of the jurisdiction can be affected
- **Severe:** 25 to 50% of the jurisdiction can be affected
- **Limited:** 0 to 25% of the jurisdiction can be affected
- **None:** 0% of the jurisdiction can be affected

The following sections provide hazard background, historical occurrences, vulnerability assessment, potential losses, and other hazard specific information for the planning area. Only the hazard types which have a significant likelihood of occurring or have reason to potentially occur are discussed. Refer to *Section 6: Participant Sections* for discussion of unique risk assessments specific to the jurisdictions (i.e. flooding).

### *SEVERE WINTER STORM*

Below is the Composite Hazard Identification Table for all the jurisdictions participating in this plan for severe winter storms. The table shows the final determination of previous occurrences, likelihood to experience in the future, the probability to occur in the future, and the extent. Differences in probability and extent are described further in vulnerability assessment as the unique aspects of the jurisdictions are taken into account.

**Table 6: Severe Winter Storm Composite Hazard Identification Table**

| JURISDICTION | PREVIOUS OCCURRENCE? Yes/No | LIKELY TO EXPERIENCE? Yes/No | PROBABILITY Highly Likely/ Likely/Possible/Unlikely | EXTENT Catastrophic/Severe /Limited/None |
|---|---|---|---|---|
| Alvo | Yes | Yes | Highly Likely | Severe |
| Ashland | Yes | Yes | Highly Likely | Severe |
| Avoca | Yes | Yes | Highly Likely | Severe |
| Bennet | Yes | Yes | Highly Likely | Severe |
| Brainard | Yes | Yes | Highly Likely | Severe |
| Cass County | Yes | Yes | Highly Likely | Severe |
| Cass County Rural Water District #1 | Yes | Yes | Highly Likely | Catastrophic |
| Cass County Rural Water District #2 | Yes | Yes | Highly Likely | Catastrophic |
| Cass County SID #1 | Yes | Yes | Highly Likely | Severe |
| Cedar Creek | Yes | Yes | Highly Likely | Severe |
| Ceresco | Yes | Yes | Highly Likely | Severe |
| Davey | Yes | Yes | Highly Likely | Severe |
| Denton | Yes | Yes | Highly Likely | Severe |
| Eagle | Yes | Yes | Highly Likely | Severe |
| Firth | Yes | Yes | Highly Likely | Severe |
| Greenwood | Yes | Yes | Highly Likely | Severe |
| Hallam | Yes | Yes | Highly Likely | Severe |
| Hickman | Yes | Yes | Highly Likely | Severe |
| Lancaster County | Yes | Yes | Highly Likely | Severe |
| Lancaster County Rural Water District #1 | Yes | Yes | Highly Likely | Catastrophic |
| Lancaster County SID #6 | Yes | Yes | Highly Likely | Severe |
| Lincoln | Yes | Yes | Highly Likely | Severe |
| Louisville | Yes | Yes | Highly Likely | Severe |
| LPSNRD | Yes | Yes | Highly Likely | Severe |
| Malcolm | Yes | Yes | Highly Likely | Severe |
| Manley | Yes | Yes | Highly Likely | Severe |
| Murdock | Yes | Yes | Highly Likely | Severe |
| Murray | Yes | Yes | Highly Likely | Severe |
| Panama | Yes | Yes | Highly Likely | Severe |
| Plattsmouth | Yes | Yes | Highly Likely | Severe |
| Raymond | Yes | Yes | Highly Likely | Severe |
| Roca | Yes | Yes | Highly Likely | Severe |
| School District 145 | Yes | Yes | Highly Likely | Severe |
| Sprague | Yes | Yes | Highly Likely | Severe |
| Union | No | Yes | Highly Likely | Severe |
| Valparaiso | Yes | Yes | Highly Likely | Severe |
| Waverly | Yes | Yes | Highly Likely | Severe |
| Weeping Water | Yes | Yes | Highly Likely | Severe |

Hazard Background

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 community by hindering transportation, knocking down tree limbs and utility lines, and causing structural damage to buildings.

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

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

Historical Occurrences

The NCDC reported six major severe winter storms that affected communities within the Planning Area. Below is a description of each event. More detailed historical occurrences can be found in each jurisdiction's 'participant section'.

- **January 26, 1994:** Freezing rain and sleet caused icing of trees and power lines. Some electrical outages also occurred. $50,000 worth of property damage was incurred.

- **September 22, 1995:** Record low temperatures from the lower 20s to the lower 30s put an end to an already stunted growing season across the midlands. Nearly the entire state fell below 28 degrees. Hardest hit were the milo, soybean, and corn crops. Crop damages reported were $262 million.

- **March 24, 1996:** Blizzard conditions in much of southeast Nebraska brought 60 mph wind gusts and wind chill temperatures from 30 to 40 degrees below zero. Hundreds of motorists were stranded and several accidents occurred due to zero visibility for ten hours.

- **November 14, 1996:** Freezing rain caused many phone and power outages. Over 40,000 Omaha Public Power District customers were without power.

- **October 25, 1997:** A major early season snowstorm struck the area. A heavy wet snowfall of 6 to 14 inches fell on trees, many of which were still fully or partially leafed, and caused extensive damage and/or total destruction. At least 205,000 residents in the affected area were without power just after the storm, many of the outages lasted for several days. Omaha Public Power District estimated that it was the worst outage in 50 years. Nearly 85% of the trees in the Omaha area and 25% of the trees in the Lincoln area sustained damage or were totally destroyed. Many emergency shelters in and around the Omaha and Lincoln areas were opened for use by those who suffered a hardship from the storm. A reported $56.5 million in property damage and $1.6 million in crop damages was recorded.

- **March 7, 1998:** A major winter storm moved through the central plains and created near blizzard conditions over portions of eastern Nebraska. Heavy snow combined with strong northerly winds of 40-45 mph created considerable blowing snow with 6-15 foot snow drifts common. Schools and businesses were closed for a few days as the strong winds continued to cause blowing snow making the task of cleaning up very difficult. Throughout the affected area, there was $26,000 of reported property damage.

Vulnerability Assessment

It was deemed, by both the public and factual research that the planning area as a whole has had previous occurrences of severe winter storms. The probability of a severe winter storm to occur again is 'highly likely' with a near 100% chance they will occur every year within the planning area. The extent was determined to be 'catastrophic', as 50% or more of the planning area could be affected by severe winter storms.

There is no area in the planning area that is void from the affects of severe winter storms. Severe winter storms have the capability to affect the entire planning area during and after the event. The entire infrastructure, including critical facilities, in the planning is vulnerable and is at risk of being damaged or affected by severe winter storms. Severe winter storms can cause damage to structures, damage to pipes, downed power lines, loss of electricity, obstruct traffic flow, and significantly damage trees. A loss of electricity in combination with cold weather can pose a significant threat to human life.

The unique characteristics of different jurisdictions allow severe winter storms to impact them differently. Furthermore, the following differences explain the range of probability and extent as shown in Table 6 above: Rural water districts are vulnerable to severe winter storms as the cold can freeze its infrastructure pipes that are used to distribute water to its users. Villages, cities and SIDs are vulnerable in that their power, cable and telephone lines can accrue ice during a winter storm and break. Heavy snow buildup can cause structural damage to residential, commercial and public structures as well as critical facilities. Snow and ice can also endanger residents that travel on the roads. Residents in the rural areas of the counties can be affected by severe winter storms as snow and ice can greatly hinder travel. Also power can be cut off to residents in unincorporated areas of the county for days, and sometimes weeks.

Potential Losses

During major events the entire Planning Area could potentially be affected. Based upon statewide information from the NCDC, 543 incorporated communities have recorded personal property damage from ice storm events over the last 57 years. The average amount of damage per event in Nebraska was $1.82 million. Throughout the Midwest, average damage per event was $2.27 million. Based upon these previous historical events, communities in the Planning Area could likely experience potential losses ranging from a few thousand dollars to potential billions of dollars. The methodology used to calculate the potential losses was done by calculating the average damage amounts from storm events over the valuation of the communities. Based on historical occurrences in the planning area, a severe winter storm event causes between 0.5% and 1.0% damage of the value of the community. This does not include loss of displacement, functional downtime, economic loss, or loss of life and injury, but data limitations prevented detailed estimates of these losses. A loss of electricity due to downed power lines can cripple any jurisdiction's economy, cause loss of power to critical facilities, and pose a threat to human life.

See each jurisdictions participant section for a more detailed discussion of potential losses to their community and the estimated dollar amount of damages from severe winter storms.

Future Vulnerability and Losses

There is no human behavior or activity that can modify the area affected by severe winter storms, thus winter storms will always be capable of affecting the entire Planning Area. Any structural growth which occurs within it in the future will be vulnerable to the losses sustained from severe winter storms. Losses from these events could prove costly considering the large amount of development anticipated to occur over the next five years.

### *TORNADO AND HIGH WINDS*

Below is the Composite Hazard Identification Table for all the jurisdictions participating in this plan for tornados and high winds. The table shows the final determination of previous occurrences, likelihood to experience in the future, the probability to occur in the future, and the extent. Differences in probability and extent are described further in vulnerability assessment as the unique aspects of the jurisdictions are taken into account.

**Table 7: Tornado and High Winds Composite Hazard Identification Table**

| JURISDICTION | PREVIOUS OCCURRENCE? Yes/No | LIKELY TO EXPERIENCE? Yes/No | PROBABILITY Highly Likely/ Likely/Possible/Unlikely | EXTENT Catastrophic/Severe /Limited/None |
|---|---|---|---|---|
| Alvo | Yes | Yes | Possible | Catastrophic |
| Ashland | Yes | Yes | Possible | Catastrophic |
| Avoca | Yes | Yes | Possible | Catastrophic |
| Bennet | Yes | Yes | Possible | Catastrophic |
| Brainard | Yes | Yes | Possible | Catastrophic |
| Cass County | Yes | Yes | Highly Likely | Limited |
| Cass County Rural Water District #1 | Yes | Yes | Likely | Limited |
| Cass County Rural Water District #2 | Yes | Yes | Likely | Limited |
| Cass County SID #1 | Yes | Yes | Possible | Catastrophic |
| Cedar Creek | Yes | Yes | Possible | Catastrophic |
| Ceresco | Yes | Yes | Possible | Catastrophic |
| Davey | Yes | Yes | Possible | Catastrophic |
| Denton | Yes | Yes | Possible | Catastrophic |
| Eagle | Yes | Yes | Possible | Catastrophic |
| Firth | Yes | Yes | Possible | Catastrophic |
| Greenwood | Yes | Yes | Possible | Catastrophic |
| Hallam | Yes | Yes | Possible | Catastrophic |
| Hickman | Yes | Yes | Possible | Catastrophic |
| Lancaster County | Yes | Yes | Highly Likely | Limited |
| Lancaster County Rural Water District #1 | Yes | Yes | Likely | Limited |
| Lancaster County SID #6 | Yes | Yes | Possible | Catastrophic |
| Lincoln | Yes | Yes | Possible | Catastrophic |
| Louisville | Yes | Yes | Possible | Catastrophic |
| LPSNRD | Yes | Yes | Highly Likely | Limited |
| Malcolm | Yes | Yes | Possible | Catastrophic |
| Manley | Yes | Yes | Possible | Catastrophic |
| Murdock | Yes | Yes | Possible | Catastrophic |
| Murray | Yes | Yes | Possible | Catastrophic |
| Panama | Yes | Yes | Possible | Catastrophic |
| Plattsmouth | Yes | Yes | Possible | Catastrophic |
| Raymond | No | Yes | Possible | Catastrophic |
| Roca | Yes | Yes | Possible | Catastrophic |
| School District 145 | Yes | Yes | Possible | Catastrophic |
| Sprague | No | Yes | Possible | Catastrophic |
| Union | Yes | Yes | Possible | Catastrophic |
| Valparaiso | Yes | Yes | Possible | Catastrophic |
| Waverly | Yes | Yes | Possible | Catastrophic |
| Weeping Water | Yes | Yes | Possible | Catastrophic |

Hazard Background

Nebraska is listed by FEMA as the state with the fifth highest number of tornados. A tornado is typically associated with a supercell thunderstorm. Exactly how a tornado forms is a complex process and is not fully understood. Tornadoes are believed to be formed when cold air overrides a layer of warm air, which forces

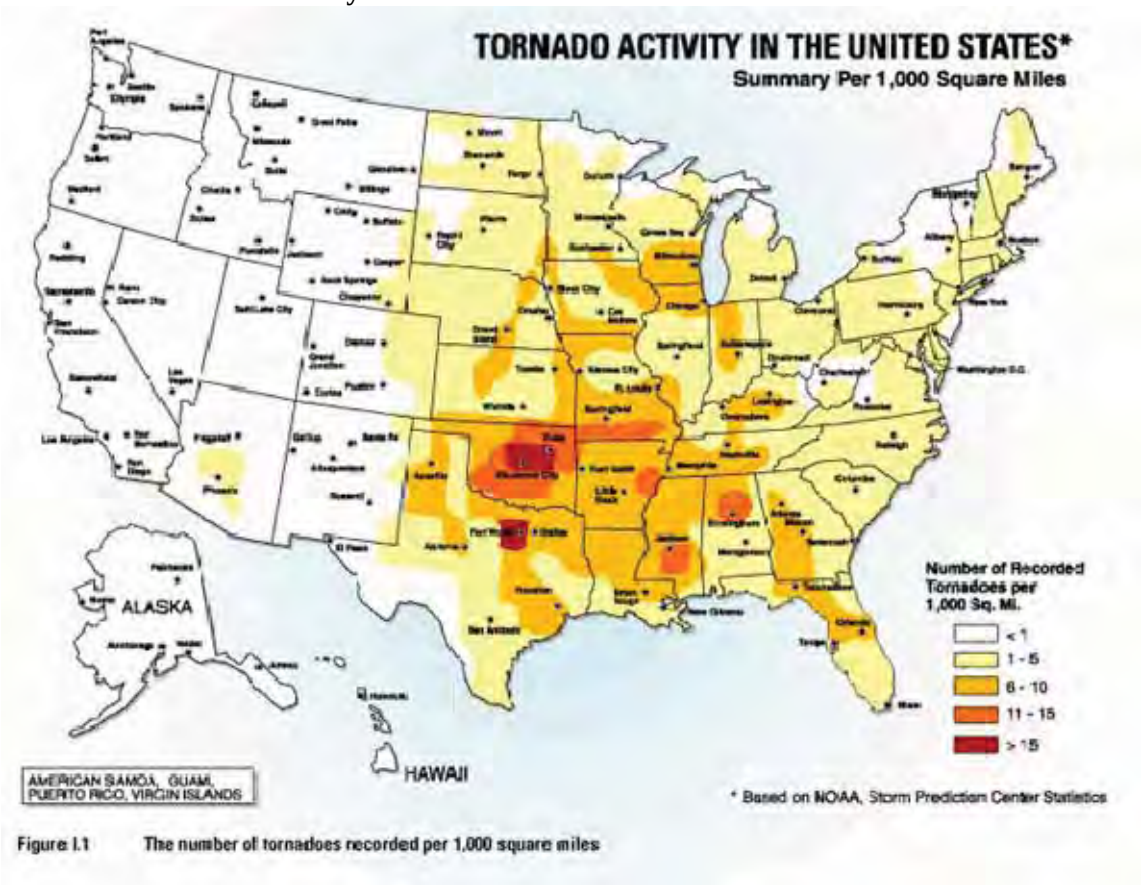
the warm air to rise quickly. As a thunderstorm develops, a large change in the direction of air flow with height, or wind shear, or an increase in wind speed, produces a horizontal spinning area of air. The updrafts of warm air cause the rotation to move from horizontal to vertical. Then, as the rotation increases, a funnel is produced and the water vapor in this funnel cloud is drawn towards the ground. This is commonly referred to as "touching down." In order for rotations to be classified as tornados, three characteristics must be met:

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

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. The figure below shows the tornado activity in the United States as recorded by the National Oceanic and Atmospheric Administration (NOAA). The tornado season typically occurs in March and April, when 80% of tornadoes occur between noon and midnight.

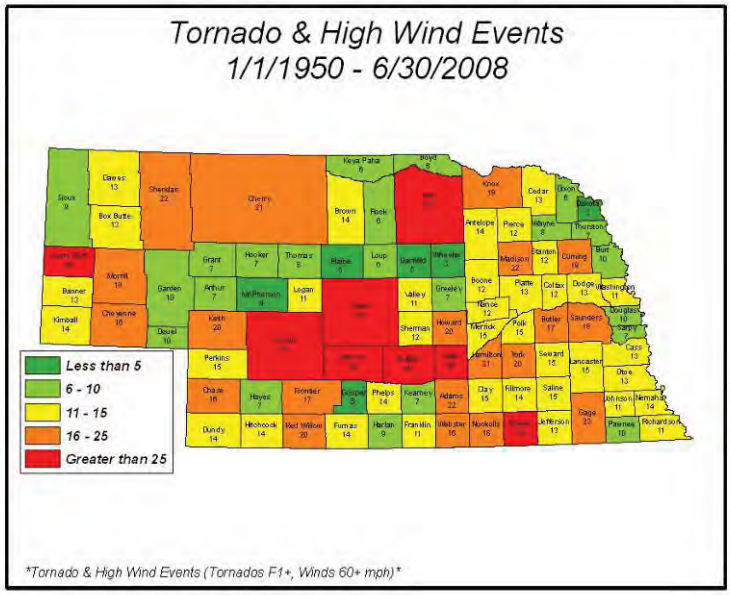
Tornados can travel distances over 100 miles, can reach over 11 miles above ground, and usually stay on the ground no more than 20 minutes.

**Figure 2: Annual Tornado Activity in the United States**




Source: National Oceanic and Atmospheric Administration (NOAA)

**Figure 3: Nebraska Recorded Tornado and High Wind Events Since 1950 (NCDC)**




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 tornadoes. The magnitude of tornados has, until recently, been measured by intensity on the Fujita-Pearson Tornado Scale, or simply the Fujita Scale, or F-Scale. The Fujita Scale does not measure tornados by their size or width, but rather the amount of damage it causes on human-built structures and trees. The scale ranges from F0 for the weakest, to F6 for the most powerful, although an F6 has never been recorded. The Fujita Scale was updated in 2007 with the Enhanced F-Scale. The enhanced scale classifies F0-F5 damage as determined by engineers and meteorologists across 28 different types of damage indicators, including different types of buildings and trees. In order to establish a rating, engineers and meteorologists examine the damage, analyze the ground-swirl patterns, review damage imagery, collect media reports, and sometimes utilize photogrammetry and videogrammetry. Based on the most severe damage to any well-built frame house, or any comparable damage as determined by engineer, an F-Scale number is assigned to the tornado. A description of both the old F-Scale and new EF-Scale measurements are described in the table below.

**Table 8: Fujita Scale for Measuring the Intensity of Tornados**

| New EF Scale | Old F-Scale | Typical Damage |
|---|---|---|
| EF0 (65-85 mph) | F0 (65-73 mph) | Light damage. Peels surface off some roofs; some damage to gutters or siding; branches broken off trees; shallow-rooted trees pushed over. |
| EF1 (86-110 mph) | F1 (73-112 mph) | Moderate damage. Roofs severely stripped; mobile homes overturned or badly damaged; loss of exterior doors; windows and other glass broken. |
| EF2 (111-135 mph) | F2 (113-157 mph) | Considerable damage. Roofs torn off well-constructed houses; foundations of frame homes shifted; mobile homes completely destroyed; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground. |
| EF3 (136-165 mph) | F3 (158-206 mph) | Severe damage. Entire stories of well-constructed houses destroyed; severe damage to large buildings such as shopping malls; trains overturned; trees debarked; heavy cars lifted off the ground and thrown; structures with weak foundations blown away some d |
| EF4 (166-200 mph) | F4 (207-260 mph) | Devastating damage. Whole frame houses, Well-constructed houses, and whole frame houses completely leveled; cars thrown and small missiles generated. |
| EF5 (>200 mph) | F5 (261-318 mph) | Incredible damage. Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 m (109 yd); high-rise buildings have significant structural deformation; incredible phenomena will occur. |
| EF No rating | F6-F12 (319 mph to speed of sound) | Inconceivable damage. Should a tornado with the maximum wind speed in excess of F5 occur, the extent and types of damage may not be conceived. A number of missiles such as iceboxes, water heaters, storage tanks, automobiles, etc. will create serious secon |

Historical Occurrences

Within the Planning Area a total of 111 tornadoes have occurred according to the NCDC. Of those 111 tornadoes five were EF4s. Total damages reported added up to $5,3993,000.

These are some of the larger tornadic events reported by the NCDC are listed below; all of them occurred in Lancaster or Cass County:

- **August 13, 1952:** The first recorded tornado for the area was an F4 that caused $250,000 in property damage.
- **June 6, 1956:** An F2 tornado touched down, injuring one individual and causing $3,000 in property damage.
- **July 28, 1956:** An F1 tornado caused $3,000 in property damage.
- **April 25, 1957:** An F4 touched down and caused $2.5 million in damages.

- **August 30, 1959:** An F2 caused $25,000 in damages.
- **July 5, 1958:** An F1 tornado caused $25,000 in property damage.
- **April 20, 1964:** An F1 caused $25,000 in property damages.
- **May 10, 1967:** A tornado caused $250,000 in property damage.
- **April 27, 1975:** An F0 tornado caused $25,000 in property damage.
- **April 3, 1981:** An F2 touched down and caused $250,000 in property damage.
- **May 1, 1983:** An F1 tornado caused $250,000 in property damage.
- **June 12, 1984:** An F2 tornado caused $2.5 million in damages.
- **May 22, 2004:** An F4 touched down in Hallam that resulted in one death and $100 million in property damage.

For more specific information regarding the tornadic events in the jurisdictions within the Planning Area, refer to each jurisdiction's respective participant section.

Vulnerability Assessment

It was deemed, by both the public and factual research that the planning area as a whole has had previous occurrences of tornados and high winds. The probability of tornados or high winds to occur again is 'highly likely' with a near 100% chance they will occur every year within the planning area. The extent was determined to be 'limited', as 0 to 25% of the planning area could be affected by a tornado or high winds event.

Tornadoes and high winds have the capability to affect an entire community within the planning area as there is no area within it void to their affects. The entire infrastructure, including all structures and critical facilities in the planning area is vulnerable and is at risk of being damaged by tornadoes and high winds. Tornados and high winds can cause structure loss, downed power lines, loss of electricity, obstruct traffic flow, and significantly damage trees. A catastrophic event could lead to major economic loss for the community. Furthermore, high wind speeds and flying debris can pose a significant threat to human life.

The planning area as a whole may not be affected by a single event as tornadoes usually occur in one area at a time. This is why the planning area as a whole will experience 'limited' extent, while a single community could be entirely affected by a tornado, thus being 'catastrophic.'

The unique characteristics of different jurisdictions allow tornados and high winds to impact them differently. Furthermore, the following differences explain the range of probability and extent as shown in Table 7 above: Rural water districts are vulnerable to tornados and high winds as the water towers, well houses, office buildings and maintenance buildings could be destroyed. Villages, cities and SIDs are vulnerable in that residential, commercial, public and out buildings, as well as critical facilities, can be destroyed or damages significantly. Their power, cable and telephone lines can break. Residents in the rural areas of the counties can be affected by tornados and high winds in the same way as those in communities. Also power can be cut off to residents in unincorporated areas of the county for days, and sometimes even weeks.

Potential Losses

A large scale tornado, such as an EF5, has the potential to devastate many communities within the Planning Area except for some of the few larger cities like Lincoln. Therefore, communities within the Planning Area could potentially receive damages reaching millions of dollars in the worst case scenario. The methodology used to calculate the potential losses was done by calculating the average damage amounts from storm events over the valuation of the communities. Based on historical occurrences in the planning area, a tornado event causes between 1.0% and 50% damage of the value of the community. All structures in the Planning Area, including critical facilities, could be destroyed. Additionally, there could be substantial loss of contents, loss due to displacement, functional downtime cost, economic loss, loss of life, and injury.

A large scale tornado, such as an EF5, has the potential to devastate any community or a large stretch across the rural planning area. All structures, including critical facilities, could potentially be destroyed. Additionally, there could be substantial loss of contents, loss due to displacement, functional downtime cost, economic loss, loss of life, and injury, but data limitations prevented detailed estimates of these losses.

See each jurisdictions participant section for a more detailed discussion of potential losses to their community and the estimated dollar amount of damages from tornados.

Future Vulnerability and Losses

There is no human behavior or activity that can modify the area affected by tornadoes and high winds, thus tornadoes and high winds will always be capable of affecting the entire Planning Area. Any structural growth which occurs within it in the future will be vulnerable to the losses sustained from tornadoes and high winds. Losses from these events could prove costly considering the large amount of development anticipated to occur over the next five years.

### *SEVERE THUNDERSTORM*

Below is the Composite Hazard Identification Table for all the jurisdictions participating in this plan for severe thunderstorms. The table shows the final determination of previous occurrences, likelihood to experience in the future, the probability to occur in the future, and the extent. Differences in probability and extent are described further in vulnerability assessment as the unique aspects of the jurisdictions are taken into account.

**Table 9: Severe Thunderstorm Composite Hazard Identification Table**

| JURISDICTION | PREVIOUS OCCURRENCE? Yes/No | LIKELY TO EXPERIENCE? Yes/No | PROBABILITY Highly Likely/ Likely/Possible/Unlikely | EXTENT Catastrophic/Severe /Limited/None |
|---|---|---|---|---|
| Alvo | Yes | Yes | Highly Likely | Severe |
| Ashland | Yes | Yes | Highly Likely | Severe |
| Avoca | Yes | Yes | Highly Likely | Severe |
| Bennet | Yes | Yes | Highly Likely | Severe |
| Brainard | Yes | Yes | Highly Likely | Severe |
| Cass County | Yes | Yes | Highly Likely | Severe |
| Cass County Rural Water District #1 | Yes | Yes | Highly Likely | Limited |
| Cass County Rural Water District #2 | Yes | Yes | Highly Likely | Limited |
| Cass County SID #1 | Yes | Yes | Highly Likely | Severe |
| Cedar Creek | Yes | Yes | Highly Likely | Severe |
| Ceresco | Yes | Yes | Highly Likely | Severe |
| Davey | Yes | Yes | Highly Likely | Severe |
| Denton | Yes | Yes | Highly Likely | Severe |
| Eagle | Yes | Yes | Highly Likely | Severe |
| Firth | Yes | Yes | Highly Likely | Severe |
| Greenwood | Yes | Yes | Highly Likely | Severe |
| Hallam | Yes | Yes | Highly Likely | Severe |
| Hickman | Yes | Yes | Highly Likely | Severe |
| Lancaster County | Yes | Yes | Highly Likely | Severe |
| Lancaster County Rural Water District #1 | Yes | Yes | Highly Likely | Limited |
| Lancaster County SID #6 | Yes | Yes | Highly Likely | Severe |
| Lincoln | Yes | Yes | Highly Likely | Severe |
| Louisville | Yes | Yes | Highly Likely | Severe |
| LPSNRD | Yes | Yes | Highly Likely | Severe |
| Malcolm | Yes | Yes | Highly Likely | Severe |
| Manley | Yes | Yes | Highly Likely | Severe |
| Murdock | Yes | Yes | Highly Likely | Severe |
| Murray | Yes | Yes | Highly Likely | Severe |
| Panama | Yes | Yes | Highly Likely | Severe |
| Plattsmouth | Yes | Yes | Highly Likely | Severe |
| Raymond | Yes | Yes | Highly Likely | Severe |
| Roca | No | Yes | Highly Likely | Severe |
| School District 145 | Yes | Yes | Highly Likely | Severe |
| Sprague | Yes | Yes | Highly Likely | Severe |
| Union | Yes | Yes | Highly Likely | Severe |
| Valparaiso | Yes | Yes | Highly Likely | Severe |
| Waverly | Yes | Yes | Highly Likely | Severe |
| Weeping Water | Yes | Yes | Highly Likely | Severe |

Hazard Background

Severe thunderstorms are a common and unpredictable annual event throughout the Midwest, especially in southeast Nebraska. Thunderstorms differ from many other hazards in that they are generally

A severe thunderstorm is defined by winds measuring 90 km/h or higher, hail measuring 2 cm or larger, or the presence of tornadic activity.

large in magnitude, have a long duration, and travel across large areas and through multiple communities within a single region. Additionally, thunderstorms often occur in series, with one area having the potential to be hit multiple times in one day.

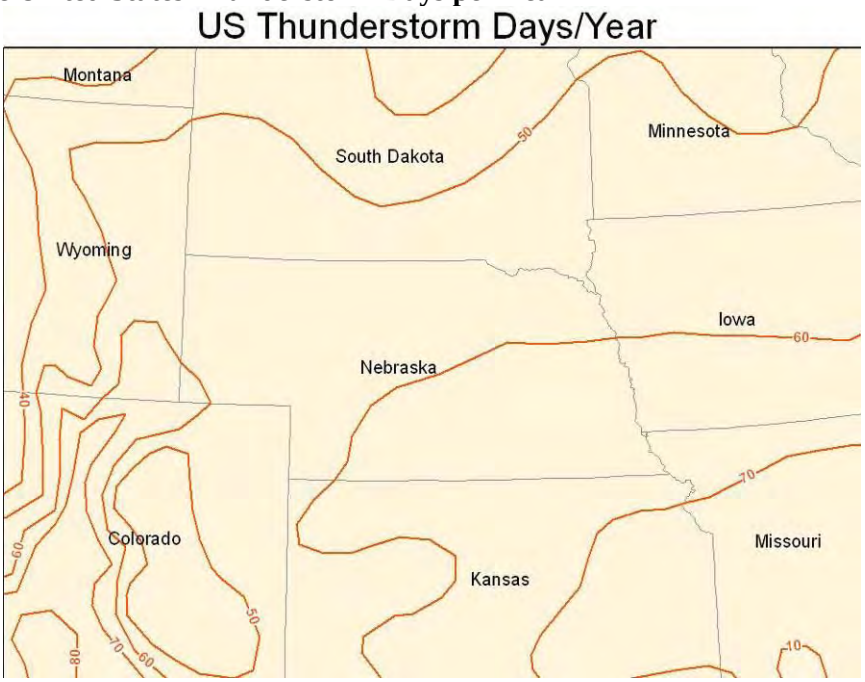
Severe thunderstorms usually occur in the evening during the spring and summer months. These often massive storms can include heavy rain, hail, lightning, high wind, and tornadoes. Furthermore, heavy rains can cause flooding; lightning can cause wildfires and damages to property; and high winds can down trees, cause power outages, and destroy property with their shear force. For the purpose of this Plan, tornadoes, wildfires, and flooding were identified as separate hazard events since they sometimes occur separately, often pose different threats, and potential losses can vary greatly.

Economically, thunderstorms are generally beneficial in that they provide moisture necessary to support Nebraska's largest industry, agriculture. The majority of thunderstorms do not cause damage, but when they escalate to the point of becoming severe, the potential damages include crop losses from wind and hail, property losses due to buildings and automobiles damaged by hail, wind, or flash flooding, and death or injury to humans and animals from lightning, drowning, or being struck by falling or flying debris.

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 is caused by a buildup of electrically charged ions in the upper part of the thunderstorm cloud, and area called the anvil. When this energy is released, lightning connects to the ground, releasing large amounts of electricity that can be harmful to humans and animals, can cause fires to buildings and agricultural lands, and can 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. These formations of ice fall within or separate from rain, and pieces measuring just three-quarters of an inch can approach speeds of 100 mph. The largest hailstone recorded in the United States was found on June 22, 2003, in Aurora, NE (60 miles west of Lincoln) and measured seven inches in diameter. Hail causes nearly $1 billon in damage to property and crops annually.

The figure below displays the average number of thunderstorms experienced by different parts of the country each year. According to this figure, Nebraska experiences between 55 and 70 thunderstorm days per year from west to east across the state.

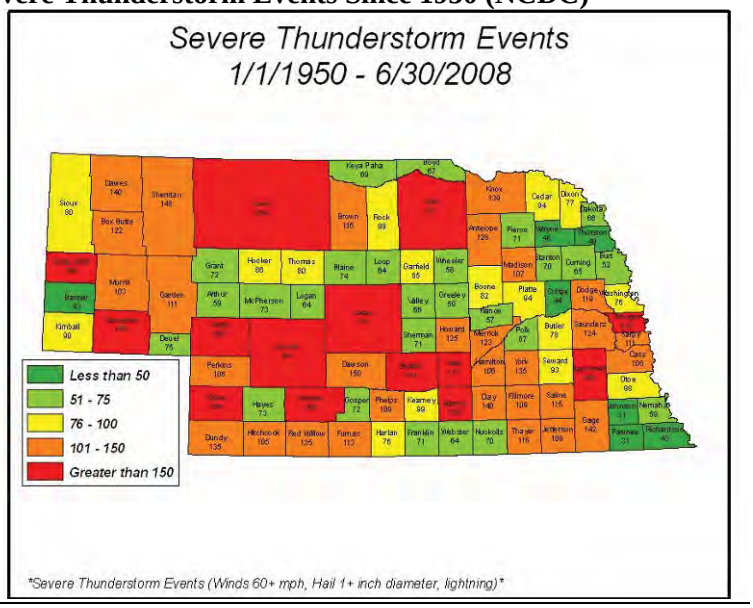
**Figure 4: Average United States Thunderstorm Days per Year**




Source: National Lightning Safety Institute

According to Figure 4, Nebraska experiences between 55 to 70 thunderstorm days/year from west to east across the state.

**Figure 5: Nebraska Severe Thunderstorm Events Since 1950 (NCDC)**



Historical Occurrences

Because most of the Planning Area is comprised mostly of Lancaster and Cass Counties, historical occurrences reported are from these areas. For additional information and details on the damages incurred, or for occurrences in jurisdictions within the Planning Area, reference the *Severe Thunderstorm* portion in their respective participant sections.

The NCDC recorded 212 thunderstorms for Cass County. Of the recorded storms, three reported injuries and one reported a fatality:

- **July 18, 1985:** Severe thunderstorm winds injured five people. No property damage was recorded.

- **June 2, 1989:** A thunderstorm brought winds with a magnitude of 52 kts. It injured one person. There was no property damage reported.

- **July 4, 1994:** Strong winds blew down a 100-foot tall cottonwood tree. The upper limbs, which were between two and three feet diameter, hit a tent that two people were camping in. A 58 year old male was killed and a 31 year old female was injured.

Lancaster County had 387 thunderstorm activities recorded by the NCDC. The winds of these storms have been as high as 85kts. The hail storms on average have had hail no larger than two inches. The city that seemed to have been most affected by thunderstorms was Lincoln which accounted for 93 of the reported storms. Lincoln recorded nearly $2 million in damage from strong winds, lightning, and hail. On June 21, 1989 a thunderstorm injured seven people.

Below is a listing of other thunderstorms that occurred in the Lancaster County area:

- **Bennet:**
  - July 11, 2000: A severe thunderstorm with wind gusts estimated at 70 mph caused considerable damage to trees. The Bennet streets from 134th to 162nd were especially hit hard. $20,000 worth of property damage was reported.

  - April 14, 2001: A severe thunderstorm with winds upwards of 75 mph caused $25,000 in property damage to a garage, farm building and power lines.

- **Firth:**
  - July 20, 2000: Hail 2 ¾ inches in diameter, driven by 50 mph winds, centered on Firth. The baseball sized hail wreaked havoc on 148 out of 200 homes and businesses and knocked out nearly every north facing window. The total damage for the 6 to 8 miles wide and 20 to 30 miles long storm was $1 million in property damage and $2 million in crop damages.

- **Lincoln:**
  - May 7, 1993: $50,000 of property damage was caused by a lightning strike at a radio station that damaged a computer system, telephone and satellite equipment.

  - September 2, 1995: $20,000 in property damage resulted from 4.5 inch diameter hail.

- May 22, 1996: $1.4 million of property damage occurred when 83mph winds blew the roof off at the Duncan Aviation facility and overturned multiple aircrafts. The roof at a State Fair Park's grandstand was also damaged. The City also suffered damage to power lines and trees.

- August 14, 1996: $20,000 worth of property damage occurred when 80 mph winds snapped the gates of a railroad crossing, damaged fences and several of businesses.

- July 10, 1997: $25,000 worth of property damage was caused when a lightning strike set fire to the roof of a home.

- August 19, 2003: $90,000 in property damage was caused by lightning that struck three businesses resulting in smoke, fire and electrical damage.

- August 8, 2006: $225,000 in property damage resulted from a lightning strike that set fire to a laundry facility.

- **Malcolm:**
  - September 2, 1995: A hail storm caused $20,000 in crop damage.

- **Raymond:**
  - April 20, 2001: A thunderstorm with winds estimated at 80 mph knocked down a power pole, blew a porch and stripped the siding off a house near Raymond. The reported damage was $20,000 in property.

Vulnerability Assessment

It was deemed, by both the public and factual research that the planning area as a whole has had previous occurrences of severe thunderstorms. The probability of a severe thunderstorm to occur again is 'highly likely' with a near 100% chance they will occur every year within the planning area. The extent was determined to be 'catastrophic', as 50% or more of the planning area could be affected by severe thunderstorms.

Severe thunderstorms have the capability to affect the entire planning area as there is no area within it void to their affects. All infrastructure and critical facilities in the planning area is vulnerable and at risk of being damaged or affected by severe thunderstorms. Severe thunderstorms can cause flooding, produce damaging hail, lightning, and high winds. This leaves structures, cars, power lines, trees, and utilities vulnerable to the affects of severe thunderstorms. All of these harmful affects can cause property damage, loss of electricity, and pose a risk to human life. Severe thunderstorms can also lead to significant damage to dams within the planning area and crops within the rural areas of the jurisdiction.

The unique characteristics of different jurisdictions allow severe thunderstorms to impact them differently. Furthermore, the following differences explain the range of probability and extent as shown in Table 9 above: Rural water districts are not very vulnerable to severe thunderstorms as water towers are not very vulnerable to the effects of severe thunderstorms and underground pipes are protected. Villages, cities and SIDs are vulnerable in that hail, winds and lightning can cause structural damage to residential, commercial and public structures as well as critical facilities. Residents in the rural areas of the counties can be affected by severe thunderstorms in that structures and crops can be damaged. The NRD also is vulnerable to severe thunderstorms in that hail can cause crop damage.

Potential Losses

Severe thunderstorms occur on an irregular basis with varying magnitudes and can cause a wide range of damage; from a few downed limbs, to wide spread tree loss, hail damage, and damage to property. Based upon the historical occurrences, the Planning Area's worst event sustained $3 million in damage, when a thunderstorm in Firth brought large hail that damaged crops and property in July of 2000. However, severe thunderstorms have the potential to cause greater losses. A major event could cause losses reaching tens of millions of dollars throughout the entire area. The methodology used to calculate the potential losses was done by calculating the average damage amounts from storm events over the valuation of the communities. Based on historical occurrences in the planning area, a severe thunderstorm event causes between 0.1% and 0.5% damage of the value of the community. Additionally, there could be losses due to displacement, functional downtime, as well as injury and loss of life, but data limitations prevented detailed estimates of these losses.

See each jurisdictions participant section for a more detailed discussion of potential losses to their community and the estimated dollar amount of damages from severe thunderstorms.

Future Vulnerability and Losses

There is no human behavior or activity that can modify the area affected by severe thunderstorms, thus severe thunderstorms will always be capable of affecting the entire Planning Area. Any structural growth which occurs within it in the future will be vulnerable to the losses sustained from severe thunderstorms. Losses from these events could prove costly considering the large amount of development anticipated to occur over the next five years.

### *FLOODING*

Below is the Composite Hazard Identification Table for all the jurisdictions participating in this plan for flooding. The table shows the final determination of previous occurrences, likelihood to experience in the future, the probability to occur in the future, and the extent. Differences in probability and extent are described further in vulnerability assessment as the unique aspects of the jurisdictions are taken into account.

**Table 10: Flooding Composite Hazard Identification Table**

| JURISDICTION | PREVIOUS OCCURRENCE? Yes/No | LIKELY TO EXPERIENCE? Yes/No | PROBABILITY Highly Likely/ Likely/Possible/Unlikely | EXTENT Catastrophic/Severe /Limited/None |
|---|---|---|---|---|
| Alvo | Yes | Yes | Possible | Limited |
| Ashland | Yes | Yes | Possible | Limited |
| Avoca | Yes | Yes | Possible | Limited |
| Bennet | Yes | Yes | Possible | Limited |
| Brainard | Yes | Yes | Possible | Limited |
| Cass County | Yes | Yes | Likely | Limited |
| Cass County Rural Water District #1 | Yes | Yes | Likely | Limited |
| Cass County Rural Water District #2 | Yes | Yes | Likely | Limited |
| Cass County SID #1 | Yes | Yes | Possible | Catastrophic |
| Cedar Creek | Yes | Yes | Possible | Catastrophic |
| Ceresco | Yes | Yes | Possible | Limited |
| Davey | Yes | Yes | Possible | Limited |
| Denton | Yes | Yes | Possible | Limited |
| Eagle | Yes | Yes | Possible | Limited |
| Firth | Yes | Yes | Possible | Severe |
| Greenwood | No | Yes | Possible | Limited |
| Hallam | Yes | Yes | Possible | Limited |
| Hickman | Yes | Yes | Possible | Severe |
| Lancaster County | Yes | Yes | Likely | Limited |
| Lancaster County Rural Water District #1 | Yes | Yes | Likely | Limited |
| Lancaster County SID #6 | Yes | Yes | Possible | Limited |
| Lincoln | Yes | Yes | Possible | Severe |
| Louisville | Yes | Yes | Possible | Severe |
| LPSNRD | Yes | Yes | Likely | Severe |
| Malcolm | Yes | Yes | Possible | Limited |
| Manley | No | Yes | Possible | Limited |
| Murdock | Yes | Yes | Possible | Limited |
| Murray | Yes | Yes | Possible | Limited |
| Panama | No | Yes | Possible | Limited |
| Plattsmouth | Yes | Yes | Possible | Limited |
| Raymond | Yes | Yes | Possible | Limited |
| Roca | Yes | Yes | Possible | Limited |
| School District 145 | Yes | Yes | Possible | Limited |
| Sprague | Yes | Yes | Possible | Severe |
| Union | Yes | Yes | Possible | Severe |
| Valparaiso | Yes | Yes | Possible | Limited |
| Waverly | Yes | Yes | Possible | Limited |
| Weeping Water | Yes | Yes | Possible | Limited |

Hazard Background

Flood events are the most damaging and costly hazard in the United States, and account for 90% of all presidential declarations of disaster. Flooding can occur on a local level, sometimes affecting only a few streets, but is also able to extend throughout an entire region, affecting whole drainage basins and impacting

22 communities located within the Planning Area have delineated a 100-year floodplain.

property in multiple states. A flood occurs when water, usually from rain or snow, overflows a waterway once the volume of water exceeds the capacity of the waterway. In some cases, a flood also occurs when areas that do not have a defined waterway become covered in water. Flooding from excessive rainfall in Nebraska usually occurs between late spring and early fall.

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

The Planning Area drains into the Platte River and Missouri River. Major tributaries include Salt Creek, which runs south to north through Lancaster County and Weeping Water Creek, which runs west to east through southern Cass County.

Historical Occurrences

The NCDC reports 59 flooding events that have affected large portions of the Planning Area. Damages that were reported totaled $770,000. The largest flooding event within the Planning Area happened on February 28, 1997. A two and a half mile long ice jam along the Platte River melted rapidly and cause flooding across many jurisdictions. Damages incurred for this flooding event climbed to $620,000.

The following reports of flooding all happened in the City of Lincoln, these are the types of events that the Planning Area is susceptible to.

The NCDC reports three flash flood occurrences, one of which reported damages:

- **August 14, 1996:** $60,000 in reported property damage was caused by four inches of rain that produced a flash flood. Local businesses and homes were also damaged.

The following list of storms and information was provided by the Lancaster County LEOP:

- Salt Creek flooded 136 times between 1900 and 1952. Of these events, 22 were considered major.

- **May 8, 1950:** Salt Creek peaked at a height of 26.05 feet with a flow of 27,800 cfs. This occurred after 5.5 inches of rain fell in six hours and accumulated to 14 inches. 20,000 acres of land was flooded including 600 homes and 80 businesses. The total damage incurred amounted to $1,643,000 and nine deaths.

- **June 2, 1951:** Antelope Creek flooded. Water was waist deep at 28th and D streets, and one foot deep at 33rd and Normal. Salt Creek peaked at 26.15 feet with a flow of 28,200 cfs.

- **June 14, 1951:** Antelope Creek flooded. Eight inches of rain fell and caused $2,000,000 worth of damage. 92 businesses, 298 homes and the railroad were all damaged in the area.

- **June, 1952:** Another Antelope Creek flood occurred when 2.18 inches fell, causing $63,000 in damage.

- Between 1962 and 1993, a series of eight floods occurred on Salt Creek. The total amount of federal funds contributed was $668,800, with the largest lump sum contribution of $487,185 in 1993.

- **June 13, 1984:** Little Salt Creek flooded when three to four inches of rain caused the creek to peak at 16.20 feet and flow 7,500 cfs. The flood was classified as a 10-year flood.

The Lincoln Journal Star recounts the following flood events:

- **1892:** Extensive flooding drove 300 people from their homes.

- **1902:** Flooding left 1,000 residents homeless and caused 9 deaths.

- **July 23, 1993:** Little Salt Creek peaked at 4 feet over flood stage. Lynn and Stevens Creek tributaries left their banks flooding streets, parking lots, businesses, and homes. The City received $823,997 from the Federal Emergency Management Agency for partial damage reimbursement. The total damage to public property was $2.9 million.

- **June 15, 1982:** Stevens Creek peaked at a height of 18.85 feet with a flow of 3,820 cfs. Up to five inches of rain blocked roads, threatened homes, and left cars stranded in high water. There was a police advisory encouraging Lincoln residents not to drive and at one point during the downpour, the police were instructed to park their cruisers unless they were needed somewhere. Lincoln Electric System reported several power outages, one of which was the result of flooded underground cables.

- **June 13, 1984:** Stevens Creek flooded with a peak of 19.57 feet and a flow of 4,620 cfs. The flood was classified as a 10-year flood and it claimed two lives when a car was swept off Highway 34.

- **July 4, 1984:** Water back log from Beal's Slough caused damage to local area businesses. One business reported damage of $4,000.

- **September 13, 1989:** Heavy rains caused $20,000 in damage to Lancaster County rock and gravel roads.

- **July 25, 1990:** Five inches of rain washed out roads, flooded basements, damaged businesses, and flooded parking lots.

Participants from the City of Lincoln recollected the following events:

- **March 1993:** The Lincoln Water System reports an ice jam on the Platte River that caused severe flooding along Salt Creek and Highway 6. The flood waters eroded embankments and exposed a 48-inch and 54-inch water transmission line from one of the Lincoln Water System's well fields. This exposure caused sections of the pipe line to break and float away.

- **July 24, 1993:** Flooding resulted when Lincoln received three times the normal amount of rain for July.

- **July 20, 1996:** Beal Slough flooded when over five inches of rain fell in south Lincoln over an 18 hour period. Flooding occurred on a number of roadways including Highway 2. Residential basements and recreational areas were flooded. Flooding also occurred near 33rd Street and Pioneers Boulevard as well as in many areas along the Tierra Branch in the Tierra, Williamsburg, Seven Oaks, and Cripple Creek Subdivisions. A similar incident occurred in 1989 when heavy rains filled and overtopped the creek. The waters spread to Tierra and Briarhurst Parks, and other nearby open spaces.

For information on the floods and damages incurred during specific localized occurrences within the Planning Area, reference each participant's *Severe Thunderstorm* portion in their respective participant section.

Vulnerability Assessment

It was deemed, by both the public and factual research that the planning area as a whole has had previous occurrences of flooding. The probability flooding to occur again is 'possible' with a l% to 10% chance it will occur in the next year within the planning area. This 'possible' probability directly relates to the definition of a 100 year flood. A 100 year flood, by definition has a 1% chance to occur every year. The extent was determined to be 'limited', as 0 to 25% of the planning area could be affected by a flood due to the floodplains in the planning area taking up between 0 and 25% of the land area.

The flooding hazard area boundaries vary for each jurisdiction in the planning area. For the purposes of this plan it was determined that the flooding hazard area boundaries are limited to the estimated 100-year flood boundary. See each jurisdictions participant section for a description of how this estimated flood boundary was determined. For more specific information and locations of flooding in the jurisdictions within the planning area, also refer to each jurisdiction's respective participant section. In the planning area, structures, infrastructure, and dams are vulnerable to floods. During a rainfall event, dams could fill up causing excess water to run through the emergency spillway and thus travel downstream. The vulnerability of dam failure is discussed later in the 'dam failure' portion. Damages which may be caused by flooding include loss of structures, destruction of infrastructure such as bridges and roads, loss of utilities (i.e. wastewater treatment) and potential for loss of life. Due to data limitations, only damages to structures within incorporated communities were evaluated. This could be addressed in future updates of the plan.

The unique characteristics of different jurisdictions allow floods to impact them differently. The major factor in determining the effects of flooding to each jurisdiction depend on if there is a floodplain through the community. The other following differences explain the range of probability and extent as shown in Table 10 above: Rural water districts are not very vulnerable flooding as the water towers and pipe infrastructure is not affected by floods. However, well houses, office buildings and maintenance buildings could be damaged by floods. Villages, cities and SIDs that have a floodplain within their boundaries are vulnerable in that residential, commercial, public and out buildings, as well as critical facilities can be damaged significantly depending on the flood depth. Residents in the rural areas of the counties can be affected by floods in the same way as those in communities if they are within floodplains. The NRD's dams could also be affected by flooding. Due to data limitations, the effects of flooding to these dams were not determined. This could be completed in future updates of the plan.

Of the 38 jurisdictions in the planning area:

- 4 have floodplains within the ETJ but not the corporate limits
- 5 have floodplains within the ETJ and near the community, but still outside the corporate limits
- 1 does not have a floodplain
- 6 have floodplains that cover the whole area (counties, RWDs, and NRD)
- 22 have floodplains within the community

For specific information on those communities with a delineated or draft 100-year floodplain refer to *Section 6: Participant Sections*.

Potential Losses

Potential losses associated with a flood event vary greatly depending on the severity of the event. Due to limited resources, the potential losses from a flood event were not calculated for the rural areas of the Planning Area. For the purposes of calculating potential losses, it was estimated that all structures in the

flooding hazard area would sustain 20 percent building damage at a flood depth of two feet. The evaluation was based on the average for one to two story buildings with basements. This information is from the Flood Building Loss Estimation Table provided by the FEMA Benefit-Cost Analysis Full Data Module.

Using the estimated flood event, the potential building damages in communities in the planning area would be $2,244,444,096 as determined in Table 11 below. These potential loss estimates are based upon structures and not infrastructure risks. Potential loss estimates for risk to infrastructure could be included in the 5-year update. This also does not include structures located in rural areas or unmapped areas, loss of displacement, functional downtime, economic loss, injury, or loss of life.

It should be noted that structural inventory was conducted and structures assessed for only incorporated communities and not RWD's, SID's, Counties or the NRD as there was limited capability to do so. Assessment for such structures and infrastructure could be completed in the next plan update.

**Table 11: Structural Inventory and Valuation Summary in 100-Year Floodplain**

| JURISDICTION | STRUCTURES IN 100-YEAR FLOODPLAIN | | | | | STRUCTURE VALUE | |
|---|---|---|---|---|---|---|---|
| | Number of Structures | Commercial / Industrial | Out Building | Residential | Public / Quasi Public | Total Value | Approximate Damage Value |
| Alvo | 0 | 0 | 0 | 0 | 0 | $0 | $0 |
| Ashland | 43 | 4 | 1 | 27 | 11 | $3,234,821 | $646,964 |
| Avoca | 5 | 0 | 2 | 1 | 2 | $77,683 | $15,537 |
| Bennet | 7 | 2 | 1 | 4 | 0 | $604,020 | $120,804 |
| Brainard | 0 | 0 | 0 | 0 | 0 | $0 | $0 |
| Cass County SID #1 | 384 | 4 | 161 | 218 | 1 | $31,305,000 | $6,261,000 |
| Cedar Creek | 436 | 10 | 128 | 295 | 3 | $48,115,708 | $9,623,142 |
| Ceresco | 0 | 0 | 0 | 0 | 0 | $0 | $0 |
| Davey | 0 | 0 | 0 | 0 | 0 | $0 | $0 |
| Denton | 0 | 0 | 0 | 0 | 0 | $0 | $0 |
| Eagle | 0 | 0 | 0 | 0 | 0 | $0 | $0 |
| Firth | 31 | 24 | 3 | 4 | 0 | $3,845,048 | $769,009 |
| Greenwood | 0 | 0 | 0 | 0 | 0 | $0 | $0 |
| Hallam | 0 | 0 | 0 | 0 | 0 | $0 | $0 |
| Hickman | 100 | 29 | 17 | 46 | 8 | $10,168,094 | $2,033,618 |
| Lancaster County SID #6 | 4 | 1 | 3 | 0 | 0 | $144,652 | $28,930 |
| Lincoln* | 5975 | N/A | N/A | N/A | N/A | $17,190,725,000* | $2,207,335,000* |
| Louisville | 100 | 28 | 23 | 39 | 10 | $7,782,668 | $1,556,534 |
| Malcolm | 5 | 1 | 2 | 2 | 0 | $378,722 | $75,744 |
| Manley | 0 | 0 | 0 | 0 | 0 | $0 | $0 |
| Murdoch | 0 | 0 | 0 | 0 | 0 | $0 | $0 |
| Murray | 6 | 3 | 2 | 1 | 0 | $297,992 | $59,598 |
| Panama | 0 | 0 | 0 | 0 | 0 | $0 | $0 |
| Plattsomuth | 167 | 66 | 25 | 63 | 13 | $65,167,972 | $13,033,595 |
| Raymond | 0 | 0 | 0 | 0 | 0 | $0 | $0 |
| Roca | 0 | 0 | 0 | 0 | 0 | $0 | $0 |
| Sprague | 25 | 1 | 14 | 10 | 0 | $1,161,770 | $232,354 |
| Union | 19 | 11 | 1 | 4 | 3 | $816,357 | $163,272 |
| Valparaiso | 2 | 1 | 0 | 1 | 0 | $209,970 | $41,994 |
| Waverly | 41 | 5 | 1 | 34 | 1 | $7,336,001 | $1,467,200 |
| Weeping Water | 73 | 13 | 14 | 38 | 8 | $4,899,006 | $979,801 |
| **TOTALS** | **7,423** | **203** | **398** | **787** | **60** | **$17,376,270,484** | **$2,244,444,096** |

*For the City of Lincoln, Structure Value was determined using HAZUS software.

Potential losses for each jurisdiction within the Planning Area can be found in their respective 'participant section'. In future updates, potential losses could be calculated for structures in the rural areas of the Planning Area.

Future Vulnerability and Losses

The majority of future development in the Planning Area will likely not occur in the floodplain presuming floodplain regulations and zoning are strictly enforced. Therefore, flooding may not be a significant threat to future development, and losses will be insignificant to future structures and critical facilities. See each respective 'participant section' for more information on the future vulnerability and losses of each jurisdiction within the Planning Area.

NFIP Repetitive Loss Structures

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 there are 31 NFIP Repetitive Loss Structures in the planning area. A specific mitigation strategy to address repetitive loss structures can be found in Section 4: Mitigation Strategy.

NDNR is not able to provide specific location of repetitive loss structures. Below, in Table 12 the jurisdictions NFIP standing and number of repetitive loss structures is shown. Also shown is the occupancy type and general location of the repetitive loss structures. Due to data limitations specific information on repetitive loss structures could be discussed in the next plan update.

**Table 12: Summary of NFIP Repetitive Loss Structures in the Planning Area**

| JURISDICTION | NFIP Participation? | Total Repetitive Loss Sturctures | OCCUPANCY TYPE AND LOCATION | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Single Family in Floodplain | Single Family Outside Floodplain | Non Residential in Floodplain | Non Residential Outside Floodplain | Other Residential in Floodplain | Other Residential Outside Floodplain |
| Alvo | No | 0 | n/a | n/a | n/a | n/a | n/a | n/a |
| Ashland | Yes | 3 | 1 | 1 | 1 | 0 | 0 | 0 |
| Avoca | Yes | 0 | n/a | n/a | n/a | n/a | n/a | n/a |
| Bennet | Yes | 0 | n/a | n/a | n/a | n/a | n/a | n/a |
| Brainard | No | 0 | n/a | n/a | n/a | n/a | n/a | n/a |
| Cass County | Yes | 17 | 14 | 1 | 0 | 1 | 1 | 0 |
| Cass County RWD #1 | No | 0 | n/a | n/a | n/a | n/a | n/a | n/a |
| Cass County RWD #2 | No | 0 | n/a | n/a | n/a | n/a | n/a | n/a |
| Cass County SID #1 | No | 0 | n/a | n/a | n/a | n/a | n/a | n/a |
| Cedar Creek | Yes | 5 | 4 | 1 | 0 | 0 | 0 | 0 |
| Ceresco | Yes | 0 | n/a | n/a | n/a | n/a | n/a | n/a |
| Davey | No | 0 | n/a | n/a | n/a | n/a | n/a | n/a |
| Denton | Yes | 0 | n/a | n/a | n/a | n/a | n/a | n/a |
| Eagle | Yes | 0 | n/a | n/a | n/a | n/a | n/a | n/a |
| Firth | Yes | 0 | n/a | n/a | n/a | n/a | n/a | n/a |
| Greenwood | Yes | 0 | n/a | n/a | n/a | n/a | n/a | n/a |
| Hallam | No | 0 | n/a | n/a | n/a | n/a | n/a | n/a |
| Hickman | Yes | 0 | n/a | n/a | n/a | n/a | n/a | n/a |
| Lancaster County | Yes | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| Lancaster County RWD #1 | No | 0 | n/a | n/a | n/a | n/a | n/a | n/a |
| Lancaster County SID #6 | No | 0 | n/a | n/a | n/a | n/a | n/a | n/a |
| Lincoln | Yes | 2 | 1 | 0 | 0 | 1 | 0 | 0 |
| Louisville | Yes | 2 | 2 | 0 | 0 | 0 | 0 | 0 |
| Lower Platte South Platte NRD | Varies | 0 | n/a | n/a | n/a | n/a | n/a | n/a |
| Malcom | No | 0 | n/a | n/a | n/a | n/a | n/a | n/a |
| Manley | No | 0 | n/a | n/a | n/a | n/a | n/a | n/a |
| Murdoch | No | 0 | n/a | n/a | n/a | n/a | n/a | n/a |
| Murray | Yes | 0 | n/a | n/a | n/a | n/a | n/a | n/a |
| Panama | No | 0 | n/a | n/a | n/a | n/a | n/a | n/a |
| Plattsmouth | Yes | 0 | n/a | n/a | n/a | n/a | n/a | n/a |
| Raymond | Yes | 0 | n/a | n/a | n/a | n/a | n/a | n/a |
| Roca | No | 0 | n/a | n/a | n/a | n/a | n/a | n/a |
| School District #145 | No | 0 | n/a | n/a | n/a | n/a | n/a | n/a |
| Sprague | Yes | 0 | n/a | n/a | n/a | n/a | n/a | n/a |
| Union | Yes | 0 | n/a | n/a | n/a | n/a | n/a | n/a |
| Valparaiso | Yes | 0 | n/a | n/a | n/a | n/a | n/a | n/a |
| Waverly | Yes | 0 | n/a | n/a | n/a | n/a | n/a | n/a |
| Weeping Water | Yes | 1 | 0 | 1 | 0 | 0 | 0 | 0 |

### *EXTREME HEAT*

Below is the Composite Hazard Identification Table for all the jurisdictions participating in this plan for extreme heat. The table shows the final determination of previous occurrences, likelihood to experience in the future, the probability to occur in the future, and the extent. Differences in probability and extent are described further in vulnerability assessment as the unique aspects of the jurisdictions are taken into account.

**Table 13: Extreme Heat Composite Hazard Identification Table**

| JURISDICTION | PREVIOUS OCCURRENCE? Yes/No | LIKELY TO EXPERIENCE? Yes/No | PROBABILITY Highly Likely/ Likely/Possible/Unlikely | EXTENT Catastrophic/Severe /Limited/None |
|---|---|---|---|---|
| Alvo | Yes | Yes | Likely | Limited |
| Ashland | Yes | Yes | Likely | Limited |
| Avoca | Yes | Yes | Likely | Limited |
| Bennet | Yes | Yes | Likely | Limited |
| Brainard | Yes | Yes | Likely | Limited |
| Cass County | Yes | Yes | Likely | Severe |
| Cass County Rural Water District #1 | Yes | Yes | Likely | Severe |
| Cass County Rural Water District #2 | Yes | Yes | Likely | Severe |
| Cass County SID #1 | Yes | Yes | Likely | Limited |
| Cedar Creek | Yes | Yes | Likely | Limited |
| Ceresco | Yes | Yes | Likely | Limited |
| Davey | Yes | Yes | Likely | Limited |
| Denton | Yes | Yes | Likely | Limited |
| Eagle | Yes | Yes | Likely | Limited |
| Firth | Yes | Yes | Likely | Limited |
| Greenwood | Yes | Yes | Likely | Limited |
| Hallam | Yes | Yes | Likely | Limited |
| Hickman | No | Yes | Likely | Limited |
| Lancaster County | Yes | Yes | Likely | Severe |
| Lancaster County Rural Water District #1 | Yes | Yes | Likely | Severe |
| Lancaster County SID #6 | Yes | Yes | Likely | Limited |
| Lincoln | Yes | Yes | Likely | Limited |
| Louisville | Yes | Yes | Likely | Limited |
| LPSNRD | Yes | Yes | Likely | Severe |
| Malcolm | Yes | Yes | Likely | Limited |
| Manley | Yes | Yes | Likely | Limited |
| Murdock | No | Yes | Likely | Limited |
| Murray | Yes | Yes | Likely | Limited |
| Panama | Yes | Yes | Likely | Limited |
| Plattsmouth | Yes | Yes | Likely | Limited |
| Raymond | Yes | Yes | Likely | Limited |
| Roca | No | Yes | Likely | Limited |
| School District 145 | Yes | Yes | Likely | Limited |
| Sprague | Yes | Yes | Likely | Limited |
| Union | Yes | Yes | Likely | Limited |
| Valparaiso | Yes | Yes | Likely | Limited |
| Waverly | Yes | Yes | Likely | Limited |
| Weeping Water | Yes | Yes | Likely | Limited |

Hazard Background

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. Over the last 30 years, more people in the United States have died from extreme heat than from

earthquakes, hurricanes, floods, lightning, and tornadoes combined. For the purposes of this Plan, extreme heat has been treated as a separate hazard from drought due to the fact that long periods of high temperature and high humidity can occur during a non-drought period.

Historical Occurrences

There have been four regional documented reports of excessive heat in the Planning Area. All four incidences occurred in the month of July with one extending into early August. The following reports were provided by the NCDC website. No other historical occurrences were identified by residents, research or community officials.

- **July 10, 1995:** There were three deaths, $160,000 in property damages, and $150,000 in crop damages caused by a heat wave of one hundred degrees plus over a five day period. The extreme heat also resulted in numerous losses in livestock and road damage.

- **July 19, 1999:** Two deaths and $3.3 million in property damage was the result of a heat wave with a heat index of 105 to 120 degrees over a twelve day period. There were also at least 5,000 head of cattle killed by the high temperatures.

- **July 28, 2001:** A heat wave with a heat index of 105 to 115 degrees over a one week period caused one death.

- **July 22, 2005:** A heat wave with a heat index of 105 to 115 over a three day period killed at least 1,250 head of cattle. The Property damage was estimated to be $3.3 million.

Temperature information taken from weather station 254815 in Lincoln was provided by the High Plains Regional Climate Center (HPRCC). The HPRCC presented data from 1955 to 2007 and revealed that the highest number of high heat days in the summer months occurred in June, July and August. The month of June averages nearly eight days of weather greater than 90 degrees Fahrenheit. The month of July averaged 14 days of heat in excess of 90 degrees Fahrenheit. August had an average of 11.5 days exceeding 90 degrees Fahrenheit

Vulnerability Assessment

It was deemed, by both the public and factual research that the planning area as a whole has had previous occurrences of extreme heat. The probability of extreme heat to occur again is 'likely' with between a 10 & 100% chance they will occur every year within the planning area. The extent was determined to be 'severe', as 25 to 50% of the planning area could be affected by extreme heat. Only 25 to 50% of the planning area could be affected because extreme heat does not affected structures.

There is no area within the region that is void from the affects from extreme heat periods. Although young children, elderly, and those working and living in non-air-conditioned environments are most vulnerable, no structures are at risk. With high temperatures, people are vulnerable to heatstroke, heat cramps, heat exhaustion, and loss of life. In addition, periods of extreme heat create a significant demand on utilities such as water and electricity which can cause a failure in the electrical system. With the high demand on energy, power loss could occur making an extreme heat event even more dangerous. Structures are not at risk during periods of extreme heat. 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 for the community.

The unique characteristics of different jurisdictions allow extreme heat to impact them differently. Furthermore, the following differences explain the range of probability and extent as shown in Table 13 above: Rural water districts are vulnerable to extreme heat as customers use more water during hot days, this places stress on the wells and water supply. Villages, cities and SIDs are vulnerable in that residents place high strain on the local power utilities. Extreme heat is dangerous to residents in these jurisdictions if power is lost. Residents in the rural areas of the counties can be affected by extreme heat in the same way as incorporated jurisdictions and even furthermore as farmers water their crops more during periods of extreme heat placing extra usage of water. The NRD also is vulnerable in the same way with farmers using extra water.

The vulnerability to the planning area and the jurisdictions within could not be assessed further due to data limitations about the effects of extreme heat on power and water supply. This could be addressed in future updates of the plan.

Potential Losses

The direct and indirect affects of extreme heat combined with the difficulty of placing value to loss of life creates a difficulty in calculating losses from this event. Losses such as power outages could affect businesses and critical facilities. There is not enough information available to quantify damages as a result of extreme heat Planning Area wide.

Future Vulnerability and Losses

There is no human behavior or activity that can modify the area affected by extreme heat, thus extreme heat will always be capable of affecting the entire Planning Area. Any structural growth which occurs within it in the future will be vulnerable to the losses sustained from extreme heat. Losses from these events could prove costly considering the large amount of development anticipated to occur over the next five years. Additionally, total losses that could occur in the future would increase as the population of Planning Area increases.

### *DROUGHT*

Below is the Composite Hazard Identification Table for all the jurisdictions participating in this plan for drought. The table shows the final determination of previous occurrences, likelihood to experience in the future, the probability to occur in the future, and the extent. Differences in probability and extent are described further in vulnerability assessment as the unique aspects of the jurisdictions are taken into account.

**Table 14: Drought Composite Hazard Identification Table**

| JURISDICTION | PREVIOUS OCCURRENCE? Yes/No | LIKELY TO EXPERIENCE? Yes/No | PROBABILITY Highly Likely/ Likely/Possible/Unlikely | EXTENT Catastrophic/Severe /Limited/None |
|---|---|---|---|---|
| Alvo | Yes | Yes | Likely | Limited |
| Ashland | Yes | Yes | Likely | Limited |
| Avoca | Yes | Yes | Likely | Limited |
| Bennet | Yes | Yes | Likely | Limited |
| Brainard | Yes | Yes | Likely | Limited |
| Cass County | Yes | Yes | Likely | Severe |
| Cass County Rural Water District #1 | Yes | Yes | Likely | Catastrophic |
| Cass County Rural Water District #2 | Yes | Yes | Likely | Catastrophic |
| Cass County SID #1 | Yes | Yes | Likely | Limited |
| Cedar Creek | No | Yes | Likely | Limited |
| Ceresco | Yes | Yes | Likely | Limited |
| Davey | No | Yes | Likely | Limited |
| Denton | Yes | Yes | Likely | Limited |
| Eagle | Yes | Yes | Likely | Limited |
| Firth | Yes | Yes | Likely | Limited |
| Greenwood | No | Yes | Likely | Limited |
| Hallam | Yes | Yes | Likely | Limited |
| Hickman | Yes | Yes | Likely | Limited |
| Lancaster County | Yes | Yes | Likely | Severe |
| Lancaster County Rural Water District #1 | Yes | Yes | Likely | Catastrophic |
| Lancaster County SID #6 | Yes | Yes | Likely | Limited |
| Lincoln | Yes | Yes | Likely | Limited |
| Louisville | Yes | Yes | Likely | Limited |
| LPSNRD | Yes | Yes | Likely | Catastrophic |
| Malcolm | Yes | Yes | Likely | Limited |
| Manley | Yes | Yes | Likely | Limited |
| Murdock | No | Yes | Likely | Limited |
| Murray | Yes | Yes | Likely | Limited |
| Panama | Yes | Yes | Likely | Limited |
| Plattsmouth | Yes | Yes | Likely | Limited |
| Raymond | Yes | Yes | Likely | Limited |
| Roca | No | Yes | Likely | Limited |
| School District 145 | Yes | Yes | Likely | Limited |
| Sprague | Yes | Yes | Likely | Limited |
| Union | No | Yes | Likely | Limited |
| Valparaiso | Yes | Yes | Likely | Limited |
| Waverly | Yes | Yes | Likely | Limited |
| Weeping Water | Yes | Yes | Likely | Limited |

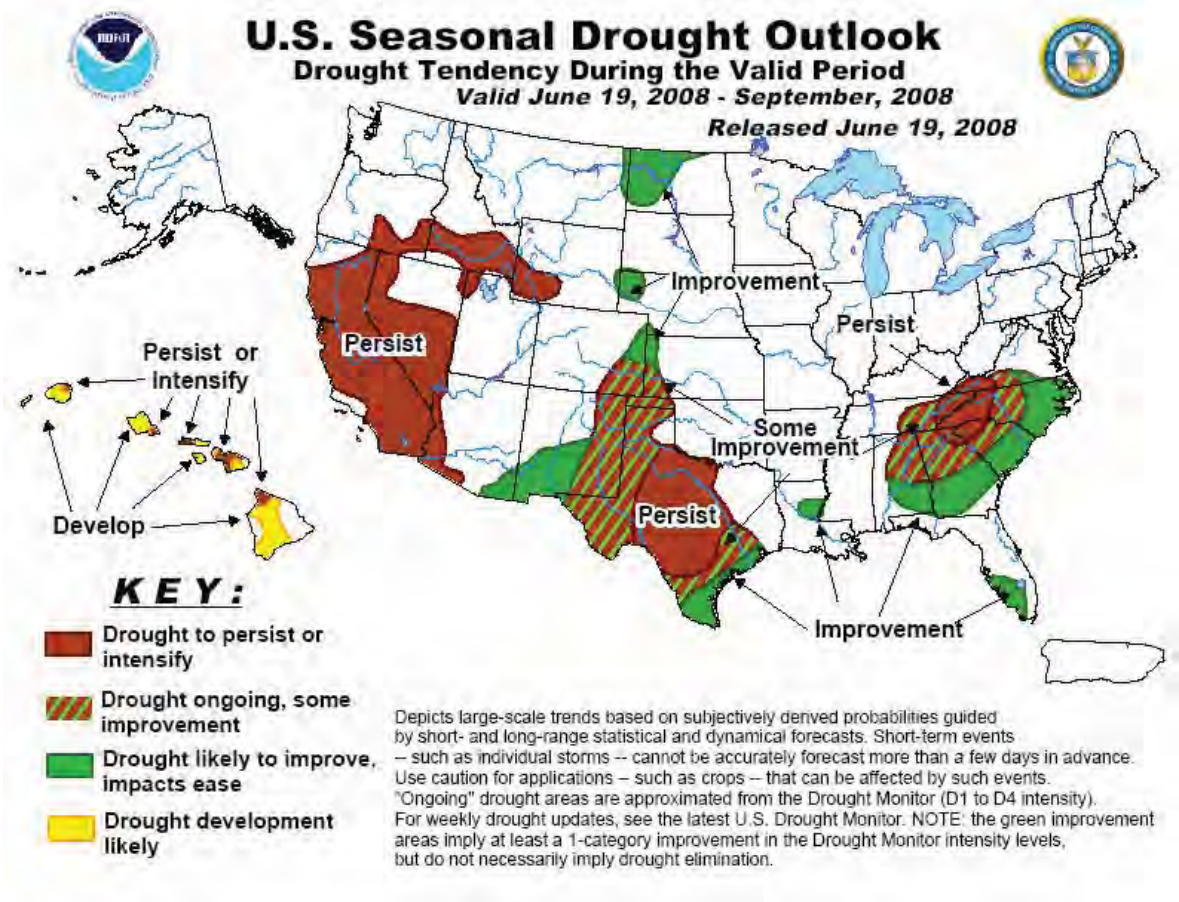
Hazard Background

The individuals who participated in the preparation of this Plan and attended public meetings agreed that the jurisdictions within the LPSNRD have all been affected by drought at one

According to the National Drought Mitigation Center located 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

time or 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. However, extreme heat is not indicative of drought conditions, and will be covered later in this report. The figure below shows NOAA's seasonal drought prediction through September, 2008. Their website (www.drought.noaa.gov) is regularly updated with the latest information on drought predictions.

**Figure 6: Seasonal Drought Outlook for the United States; June through September, 2008**




Source: National Oceanic and Atmospheric Administration (NOAA)

Wildfires are also more likely to occur during periods of drought, but they are not considered as a major threat within the Planning Area. Droughts are affected by natural processes, natural water availability, and also human demands on water supply. Demands on water supply caused by droughts have significant political, social, economical, and environmental impacts. According to the National Weather Service, droughts can be brought on by four different conditions:

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

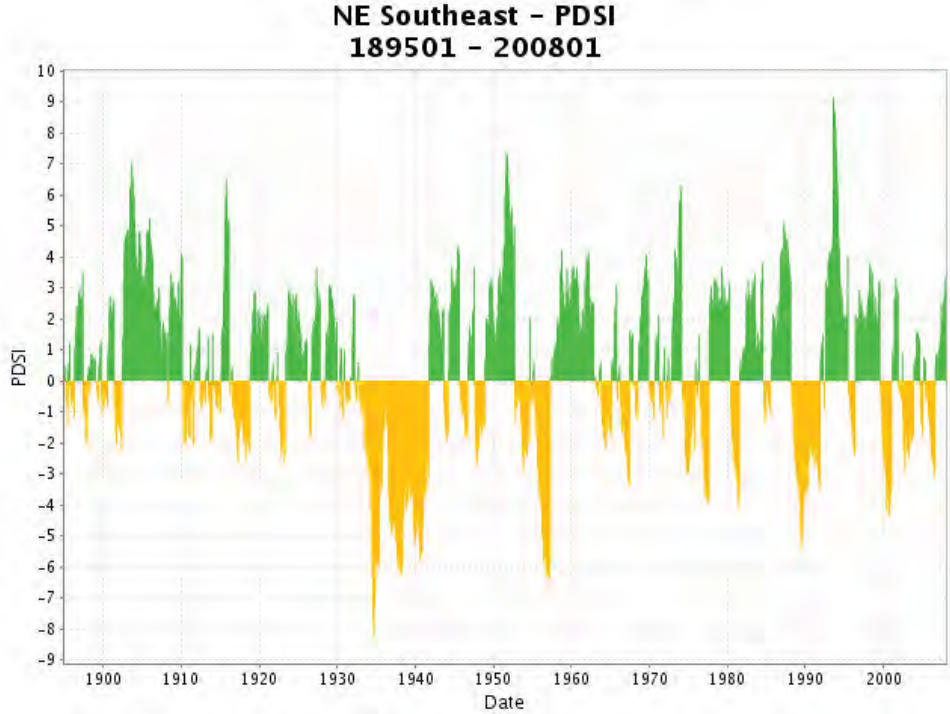
- **Socioeconomic** - occurs when the demand for water is greater than the supply. This can be caused by an increase in demand and / or reduction in supply

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 Planning Area. In extreme cases, people may even migrate or relocate in search of more productive supplies of water. Internationally, social unrest and war can break out because of the politics often tied to the supply and demand for water.

Historical Occurrences

The Palmer Drought Severity Index (PDSI) is a graph that shows drought history. The graph is created using data from the National Climatic Data Center (NCDC), utilizing their Climate Visualization System (CLIMVIS), and displayed on the NOAA website. The figure below shows a graph of the drought history for Division 9 - Southeast, which includes the area of Lancaster County, between the years 1895 and 2008. The negative axis indicates a drought: -2 represents a moderate drought, -3 represents a severe drought, and -4 represents an extreme drought.

**Figure 7: Palmer Drought Severity Index (PDSI); Southeastern Nebraska 1895 to 2008**




Source: National Oceanic and Atmospheric Administration (NOAA)

The figure above shows the "Dust Bowl" occurring between 1930 and the early 1940's. It was during this period that the United States was experiencing a severe economic depression known as the "Great Depression." There was a significant amount of emigration as people from the Midwest moved out towards California and other coastal areas. Subsequent to this period, Nebraska experienced other significant droughts, but none as sever or long lasting as that during the Dust Bowl years. The next significant drought occurred during the early to late 1950's. Other prominent droughts occurred in the 1990's and in 2000's. The estimated damages due to drought in Nebraska for the year 2006 amounted to over $360 million, with the Nebraska Department of Agriculture distributing $3.6 million for drought assistance to agricultural operators.

On the NCDC's website, there was one report of a drought having affected several counties within the state of Nebraska. Droughts are often times not physical occurrences that are specific to one area, but more of a climate hazard that impacts entire regions. The drought on record that affected the Planning Area began in early September 1999, and ended temporarily in eastern Nebraska on November 22 of that year. Many communities banned outdoor burning because of the numerous grass fires. Overall, the property damages were estimated at $55,000.

The estimated drought damages in 2006 for Nebraska were over $360 million. The Nebraska Department of Agriculture distributed $3.6 million for drought assistance in agriculture.

Cass County Rural Water District #1 reports that during the summers of 2000, 2002 and 2005, restrictions were placed on all outside watering for approximately 60 days in response to drought conditions.

Cass County RWD#2 recorded that due to a drought mainly from 2001-2005 a drop in static groundwater levels required the installation of a new well (#4) in 2002.

No other specific historical occurrences were recorded by residents, city officials, or found in other resources for the Planning Area.

Vulnerability Assessment

It was deemed, by both the public and factual research that the planning area as a whole has had previous occurrences of drought. The probability of a drought to occur again is 'likely' with between a 10 & 100% chance they will occur every year within the planning area. The extent was determined to be 'catastrophic', as 50% or more of the planning area could be affected by drought. Although drought does not affect structures, the whole planning area contains a lot of agricultural ground that could be severely impacted by drought.

Drought has the capability to affect the entire planning area during an extended event. The whole region is within the hazard area boundaries and is at risk of being affected by drought. Drought can cause a severe fall in the availability of both surface and groundwater for domestic, municipal, and agriculture uses. In addition, extended periods of drought typically occur in combination with periods of extreme heat, putting a larger demand on electricity and water supplies. Drought can negatively impact the economy, social structure and the environment in the farming communities within the planning area. Economic effects could also affect most communities within the planning area.

The planning area is very vulnerable to the affects of drought. Recreational dams could experience a fall in the water level. The lack of water in dams, rivers, and streams would not only have adverse affects on recreation and the revenue generated by it, but also cause damage to ecosystems and wildlife.

The unique characteristics of different jurisdictions allow drought to impact them differently. Furthermore, the following differences explain the range of probability and extent as shown in Table 14 above: Rural water districts are vulnerable to drought as customers use more water during hot days, this places stress on the wells and water supply. Villages, cities and SIDs are vulnerable in that residents use more water for their lawns and every day activities. Residents in the rural areas of the counties can be affected by drought in the same way as incorporated jurisdictions and even furthermore as farmers water their crops more during periods of drought placing extra usage of water. The NRD also is vulnerable in the same way with farmers using extra water.

The vulnerability to the planning area and the jurisdictions within could not be assessed further due to data limitations about the effects of drought on water supply and economy. This could be addressed in future updates of the plan.

Potential Losses

The potential losses associated with drought are directly determined by the magnitude and frequency of the occurrence and are extremely hard to determine. Most losses are crop related, which can directly have a negative affect on the economy Planning Area wide, which is mostly supported by the agricultural industry. Losses associated with lack of water in lakes, ponds, rivers and streams could potentially cause loss of revenue, recreation, animals and their habitats. It is beyond the scope of this plan to estimate the dollar value to these potential losses.

Along with the monetary loss of crops and livestock, environmental losses, economic losses, and losses associated with disruption of social structure would be present. The potential of the loss of life is also present along with the potential for an outward migration of people.

Future Vulnerability and Losses

There is no human behavior or activity that can modify the area affected by drought, thus drought will always be capable of affecting the entire Planning Area. Any structural growth which occurs within it in the future will be vulnerable to the losses sustained from drought. Losses from these events could prove costly considering the large amount of development anticipated to occur over the next five years.

### *EARTHQUAKE*

Below is the Composite Hazard Identification Table for all the jurisdictions participating in this plan for earthquake. The table shows the final determination of previous occurrences, likelihood to experience in the future, the probability to occur in the future, and the extent. Differences in probability and extent are described further in vulnerability assessment as the unique aspects of the jurisdictions are taken into account.

**Table 15: Earthquake Composite Hazard Identification Table**

| JURISDICTION | PREVIOUS OCCURRENCE? Yes/No | LIKELY TO EXPERIENCE? Yes/No | PROBABILITY Highly Likely/ Likely/Possible/Unlikely | EXTENT Catastrophic/Severe /Limited/None |
|---|---|---|---|---|
| Alvo | No | No | Unlikely | Limited |
| Ashland | No | No | Unlikely | Limited |
| Avoca | No | No | Unlikely | Limited |
| Bennet | No | No | Unlikely | Limited |
| Brainard | No | No | Unlikely | Limited |
| Cass County | Yes | No | Possible | Severe |
| Cass County Rural Water District #1 | Yes | No | Possible | Catastrophic |
| Cass County Rural Water District #2 | No | No | Possible | Catastrophic |
| Cass County SID #1 | No | No | Unlikely | Limited |
| Cedar Creek | No | No | Unlikely | Limited |
| Ceresco | No | No | Unlikely | Limited |
| Davey | No | No | Unlikely | Limited |
| Denton | No | No | Unlikely | Limited |
| Eagle | No | No | Unlikely | Limited |
| Firth | No | No | Unlikely | Limited |
| Greenwood | No | No | Unlikely | Limited |
| Hallam | Yes | No | Unlikely | Limited |
| Hickman | No | No | Unlikely | Limited |
| Lancaster County | Yes | No | Possible | Severe |
| Lancaster County Rural Water District #1 | No | No | Possible | Catastrophic |
| Lancaster County SID #6 | No | No | Unlikely | Limited |
| Lincoln | No | No | Unlikely | Limited |
| Louisville | No | No | Unlikely | Limited |
| LPSNRD | Yes | No | Possible | Limited |
| Malcolm | No | No | Unlikely | Limited |
| Manley | No | No | Unlikely | Limited |
| Murdock | No | No | Unlikely | Limited |
| Murray | No | No | Unlikely | Limited |
| Panama | No | No | Unlikely | Limited |
| Plattsmouth | No | No | Unlikely | Limited |
| Raymond | No | No | Unlikely | Limited |
| Roca | No | No | Unlikely | Limited |
| School District 145 | No | No | Unlikely | Limited |
| Sprague | No | No | Unlikely | Limited |
| Union | No | No | Unlikely | Limited |
| Valparaiso | No | No | Unlikely | Limited |
| Waverly | No | No | Unlikely | Limited |
| Weeping Water | No | No | Unlikely | Limited |

Hazard Background

Earthquakes in Nebraska are not common, but when they do occur, they are generally small and produce little to no damage. Earthquakes are measured by their magnitude and intensity. Magnitude is measured using the Richter scale, which uses seismographs around the world to measure

Many residents of Nebraska are surprised to discover that earthquakes do occur within the state.

the amount of energy released by the quake. The Richter scale is a base-10 logarithmic scale. Intensity uses the Modified Mercalli Intensity Scale, and is determined by comparing actual damage against the damage patterns of earthquakes with known intensities. The table below displays the typical effects of the various magnitudes of the Richter Scale.

**Table 16: Richter Magnitude Damage Descriptions**

| Richter Magnitude | Description | Earthquake Effects |
|---|---|---|
| 0.0-2.0 | Micro | Microearthquakes, not felt |
| 2.0-2.9 | Minor | Generally not felt, but recorded |
| 3.0-3.9 | Minor | Often felt, but rarely causes damage |
| 4.0-4.9 | Light | Noticeable shaking of indoor items, significant damage unlikely |
| 5.0-5.9 | Moderate | Can cause major damage to poorly constructed buildings over small regions. At most slight damage to well-designed buildings |
| 6.0-6.9 | Strong | Can be destructive in areas up to about 100-miles across in population areas |
| 7.0-7.9 | Major | Can cause serious damage over larger areas |
| 8.0-8.9 | Great | Can cause serious damage in areas of several hundred miles |
| 9.0-9.9 | Great | Devastating in areas several thousand miles across |
| 10.0+ | Great | Never recorded, energy yield extremely high |

Source: USGS

Historical Occurrences

Earthquakes occur frequently in Southeast Nebraska. However, most earthquakes that do occur are of small magnitude (less than 3.0 on the Richter scale) and do not cause damages, nor are they felt. Figure 6 shows a map of the earthquakes that have occurred in Southeast Nebraska. The information is from the USGS Earthquake Hazards Program, more specifically the NEIC Earthquake Search database. Two sets of earthquake data are listed. The circles in the figure are *Significant U.S. Earthquakes from 1568-1989*. This is a catalog of principal earthquakes in the United States for that time period which have magnitudes greater than or equal to 4.5 or intensity of VI or larger. The Squares on the figure are from the catalog of earthquakes located by the USGS NEIC and its predecessors. This data is available from 1973 to the present.

From the database, it can be seen that there was an earthquake north of Garland, NE on November 15, 1877 that registered a 5.1 on the Richter scale. The only other earthquake of significant magnitude in Southeast Nebraska occurred near Elk Creek on March 1st, 1935. This earthquake event was actually two earthquakes that occurred 4 minutes apart between 4.0 and 5.0 on the Richter scale. During this event, some chimneys were cracked and a few collapsed. A few windows were also broken and cracks appeared in the plaster and stone walls. The damages occurred in Tecumseh as well as Humboldt, Pawnee City, Peru, Shubert, Stella and St. Marys Nebraska.

Historical occurrences of earthquakes being felt or causing damage are listed in each jurisdictions 'participant section.'

Vulnerability Assessment

It was deemed, by both the public and factual research that the planning area as a whole has had previous occurrences of earthquake. The probability of an earthquake to occur again is 'possible' with between a 1 and 10% chance they will occur every year within the planning area. The extent was determined to be 'limited', as 0 to 25% of the planning area could be affected by earthquake. The limited extent was determined due to the minor earthquakes that have occurred in the past and the very minor damages to structures and infrastructure the earthquakes have caused.

Southeastern Nebraska has not been a measurable earthquake of any kind for over 70 years. Furthermore, earthquakes which have occurred have produced very light to negligible structural damage. Due to this and limited resources, it was not deemed appropriate to assess the vulnerability of specific structures which are vulnerable to earthquakes or examine the potential losses from an earthquake event. Futhermore, data was limited concerning damages from earthquakes. This could be addressed in future updates of the plan if deemed necessary.

The unique characteristics of different jurisdictions allow earthquake to impact them differently. Furthermore, the following differences explain the range of probability and extent as shown in Table 15 above: Rural water districts are vulnerable to earthquake as underground pipes could be significantly damaged in the event of an earthquake. With the large area the rural water districts make up, the extent of the damages could be catastrophic. Villages, cities and SIDs are vulnerable in that structures and infrastructure could be damages by the earthquake. Residents in the rural areas of the counties can be affected by earthquakes in the same way as incorporated jurisdictions. The NRD also is vulnerable in that dams could breach if the earthquake was severe enough although there are no occurrences of this happening in the Lower Platte South NRD.

Potential Losses/ Future Vulnerability and Losses

There is no human behavior or activity that can modify the area affected by earthquakes, thus earthquakes will always be capable of affecting the entire Planning Area. Any structural growth which occurs within it in the future will be vulnerable to the losses sustained from earthquakes. However; the rarity of earthquake events keeps the vulnerability and losses negligible. Due to this and limited resources, it was not deemed necessary, nor even feasible, to assess the value of potential current or future losses associated from an earthquake event.

**Figure 8: Earthquake Hazard Map**

# INSERT MAP

### *WILDFIRE*

Below is the Composite Hazard Identification Table for all the jurisdictions participating in this plan for wildfire. The table shows the final determination of previous occurrences, likelihood to experience in the future, the probability to occur in the future, and the extent. Differences in probability and extent are described further in vulnerability assessment as the unique aspects of the jurisdictions are taken into account.

**Table 17: Wildfire Composite Hazard Identification Table**

| JURISDICTION | PREVIOUS OCCURRENCE? Yes/No | LIKELY TO EXPERIENCE? Yes/No | PROBABILITY Highly Likely/ Likely/Possible/Unlikely | EXTENT Catastrophic/Severe /Limited/None |
|---|---|---|---|---|
| Alvo | Yes | No | Unlikely | None |
| Ashland | No | No | Unlikely | None |
| Avoca | No | No | Unlikely | None |
| Bennet | No | No | Unlikely | None |
| Brainard | No | No | Unlikely | None |
| Cass County | Yes | Yes | Likely | Limited |
| Cass County Rural Water District #1 | No | No | Unlikely | None |
| Cass County Rural Water District #2 | No | No | Unlikely | None |
| Cass County SID #1 | No | No | Unlikely | None |
| Cedar Creek | No | No | Unlikely | None |
| Ceresco | No | No | Unlikely | None |
| Davey | No | No | Unlikely | None |
| Denton | No | No | Unlikely | None |
| Eagle | No | No | Unlikely | None |
| Firth | No | No | Unlikely | None |
| Greenwood | No | No | Unlikely | None |
| Hallam | No | No | Unlikely | None |
| Hickman | No | No | Unlikely | None |
| Lancaster County | Yes | Yes | Likely | Limited |
| Lancaster County Rural Water District #1 | No | No | Unlikely | None |
| Lancaster County SID #6 | No | No | Unlikely | None |
| Lincoln | No | No | Unlikely | None |
| Louisville | Yes | No | Unlikely | None |
| LPSNRD | Yes | Yes | Highly Likely | Limited |
| Malcolm | No | No | Unlikely | None |
| Manley | No | No | Unlikely | None |
| Murdock | No | No | Unlikely | None |
| Murray | No | No | Unlikely | None |
| Panama | No | No | Unlikely | None |
| Plattsmouth | Yes | Yes | Likely | Limited |
| Raymond | No | No | Unlikely | None |
| Roca | No | No | Unlikely | None |
| School District 145 | No | No | Unlikely | None |
| Sprague | No | No | Unlikely | None |
| Union | No | No | Unlikely | None |
| Valparaiso | No | No | Unlikely | None |
| Waverly | No | No | Unlikely | None |
| Weeping Water | No | No | Unlikely | None |

Hazard Background

Wildfire is a general term for an uncontrolled fire that often occurs in wildland areas, but can consume agricultural resources and houses as well. Wildland areas are not limited to but include grasslands, CRP acres, forests, etc. The causes of wildfires vary, but most often include lightning, human carelessness, and arson. According to FEMA, dry conditions during various times of the year greatly increase the potential for

wildland fires; therefore drought is a major contributor to extreme wildfires. The USGS notes that wildfires are a growing natural hazard in most regions of the United States. These fires, on average, burn 4.3 million acres in the U.S. annually, causing the federal government to spend roughly $1 billion per year on fire suppression. Although fire is a natural occurrence that can be a beneficial process, the large buildup of vegetation used for fire suppression can act as extra fuel and increases the intensity and devastation of these fires.

According to FEMA, there are three different classes of wildland fires:

- A **surface fire** is the most common type, and burns along the floor of a forest, moving slowly and killing or damaging trees;
- A **ground fire** is usually started by lightning and burns on or below the forest floor, and
- A **crown fire** spreads rapidly by wind and moves quickly by jumping along the tops of trees.

Lightning starts approximately 10,000 forest fires each year, yet four out of every five forest fires are started by humans.

Wildfires generally occur in areas where climates are sufficiently moist to allow the growth of trees and vegetation, but also have long, dry, and hot periods. These hot periods allow branches and leaves to fall, and material to dry out, leaving highly flammable material to accumulate. During a severe drought, wildfires are common in grasslands and scrublands. During windy days, grassland fires can spread rapidly and become uncontrollable.

In recent years, the areas where wildlands border developing areas, wildfires have become more dangerous as they pose a threat to suburban homes located in transitions zones between rural and urban areas. In some extreme occasions, wildfires have caused numerous deaths and extensive damage as fires rapidly sweep through urban-fringe communities. The damage caused by wildfires goes beyond just smoldering piles of ash and includes the effects of erosion, landslides, the introduction of invasive species, and changes in water quality.

Historical Occurrences

The Lower Platte South NRD reported one particular incident near Weeping Water in the winter of 2006 where a wildfire burned 500 acres of crops. Also Plattsmouth has had several wildfires north of their community in the heavily wooded bluffs along the Missouri River, although the fires have never spread into the community.

Vulnerability Assessment

It was deemed, by both the public and factual research that the planning area as a whole has had previous occurrences of wildfire. The probability of a wildfire to occur again is ‘highly likely’ with between a near 100% chance they will occur every year within the planning area. The extent was determined to be ‘limited’, as 0 to 25% of the planning area could be affected by wildfire. The planning area as a whole contains CRP land and wooded areas that can be affected by wildfire.

Wildfires have the capability to affect widespread areas during an extended event. All areas in and around the District with trees and grassland are in the hazard area boundaries. Areas within the planning area that are vulnerable to the affects of wildfires include 40,000 acres of land under the Conservation Reserve Program (CRP), land that runs along the railroads, and ditches along the highways, particularly Highway 50, in Cass County. It is important to note that wildfires are often associated with periods of extreme heat and periods of drought, both of which have been previously discussed as separate hazard events.

The unique characteristics of different jurisdictions allow wildfires to impact them differently. Furthermore, the following differences explain the range of probability and extent as shown in Table 17 above: Rural water districts are not vulnerable to wildfire as the majority of their infrastructure is underground. Villages, cities and SIDs are not vulnerable in that there are no forests near the communities that pose a threat other than Plattsmouth. Plattsmouth is vulnerable as there is a forest on the north side of the community. Residents in the rural areas of the counties can be affected by wildfire in that CRP land can spread to farm structures. The NRD also is likely the most vulnerable to wildfire in that it oversees conservation services such as CRP land.

Data limitation existed to assess the number of structures that can be damages or affected by wildfire. This could be addressed in future updates of the plan.

Potential Losses

The monetary loss of a wildfire varies greatly with the location and severity of the event and could change depending on what areas are included in the estimate. If the loss estimate were to be limited to the Planning Area's communities proper, losses would be relatively lower than if it were to include the rural areas surrounding them. If a wildfire were to occur when the grasses are dormant in February or March, the losses could be greater; threatening crops, rural houses, and even a community proper if any of the CRP land is adjacent. For these reasons, it would be appropriate to say losses could range from thousands to millions of dollars. In addition to the initial monetary losses associated with wildfires, land becomes barren and could take years to recover, and also threaten livestock, citizens in the path of the fire and firefighters extinguishing the fire.

Future Vulnerability and Losses

The likelihood of wildfires occurring in the future will decrease as land management gets better. If land management stays as it is today, future development and future generations in the Planning Area will all be equally vulnerable to the affects and losses associated with wildfires today. The total losses that could occur in the future would increase as the population and development increases.

### *LANDSLIDE*

Below is the Composite Hazard Identification Table for all the jurisdictions participating in this plan for landslides. The table shows the final determination of previous occurrences, likelihood to experience in the future, the probability to occur in the future, and the extent. Differences in probability and extent are described further in vulnerability assessment as the unique aspects of the jurisdictions are taken into account.

**Table 18: Landslide Composite Hazard Identification Table**

| JURISDICTION | PREVIOUS OCCURRENCE? Yes/No | LIKELY TO EXPERIENCE? Yes/No | PROBABILITY Highly Likely/ Likely/Possible/Unlikely | EXTENT Catastrophic/Severe /Limited/None |
|---|---|---|---|---|
| Alvo | No | No | Unlikely | None |
| Ashland | No | No | Unlikely | None |
| Avoca | No | No | Unlikely | None |
| Bennet | No | No | Unlikely | None |
| Brainard | No | No | Unlikely | None |
| Cass County | Yes | Yes | Possible | Limited |
| Cass County Rural Water District #1 | No | No | Unlikely | None |
| Cass County Rural Water District #2 | No | No | Unlikely | None |
| Cass County SID #1 | No | No | Unlikely | None |
| Cedar Creek | No | No | Unlikely | None |
| Ceresco | No | No | Unlikely | None |
| Davey | No | No | Unlikely | None |
| Denton | No | No | Unlikely | None |
| Eagle | No | No | Unlikely | None |
| Firth | No | No | Unlikely | None |
| Greenwood | No | No | Unlikely | None |
| Hallam | No | No | Unlikely | None |
| Hickman | No | No | Unlikely | None |
| Lancaster County | Yes | Yes | Possible | Limited |
| Lancaster County Rural Water District #1 | No | No | Unlikely | None |
| Lancaster County SID #6 | No | No | Unlikely | None |
| Lincoln | Yes | Yes | Possible | Limited |
| Louisville | No | No | Unlikely | None |
| LPSNRD | Yes | Yes | Likely | Limited |
| Malcolm | No | No | Unlikely | None |
| Manley | No | No | Unlikely | None |
| Murdock | No | No | Unlikely | None |
| Murray | No | No | Unlikely | None |
| Panama | No | No | Unlikely | None |
| Plattsmouth | No | No | Unlikely | None |
| Raymond | No | No | Unlikely | None |
| Roca | No | No | Unlikely | None |
| School District 145 | No | No | Unlikely | None |
| Sprague | No | No | Unlikely | None |
| Union | No | No | Unlikely | None |
| Valparaiso | No | No | Unlikely | None |
| Waverly | No | No | Unlikely | None |
| Weeping Water | No | No | Unlikely | None |

Hazard Background

The USGS reports that landslides occur in all 50 states and U.S. territories and cause nearly $2 billion in damages and more than 25 deaths on average, each year. The threat of landslide to human life and property has increased with urban and recreational expansion into hillside areas. The likelihood of a landslide has also increased in connection with the frequency of other major natural disasters that destabilize the ground such as

earthquakes, volcanoes, wildfires, floods, storms, and thawing of land as well as other natural phenomena that causes ground failure.

FEMA describes landslides as masses of rock, earth, or debris that moves down a slope. The debris and mud flows that occur are essentially rivers of rock, earth, and other debris saturated with water, which can that move slowly or rapidly. They develop when water accumulates in the ground during heavy rainfall or rapid snowmelt and over saturates the underlying soil, causing it to slip and fall from the side of a slope. Landslides act like avalanches because they can strike with little or no warning, travel several miles from their source and grow in size as they pick up debris in the form of trees, boulders, cars and other materials.

Landslides in Southeast Nebraska rarely occur.

Historical Occurrences

According to the University of Nebraska Lincoln's School of Natural Resources Landslides in Nebraska Database, there are 23 records of landslide events in Lancaster County and one record in Cass County. A large portion of these records indicate that the causes of these landslides were road cuts, although there were some instances caused by railroad cuts and stream cuts. See each jurisdictions participant section for landslides specific to their community.

These are the events that we were able to gather information on from the University of Nebraska Lincoln's School of Natural Resources Landslides in Nebraska Database:

- **October 1, 1985:** A rotational slide slope movement of earth material, Peorian loess over glacial till, caused by a road cut occurred at I-180 and Superior Street on the east facing slope.

- **October 1, 1986:** A rotational slide of earth materials, Peorian loess over glacial till and Penn Shawnee Shales, caused by a road cut occurred in Nehawka at Highways 73 and 75.

- **March 15, 1987:** A rotational slide slope movement of earth, geologically described as Pleistocene materials, caused by a stream cut occurred on the bike path on Capitol Parkway and Washington on the east facing slope.

Vulnerability Assessment

It was deemed, by both the public and factual research that the planning area as a whole has had previous occurrences of landslides. The probability of a landslide to occur again is 'likely' with between a 10 & 100% chance they will occur every year within the planning area. The extent was determined to be 'limited', as 0 to 25% of the planning area could be affected by landslide.

While landslides don't generally occur in Southeast Nebraska, there are particular areas that are more vulnerable to them. Landslides in the planning area generally occur along cuts in the roads and highways. Land that lies along river bluffs is also susceptible to landslides and could cause damage to, or completely destroy, any structure built on it. Landslides have occurred in Lincoln along cuts in the roads and highways. Any area where man-made or constructed slopes are too steep, it is susceptible to landslides. This is especially true along roadways in Lincoln such as I-80, I-180, Hwy 2, Hwy 6, Hwy 34 and Hwy 77. The slopes along these interstates and highways vary greatly and, due to limited resources, it was not feasible to identify specific locations that are vulnerable to landslides.

The unique characteristics of different jurisdictions allow landslides to impact them differently. Furthermore, the following differences explain the range of probability and extent as shown in Table 18 above: Rural water

districts were not deemed vulnerable to landslides as their jurisdictions are not in areas where landslides occur. Certain villages, cities and SIDs are vulnerable where there are cuts in the roads and highways. Infrastructure could be damaged, and in certain places, structures that are on river bluffs. Residents in the rural areas of the counties and in the NRD can be affected by landslides in the same way as incorporated communities and also in that farming ground could be damaged.

Data limitation existed to assess the number of structures that can be damages or affected by landslides. This could be addressed in future updates of the plan.

Potential Losses

Potential losses from a landslide event vary greatly depending on the area it affects. Road damages can vary in repair costs, homes or other structures along river bluffs vary in value, and it is also possible for a landslide to occur without causing any monetary losses. Landslides also damage the land or the hillsides, making roadway conditions unsafe. It would be accurate to say that, depending on the magnitude and severity of a landslide event, losses could reach $100,000. Additionally, landslides potentially present a threat to life and functional downtime if a road closure occurs.

For more specific information regarding landslides in the jurisdictions within the Planning Area, refer to each jurisdiction's respective participant section.

Future Vulnerability and Losses

If special precautions, such as decreasing the angle of the slope of construction, are taken when building on landslide prone areas, the vulnerability to landslides will decrease. If construction techniques stay the same or if there are instances in which no special accommodations or precautions can be made, any new roads or new structure built along river bluffs will be just as vulnerable to the affects of landslides as existing ones. Thus the potential losses would be the same as the current, which vary depending on the magnitude and severity of the event along with the area it affects. Landslides will additionally continue to present a threat to life and functional downtime.

### *DAM FAILURE*

Below is the Composite Hazard Identification Table for all the jurisdictions participating in this plan for dam failure. The table shows the final determination of previous occurrences, likelihood to experience in the future, the probability to occur in the future, and the extent. Differences in probability and extent are described further in vulnerability assessment as the unique aspects of the jurisdictions are taken into account.

**Table 19: Dam Failure Composite Hazard Identification Table**

| JURISDICTION | PREVIOUS OCCURRENCE? Yes/No | LIKELY TO EXPERIENCE? Yes/No | PROBABILITY Highly Likely/ Likely/Possible/Unlikely | EXTENT Catastrophic/Severe /Limited/None |
|---|---|---|---|---|
| Alvo | No | No | Unlikely | None |
| Ashland | No | Yes | Possible | Limited |
| Avoca | No | No | Unlikely | None |
| Bennet | No | Yes | Possible | Limited |
| Brainard | No | No | Unlikely | None |
| Cass County | No | Yes | Possible | Limited |
| Cass County Rural Water District #1 | No | Yes | Possible | Limited |
| Cass County Rural Water District #2 | No | No | Unlikely | None |
| Cass County SID #1 | No | Yes | Possible | Limited |
| Cedar Creek | No | Yes | Possible | Limited |
| Ceresco | No | Yes | Possible | Limited |
| Davey | No | No | Unlikely | None |
| Denton | No | Yes | Possible | Limited |
| Eagle | No | No | Unlikely | None |
| Firth | No | Yes | Possible | Limited |
| Greenwood | No | Yes | Possible | Limited |
| Hallam | No | No | Unlikely | None |
| Hickman | No | Yes | Possible | Limited |
| Lancaster County | Yes | Yes | Possible | Limited |
| Lancaster County Rural Water District #1 | No | No | Unlikely | None |
| Lancaster County SID #6 | No | Yes | Possible | Limited |
| Lincoln | No | Yes | Possible | Limited |
| Louisville | No | Yes | Possible | Limited |
| LPSNRD | No | Yes | Possible | Limited |
| Malcolm | No | No | Unlikely | None |
| Manley | No | No | Unlikely | None |
| Murdock | No | No | Unlikely | None |
| Murray | No | No | Unlikely | None |
| Panama | No | No | Unlikely | None |
| Plattsmouth | No | Yes | Possible | Limited |
| Raymond | No | Yes | Possible | Limited |
| Roca | No | Yes | Possible | Limited |
| School District 145 | No | No | Unlikely | None |
| Sprague | No | Yes | Possible | Limited |
| Union | No | Yes | Possible | Limited |
| Valparaiso | No | Yes | Possible | Limited |
| Waverly | No | Yes | Possible | Limited |
| Weeping Water | No | Yes | Possible | Limited |

Hazard Background

Dam failure is described as the structural failure of a water impounding structure. Structural failure can occur during extreme conditions, which can include:

- Reservoir inflows in excess of design flows;

- Flood pools higher then previously attained;
- Unexpected drop in pool level;
- Pool near maximum level and rising;
- Excessive rainfall or snowmelt;
- Large discharge through spillway;
- Erosion, landslide, seepage, settlement, and cracks in the dam or area; and
- Earthquakes

NDNR regulates dam safety and has classified dams by the potential hazard each poses to human life and economic loss in its current condition. The following classifications and descriptions identify each hazard class:

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

Dams that are classified with high hazard potential require the creation of an Emergency Action Plan (EAP). The EAP defines responsibilities and provides procedures designed to identify unusual and unlikely conditions which may endanger the structural integrity of the dam within sufficient time to take mitigating actions and to notify the appropriate emergency management officials of possible, impending, or actual failure of the dam. The EAP may also be used to provide notification when flood releases will create major flooding. An emergency situation can occur at anytime; however, emergencies are more likely to happen when extreme conditions are present.

The EAP includes information regarding the efficiency of emergency response entities so that proper action can be taken to prevent the loss of life and property. Local emergency response entities generally included in an EAP include:

- 911 Dispatch
- County Sheriff
- Local Fire Department
- Emergency Management Agency Director
- County Highway Department
- National Weather Service

Historical Occurrences

No instances of dam failure have been recorded within the Planning Area.

Vulnerability Assessment

It was deemed, by both the public and factual research that the planning area as a whole has not had previous occurrences of dam failure. The definition of dam failure for the purposes of this plan was considered ‘sunny

day failure,' of a full dam. This is a total dam failure in which the impounded water all flow downstream. This was done because inundation maps are generated using this assumption. The probability of a dam failure to occur again is 'possible' with between a 1 to 10% chance they will occur every year within the planning area. The extent was determined to be 'limited', as 0 to 25% of the planning area could be affected by dam failure. Overall throughout the planning area, if a high hazard dam failure occurred, the majority of structures would not be affected by an inundation occurring as a result of a dam failure.

According to the NDNR dam database, there are twenty-eight (28) high hazard dams within Lower Platte South NRD, which generally makes up the planning area. The vulnerability assessment for dam failure is discussed more specifically regarding dam failures in each jurisdiction's respective participant section.

It shall be noted that the inundation maps for the high hazard dams in Nebraska are not available for public viewing because it is sensitive information. More detailed information can be sought after through the Nebraska Department of Natural Resources. This presented a data limitation as the specific areas in which dam failures affected and their structures could not be determined. This could be completed for future updates of the plan.

Discussions were held with the NDNR to determine which high hazard dams could potentially inundate the incorporated cities, villages and towns within the jurisdictions of the planning area. Discussions on which dams can do this and their effects can be found in each 'participant section'. As for the rural and unincorporated areas (such as areas in the NRD, RWDs, and counties) within planning area, every high hazard can inundate areas downstream of the dam. As previously mentioned, due to data limitations, the areas affected by the dam inundations and the structures affected were not known. Therefore, assessing the vulnerability and potential losses to rural areas was not completed for this plan. This could be completed in the future updates.

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

The unique characteristics of different jurisdictions allow dam failure to impact them differently. Furthermore, the following differences explain the range of probability and extent as shown in Table 19 above: Rural water districts are vulnerable to dam failure as water could wash out pipes, structures and water towers. Villages, cities and SIDs are vulnerable in that structures could be inundated or destroyed and the loss of life or injury could occur. Residents in the rural areas of the counties can be affected by drought in the same way that incorporated communities are affected. The NRD, which owns and maintains many dams, risks loosing their infrastructure when a dam fails.

Potential Losses

Due to limited resources and the sensitivity of the inundation maps from high hazard dams estimate potential losses from dam failure were not calculated but could be included in a 5-year update.

Future Vulnerability and Losses

Any future structure in the Planning Area that is built in the inundation area of a high hazard dam would be very vulnerable to dam failure and the losses could be equivalent to the valuation of the structure. More information on inundation areas can be viewed at the Department of Natural Resources.

### *LEVEE FAILURE*

Below is the Composite Hazard Identification Table for all the jurisdictions participating in this plan for levee failure. The table shows the final determination of previous occurrences, likelihood to experience in the future, the probability to occur in the future, and the extent. Differences in probability and extent are described further in vulnerability assessment as the unique aspects of the jurisdictions are taken into account.

**Table 20: Levee Failure Composite Hazard Identification Table**

| JURISDICTION | PREVIOUS OCCURRENCE? Yes/No | LIKELY TO EXPERIENCE? Yes/No | PROBABILITY Highly Likely/ Likely/Possible/Unlikely | EXTENT Catastrophic/Severe /Limited/None |
|---|---|---|---|---|
| Alvo | No | No | Unlikely | None |
| Ashland | No | Yes | Possible | Limited |
| Avoca | No | No | Unlikely | None |
| Bennet | No | No | Unlikely | None |
| Brainard | No | No | Unlikely | None |
| Cass County | No | Yes | Possible | Limited |
| Cass County Rural Water District #1 | No | No | Unlikely | None |
| Cass County Rural Water District #2 | No | No | Unlikely | None |
| Cass County SID #1 | Yes | Yes | Possible | Limited |
| Cedar Creek | No | No | Unlikely | None |
| Ceresco | No | No | Unlikely | None |
| Davey | No | No | Unlikely | None |
| Denton | No | No | Unlikely | None |
| Eagle | No | No | Unlikely | None |
| Firth | No | No | Unlikely | None |
| Greenwood | No | No | Unlikely | None |
| Hallam | No | No | Unliekly | None |
| Hickman | No | No | Unlikely | None |
| Lancaster County | No | No | Unlikely | None |
| Lancaster County Rural Water District #1 | No | No | Unlikely | None |
| Lancaster County SID #6 | No | No | Unlikely | None |
| Lincoln | No | Yes | Possible | Limited |
| Louisville | No | No | Unlikely | None |
| LPSNRD | No | Yes | Possible | Limited |
| Malcolm | No | No | Unlikely | None |
| Manley | No | No | Unlikely | None |
| Murdock | No | No | Unlikely | None |
| Murray | No | No | Unlikely | None |
| Panama | No | No | Unlikely | None |
| Plattsmouth | No | Yes | Possible | Limited |
| Raymond | No | No | Unlikely | None |
| Roca | No | No | Unlikely | None |
| School District 145 | No | No | Unlikely | None |
| Sprague | No | No | Unlikely | None |
| Union | No | No | Unlikely | None |
| Valparaiso | No | No | Unlikely | None |
| Waverly | No | No | Unlikely | None |
| Weeping Water | No | No | Unlikely | None |

Hazard Background

According to FEMA on their website:

> "The United States has thousands of miles of levee systems. These manmade structures are most commonly earthen embankments designed and constructed in accordance with sound engineering

practices to contain, control, or divert the flow of water to provide some level of protection from flooding. Some levee systems date back as far as 150 years. Some levee systems were built for agricultural purposes. Those levee systems designed to protect urban areas have typically been built to higher standards. Levee systems are designed to provide a specific level of flood protection. No levee system provides full protection from all flooding events to the people and structures located behind it. Thus, some level of flood risk exists in these levee-impacted areas."

Levee failure can occur several ways. A breach of a levee is when part of the levee breaks away, leaving a large opening for floodwaters to flow through. A levee breach can be gradual by surface or subsurface erosion, or it can be sudden. A sudden breach of a levee often occurs when there are soil pores in the levee that allow water to flow through causing an upward pressure greater than the downward pressure from the weight of the soil of the levee. This underseepage can then resurface on the backside of the levee and can quickly erode a hole to cause a breach. Sometimes the levee actually sinks into a liquefied subsurface below.

Another way a levee failure can often occur is when the levee overtops the crest of the levee. This happens when the flood waters simply exceed the lowest crest elevation of the levee. An overtopping can lead to significant erosion of the backside of the levee and can result to a breach and thus a levee failure.

Historical Occurrences

The only occurrence of a levee failure in the planning area was reported by Cass County SID #1 (Lake WaConDa). They recorded that 'in the spring of 2003, the river was one inch from cresting. The community used 7 dewatering pumps to keep the water down. Six homes were damaged and there was a broken levee.'

Vulnerability Assessment

It was deemed, by both the public and factual research that the planning area as a whole has one previous occurrence of levee failure. This event was in Cass County SID #1 (Lake WaConDa) and was reported by the community. The probability of a levee failure to occur again is 'possible' with between a 1 & 10% chance they will occur every year within the planning area. The extent was determined to be 'limited', as 0 to 25% of the planning area could be affected by levee failure. The damages of a levee failure will be limited to those areas behind the levee.

Investigation into the FIRM map floodplain indicated that there is no levee in the Planning Area that provides 100 year flooding protection. None are FEMA certified. In the event that a levee failure occurred, effects would be similar to those of a flood. The effects, damages, and locations of flooding are covered under the "Flooding" sections. Damages which may be caused by flooding include loss of structures, destruction of infrastructure such as bridges and roads, loss of utilities and potential for loss of life. For more specific information regarding levee failure events in the jurisdictions within the Planning Area, refer to each jurisdiction's respective participant section.

Levee failure only affects those jurisdictions that have levees. The jurisdictions that have levees are: Ashland, Plattsmouth, Cass County, Cass County SID #1 (Lake WaConDa), Lancaster County and the City of Lincoln. **None of the levees in the planning area provide 100 year protection.** Although they do provide some protection to structures behind them, they do not provide any protection from the 100-year floodplain. Due to data limitation on what structures these levee failures would affect, these structures were not assessed. This could be done in future updates of the plan.

Potential Losses

Due to the lack of resources and data deficiencies, potential losses were not calculated for a levee failure. Losses could be similar to those of a flood, damaging or destroying structures that are protected by the levee,

displacing people and losses of functional down time, economic effects, or recovery and replacement costs. An estimate for losses for structures protected by the levee could be completed for the next plan update.

Future Vulnerability and Losses

The majority of future development in Planning Area will likely not occur in the floodplain, and thus the damage area of levee failure, presuming floodplain regulations and zoning are strictly enforced. Therefore, levee failure may not be a significant threat to future development and losses will be insignificant to future structures and future critical facilities. If in the future a structure is built behind a levee and thus within the floodplain, the vulnerability and potential losses will be the same as that of the existing structures behind the levee and within the floodplain. See each respective 'participant section' for more information on the future vulnerability and losses of each jurisdiction within the Planning Area.

# SECTION 4: MITIGATION STRATEGY

## INTRODUCTION

The primary focus of the mitigation strategy is to establish goals, objectives, and action items to identify the activities and projects that offer the ability to reduce the effects of hazards on existing infrastructure and property in a cost effective and technically feasible manner. The development of the goals and objectives presented in this Plan was completed through the Hazard Identification meetings. A set of public meetings was held on April 23rd and 24th, 2008, after the initial draft was developed based upon the most current information. Prior to this set of meetings, an additional key personnel meeting was held to review the information and provide additional input to the Plan and guidance to the process.

After each hazard was identified, goals and objectives were established for each participant. The intent of each goal and set of objectives is to develop strategies that account for the risks associated with hazards, and identify ways to reduce or eliminate those risks. Each goal and set of objectives is supplemented with alternative mitigation actions.

A preliminary list of goals and objectives were provided to the key personnel at the Hazard Identification meeting. Each participant was directed to review all of the goals and objectives and provide their comments on how to make improvements or changes that would make each one specific to the needs of their community. Information from this review was used to finalize goals and objectives for each participant.

## DEVELOPMENT OF GOALS

The Mitigation Alternative meetings were open for public input to encourage greater involvement and gather additional input from other residents and outside communities. The meeting was held after the initial draft of the Plan was completed, and the findings presented therein were discussed. Using the risk assessment information, meeting attendees were able to further discuss historical hazard events, the vulnerability of their community, and the potential losses resulting from a hazard event. A sign-in sheet showing the persons who attended the meeting is shown in Appendix B. During the meeting, attendees contributed their thoughts and were guided through a process to finalize the goals and objectives.

Presented here are the final goals and objectives as selected by members of the public and key personnel. These goals and objectives provide specific direction to participants for reducing future hazard related losses. The goals and objectives were numbered merely to assist in the development and organization of mitigation actions and alternatives. Each action item is linked to a goal and objective.

**Goal 1: Protect the Health and Safety of Persons Residing within the LPSNRD Boundary Area**

(Overall purpose of Plan)

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

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

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

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

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

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

**Goal 4: Improve Emergency Management Capabilities**

**Objective 4.1**: Develop or improve community and / or county emergency response plans, procedures, and abilities.

**Objective 4.2**: Develop or improve evacuation plans and procedures.

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

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

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

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

## MITIGATION ALTERNATIVES (ACTION ITEMS)

After the establishment of each participant's goals and objectives, mitigation alternatives or action items were prioritized. This list of alternatives included each idea that was originally mentioned during the planning process. In addition, JEO provided each participant with a preliminary list of mitigation alternatives to be used as a starting point, which was organized by hazard type. Each participant was asked to individually prioritize the list of potential mitigation alternatives. The prioritized list of alternatives will help participants determine which actions will best assist their respective jurisdiction in alleviating damages in the event of a hazard occurrence. The listed priority does not indicate which actions will be implemented first, but will serve as a guide in determining what an appropriate action may be and when it should be implemented.

These mitigation alternatives are the heart of this Plan. The participants were instructed that each alternative must be directly related to the goals and objectives. Alternatives must also be specific activities that are concise and can be implemented individually. Each goal, objective, and corresponding action item is arranged by a numbering system.

Mitigation alternatives were evaluated using FEMA's recommended STAPLEE process. This process addresses all major factors when weighing the costs and benefits of implementing one action over another. Important factors to be considered when ranking the alternatives include the prohibitive costs, the community's resource capabilities, the community's desires and concerns, and the overall feasibility of the action. STAPLEE criteria were used to evaluate the potential benefits of the each participant's listing of mitigation alternatives or actions. The STAPLEE evaluation includes consideration of the social, technical,

administrative, political, legal, economic and environmental benefits of the mitigation actions, which are summarized below.

**S – Social:** Mitigation actions are acceptable to the community if they do not adversely affect a particular segment of the population, do not cause relocation of lower income people, and if they are compatible with the communities social and cultural values.

**T – Technical:** Mitigation actions are technically most effective if they provide long-term reduction of losses and have minimal secondary adverse impacts.

**A – Administrative:** Mitigation actions are easier to implement if the jurisdiction has the necessary staffing and funding.

**P – Political:** Mitigation actions can truly be successful if all stakeholders have been offered an opportunity to participate in the planning process and if there is public support of the action.

**L – Legal:** It is critical that the jurisdiction or implementing agency have the legal authority to implement and enforce a mitigation action.

**E – Economical:** Budget constraints can significantly deter the implementation of mitigation actions. Hence, it is important to evaluate whether an action is cost-effective, as determined by a cost-benefit review, and possible to fund.

**E – Environmental:** Sustainable mitigation actions that do not have an adverse effect on the environment, comply with Federal, State, and local environmental regulations, and are consistent with the community's environmental goals provide mitigation benefits while being environmentally sound.

Participants received a worksheet to assist them in scoring the priority of each alternative. Most participants took additional worksheets back to their communities. The key personnel and members attending the public meeting were asked to take into account all the STAPLEE criteria and to come up with a cumulative priority ranking that maximizes the benefits of each alternative.

The projects with the greatest benefits and lowest relative costs as determined by the STAPLEE criteria were assigned a high priority, while alternatives with lower benefits and relatively higher costs were assigned a low priority. Other alternatives with varying degrees of benefits and costs were assigned a medium priority. An example of a STAPLEE worksheet is presented in Appendix C. In the future, a more detailed and formal formulation of the costs and benefits of each mitigation alternative could be established to better prioritize the participant action items.

A final list of alternatives, or actions, was established including information on the associated hazard mitigated, and a description of the action, responsible party, priority, cost estimate, potential funding sources and timeline. This information was established through input from participants and assistance from the consultant.

It is important to note that not all of the mitigation actions identified may ultimately be included in the participant's individual plan due to limited capabilities, prohibitive costs, low benefit / cost ratio, or other concerns. Even though there are cost estimates, priority scores, and responsible agencies identified,

participants have not necessarily committed to undertaking any of the activities. This information will serve as a guide for the participants to assist in hazard mitigation for the future.

### *IMPORTANCE OF NFIP*

Source: Nebraska Department of Natural Resources 2008

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

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

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

Currently, Nebraska has 13,300 policies in force representing $1.3 billion worth of coverage.

The Community Rating System (CRS) is a new program of the NFIP. It was created as an incentive mechanism aimed at recognizing and encouraging exemplary community floodplain management that exceeds minimum NFIP standards. Flood insurance premium rates are adjusted to reflect reduced risk resulting from community activities that meet the three goals of the CRS: reducing flood losses; facilitating accurate insurance rating; and promoting the awareness of flood insurance.

The NFIP has been successful in requiring new buildings to be protected from damage by the 100-year flood. The CRS provides an incentive for communities to do more than regulate construction of new buildings to the minimum national standards. Under the CRS, flood insurance premium rates are adjusted to reflect community activities designed to reduce flood damage to existing buildings, to manage development in areas not mapped by the NFIP, to protect new buildings beyond minimum NFIP protection level, to help insurance agents obtain flood data, and to help people obtain flood insurance.

Currently, policyholders in CRS participating communities can receive discounts from their policy premiums ranging from 5 percent to 45 percent.

Each jurisdiction's participation in NFIP is listed in *Section 6: Participant Sections*. This Lower Platte South NRD Multi-Jurisdictional Hazard Mitigation Plan recommends and encourages each participant community to remain in good standing with this program and continue to be involved as a participant with NFIP. Compliance with the NFIP should remain a top priority for each participating community.

### *PARTICIPANT MITIGATION ALTERNATIVES*

The following, in Table 21 are specific actions listed by participants of the Lower Platte South NRD Hazard Mitigation Plan intended to be utilized in the implementation of mitigation alternatives. Each action is described by the following:

- Description – general summary of the action item.
- Analysis – brief summary of what the action item will accomplish.
- Goal/Objective – which goal and object the action item falls under.
- Hazard(s) Addressed – which hazard the mitigation action aims to address.
- Potential funding – a list of any potential funding mechanism used to fund the action.
- Timeline – a general timeline as established by planning participants and the planning team.
- Priority – based upon the STAPLEE process a general description of the urgency in which an action may be implemented (high/medium/low). Priority may vary between each community mostly dependent on funding capabilities and the size of the local tax base.
- Lead agency – listing of agencies which may lead the implementation of the action item.

Implementation of actions will vary between individual plan participants based upon the availability of existing information (such as drainage studies), funding opportunities and limitations, and administrative capabilities of smaller communities. The information listed below is a consensus of all planning participants and variation from one participant to another will be present. Establishment of a cost-benefit analysis is out of the scope of this plan and could potentially be completed prior to submittal of a project grant application or as part of a 5-year update.

Every participating jurisdiction in this plan can pursue project grant applications for any of the actions listed as all of the actions fall under the goals and objectives of this plan. Tables 22 and 23 on the following pages indicate which actions were selected as highly favorable by each participant for their respective jurisdiction during the planning process. The actions listed in Table 21 are linked to those in Tables 22 and 23 by their action number.

**Table 21: Lower Platte South NRD Action Items**

| **ACTION 2.1.1** | **Backup Generators** |
|---|---|
| Analysis | Provide a portable or stationary source of backup power to redundant power supplies, municipal wells, lift stations, and other critical facilities and shelters. |
| Goal/Objective | Goal 2/Objective 2.1 |
| Hazard(s) Addressed | Tornados and high winds, severe winter storms, severe thunderstorms |
| Estimated Cost | $15,000-$30,000 per generator |
| Potential Funding | HMGP, LPSNRD, Governing County & Local Governing Agency |
| Timeline | 1 year |
| Priority | High |
| Lead Agency | Local Governing Agency, Emergency Management |

| **ACTION 2.1.2** | **Storm Shelter / Safe Rooms** |
|---|---|
| Analysis | Design and construct storm shelters and safe rooms in highly vulnerable areas such as mobile home parks, campgrounds, school, and other areas. |
| Goal/Objective | Goal 2/Objective 2.1 |
| Hazard(s) Addressed | Tornados and high winds, severe thunderstorms |
| Estimated Cost | $200-$300/sf stand alone; $150-200/sf addition/retrofit |
| Potential Funding | PDM, HMPG, LPSNRD, Governing County & Local Governing Agency |
| Timeline | Ongoing |
| Priority | High |
| Lead Agency | Local Governments, Emergency Management |

| ACTION 2.1.3 | New Municipal Well |
|---|---|
| Analysis | 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. |
| Goal/Objective | Goal 2/Objective 2.1 |
| Hazard(s) Addressed | Drought |
| Estimated Cost | $350,000 to $450,000 |
| Potential Funding | Community Development Block Grant (CDBG), State Revolving Fund (SRF), LPSNRD, Governing County & Local Governing Agency |
| Timeline | Three to six months |
| Priority | Medium |
| Lead Agency | Local Governments |

| ACTION 2.1.4 | Power and Service Lines |
|---|---|
| Analysis | 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 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. |
| Goal/Objective | Goal 2/Objective 2.1 |
| Hazard(s) Addressed | Tornados and high winds, severe winter storms, severe thunderstorms |
| Estimated Cost | $70,000/mile |
| Potential Funding | HMGP, PDM, LPSNRD, Governing County & Local Governing Agency |
| Timeline | 5 years |
| Priority | Medium |
| Lead Agency | Local Public Power District/ Local Electric Dept., Local governments |

| ACTION 2.1.5 | NFIP Repetitive Loss Structure Removal/Acquisition |
|---|---|
| Analysis | Implement projects such as property acquisition, relocation, demolition, or elevation of the one existing repetitive loss structure located in the City/Village |
| Goal/Objective | Goal 2/Objective 2.1 |
| Hazard(s) Addressed | Flooding |
| Estimated Cost | Dependent upon market value of the structure |
| Potential Funding | HMGP, PDM, Flood Mitigation Assistance, Severe Repetitive Loss, Repetitive Flood Claims, LPSNRD, Governing County & Local Governing Agency |
| Timeline | Ongoing |
| Priority | High |
| Lead Agency | The City/Village, Lower Platte South NRD |

| ACTION 2.1.6 | Construct/ Update Snow Fences |
|---|---|
| Analysis | Construct snow fences to protect main transportation routes and critical facilities from excessive snow drifting and road closure. |
| Goal/Objective | Goal 2/Objective 2.1 |
| Hazard(s) Addressed | Severe winter storms |
| Estimated Cost | $1,000+ |
| Potential Funding | HMGP, LPSNRD, Governing County & Local Governing Agency |
| Timeline | Ongoing |
| Priority | Medium |
| Lead Agency | Local Governments |

| ACTION 2.1.7 | Levee/ Floodwall Construction and/or Improvements |
|---|---|
| Analysis | Levees and floodwalls serve to provide flood protection to businesses and residents during large storm events. Improvements to existing levees and floodwalls will increase flood protection. If possible, the structure may be designed to FEMA standards to provide 100-year flood protection providing additional flood insurance benefits. |
| Goal/Objective | Goal 2/Objective 2.1 |
| Hazard(s) Addressed | Flooding |
| Estimated Cost | $500,000+ |
| Potential Funding | USACE, HMGP, PDM , LPSNRD, Governing County & Local Governing Agency |
| Timeline | Five years |
| Priority | High |
| Lead Agency | Local Governments, Lower Platte South NRD |

| ACTION 2.1.8 | River/ Stream Bank Stabilization |
|---|---|
| Analysis | Bank degradation is occurring 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. Channel stabilization can protect structures, increase conveyance and provide flooding benefits. |
| Goal/Objective | Goal 2/Objective 2.1 |
| Hazard(s) Addressed | Flooding |
| Estimated Cost | $50,000+ |
| Potential Funding | HMGP, PDM, LPSNRD, Governing County & Local Governing Agency |
| Timeline | Three to five years |
| Priority | Medium |
| Lead Agency | Local Governments, Lower Platte South NRD |

| ACTION 2.1.9 | Grade Control Structures |
|---|---|
| Analysis | Stream bed degradation has occurring along many rivers and creeks. Grade control structures including sheet-pile weirs, rock weirs, ponds, road dams, etc. can be implemented to maintain the channel bed. Stream bed/grade stabilization can protect structures, prevent down cutting and provide flooding benefits. |
| Goal/Objective | Goal 2/Objective 2.1 |
| Hazard(s) Addressed | Flooding |
| Estimated Cost | $50,000 to 100,000 per site |
| Potential Funding | USACE, PDM, HMGP , LPSNRD, Governing County & Local Governing Agency |
| Timeline | Five years |
| Priority | Medium |
| Lead Agency | Lower Platte South Natural Resource District |

| ACTION 2.1.10 | Stormwater System and Drainage Improvements |
|---|---|
| Analysis | Larger communities generally utilize underground stormwater systems comprising of pipes and inlets to convey runoff. Undersized systems can contribute to localized flooding. Stormwater system improvements may include pipe upsizing and additional inlets. These improvements can serve to more effectively convey runoff within cities and towns, preventing interior localized flooding. Retention and detention facilities may also be implemented to decrease runoff rates while also decreasing the need for other stormwater system improvements.<br><br>Smaller communities may utilize stormwater systems comprising of ditches and culverts to convey runoff. Undersized systems can contribute to localized flooding. Drainage improvements may include ditch upsizing, ditch cleanout and culvert improvements. These improvements can serve to more effectively convey runoff within villages, preventing interior localized flooding. |
| Goal/Objective | Goal 2/Objective 2.1 |
| Hazard(s) Addressed | Flooding |
| Estimated Cost | $10,000-$50,000 for smaller communities, $100,000+ for larger |
| Potential Funding | HMGP, PDM, CDBG, LPSNRD, Governing County & Local Governing Agency |
| Timeline | One to ive years |
| Priority | Medium |
| Lead Agency | Local governments |

| ACTION 2.1.11 | GPS System |
|---|---|
| Analysis | Purchase GPS system to keep records of infrastructure, floodplains, utilities, disasters, etc. |
| Goal/Objective | Goal 2/Objective 2.1 |
| Hazard(s) Address | All |
| Estimated Cost | Varies depending on system |
| Potential Funding | Village of Bennet |
| Timeline | Immediate |
| Priority | Low |
| Lead Agency | Bennet Rural Fire District |

| ACTION 2.1.12 | New Water Towers |
|---|---|
| Analysis | New water towers to be constructed with tornado and earthquake design specifications. This will ensure water supply will not be cut off in the event of a tornado or earthquake. |
| Goal/Objective | Goal 2/Objective 2 |
| Hazard(s) Address | Tornados and High Winds, and Earthquakes |
| Estimated Cost | $500,000 |
| Potential Funding | LPSNRD, Governing County & Local Governing Agency |
| Timeline | 5 years |
| Priority | High |
| Lead Agency | Governing County & Local Governing Agency |

| ACTION 2.1.13 | Central Sewer System |
|---|---|
| Analysis | A new or revitalized central sewer system combines sewer treatment for residents minimizing the impact a flood could have on many smaller sewer systems |
| Goal/Objective | Goal 2/Objective 2.1 |
| Hazard(s) Address | Flooding |
| Estimated Cost | Varies |
| Potential Funding | Cass County SID#1 |
| Timeline | Varies |
| Priority | Medium |
| Lead Agency | Cass County SID #1 |

| ACTION 2.1.14 | Cass County SID #1 Levee Improvement Project |
|---|---|
| Analysis | A design and construction of an improved levee around Cass County SID #1/ Lake Waconda would help protect the community from flooding. It's recommended that any changes be made in accordance to FEMA levee certification standards. |
| Goal/Objective | Goal 2/Objective 2.1 |
| Hazard(s) Address | Flooding |
| Estimated Cost | Varies |
| Potential Funding | US Army Corps of Engineers, DNR, LPSNRD, Cass County, Cass County SID #1/ Lake Waconda |
| Timeline | 2 years |
| Priority | High |
| Lead Agency | Cass County SID #1/ Lake Waconda |

| ACTION 2.1.15 | Anchor fertilizer, fuel and propane tanks |
|---|---|
| Analysis | Anchor fuel tanks to prevent movement. If left unanchored, tanks could present a major threat to property and safety in a tornado or high wind event. |
| Goal/Objective | Goal 2/Objective 2.1 |
| Hazard(s) Address | Tornados and High Winds |
| Estimated Cost | $1,000 plus |
| Potential Funding | PDM, HMGP, LPSNRD, Governing County & Local Governing Agency |
| Timeline | 2 years |
| Priority | High |
| Lead Agency | Governing County & Local Governing Agency , Residents and Fuel Suppliers |

| ACTION 2.1.16 | Wood chipper |
|---|---|
| Analysis | Buy a new chipper to help rid Village of debris. Debris left behind from a severe weather event pose a threat to safety in the case that another severe event happens before the debris is cleared. |
| Goal/Objective | Goal 2/Objective 2.1 |
| Hazard(s) Address | Tornado and high winds, severe thunderstorm, severe winter storm |
| Estimated Cost | $3,000 plus |
| Potential Funding | PDM, HMGP, Eagle, Cass County |
| Timeline | 3 years |
| Priority | Low |
| Lead Agency | Village of Eagle |

| ACTION 2.1.17 | Well System Improvements |
|---|---|
| Analysis | Improve Village well system to provide water to residents during drought or high water demands |
| Goal/Objective | Goal 2/Objective 2.1 |
| Hazard(s) Address | All Hazards |
| Estimated Cost | $100,000 plus |
| Potential Funding | CDBG, SRF, LPSNRD, Hallam, Lancaster County |
| Timeline | 3 years |
| Priority | High |
| Lead Agency | Village of Hallam |

| ACTION 2.1.18 | Bury waterlines |
|---|---|
| Analysis | Re-bury or deepen waterlines in danger of washing out. This will ensure that water supply is not cut off in the event of a flood. |
| Goal/Objective | Goal 2/Objective 2.1 |
| Hazard(s) Address | Flooding |
| Estimated Cost | Varies depending on community and size of pipes |
| Potential Funding | PDM, NEMA, LPSNRD, Lancaster County Rural Water District#1, Lancaster County |
| Timeline | 3 Years |
| Priority | High |
| Lead Agency | Lancaster County Rural Water District#1 |

| ACTION 2.1.19 | Underground Water Storage |
|---|---|
| Analysis | Underground water storage minimizes effects of tornadoes, high winds, severe thunderstorms and severe winter storms as the storage tank is protected |
| Goal/Objective | Goal 2/Objective 2.1 |
| Hazard(s) Address | Severe Winter Storm, Severe Thunderstorms, Tornados and High Winds |
| Estimated Cost | $30,000+ |
| Potential Funding | PDM, NEMA, Lancaster County Rural Water District#1, Lancaster County |
| Timeline | 1 Year |
| Priority | High |
| Lead Agency | Lancaster County Rural Water District#1 |

| ACTION 2.1.20 | Project at Beal Slough at 40th Street |
|---|---|
| Analysis | Near 40th Street to reduce flood elevations by increasing peak discharge conveyance through 40th Street, Highway 2, and the BNSF Railway Bridge. Conveyance improvements to include construction of a supplemental box culvert beneath 40th Street, channel improvements between 40th Street and Highway 2, and construction of a concrete channel liner beneath the Highway 2 and BNSF bridges. This 40th Street project may also include an off-line detention facility and bypass channel downstream of the BNSF bridge. (Phase 1 & 2, Beal Slough at 40th Street, Flood Reduction Study, November 2007) |
| Goal/Objective | Goal 2/Objective 2.1 |
| Hazard(s) Address | Flooding |
| Estimated Cost | $1,400,000 |
| Potential Funding | PDM, HMGP, Lincoln, State of Nebraska, LPSNRD, NEMA |
| Timeline | Consideration pending the availability of future funding |
| Priority | Low |
| Lead Agency | Watershed Management, LPSNRD |

| ACTION 2.1.21 | Project at Beal Slough at 14th Street |
|---|---|
| Analysis | Near 14th Street to decrease flood elevations by implementing a package of conveyance improvements. Improvements near 14th Street to include construction of a diversion channel around a BNSF Railway spur track, channel improvements to Beal Slough, and replacement of the existing 14th Street bridge to increase conveyance capacity. (Preliminary Flood Reduction Study, Beal Slough - Pioneers Boulevard to Southwood Drive, July 26, 2006) |
| Goal/Objective | Goal 2/Objective 2.1 |
| Hazard(s) Address | Flooding |
| Estimated Cost | $7,325,000 |
| Potential Funding | PDM, HMGP, Lincoln, State of Nebraska, LPSNRD, NEMA |
| Timeline | Consideration pending the availability of future funding |
| Priority | Very High |
| Lead Agency | Watershed Management, LPSNRD |

| ACTION 2.1.22 | Flood Reduction at Antelope Creek |
|---|---|
| Analysis | Flood reduction project along Antelope Creek from 40th Street downstream through 27th Street. This project involves widening 1,450 feet of the channel with a "lower shelf" on the left bank, reconstruction of the existing bike trail, installation of 2 box culverts at the "A" Street crossing, and creation of a dry detention cell in Antelope Park. (Preliminary Flood Reduction Study, Antelope Creek, South 27th Street to South 56th Street, Lincoln, Nebraska, Alternative 4 p. 32) |
| Goal/Objective | Goal 2/Objective 2.1 |
| Hazard(s) Address | Flooding |
| Estimated Cost | $2,747,000 |
| Potential Funding | PDM, HMGP, Lincoln, State of Nebraska, LPSNRD, NEMA |
| Timeline | 2 years |
| Priority | High |
| Lead Agency | Watershed Management |

| ACTION 2.1.23 | Antelope Creek Project Near A Street |
|---|---|
| Analysis | Antelope Creek project near A Street. This project would add two box culverts at A Street bridge, realign the Billy Wolff bicycle trail, and improve the channel for 1450 linear feet downstream. (Preliminary Flood Reduction Study, Antelope Creek, South 27th Street to South 56th Streets, section 3.1) |
| Goal/Objective | Goal 2/Objective 2.1 |
| Hazard(s) Address | Flooding |
| Estimated Cost | Not yet available |
| Potential Funding | PDM, HMGP, Lincoln, State of Nebraska, LPSNRD, NEMA |
| Timeline | 1 year |
| Priority | High |
| Lead Agency | LPSNRD |

| ACTION 2.1.24 | Antelope Creek Dry Detention Project |
|---|---|
| Analysis | Antelope Creek Dry Detention Project in Antelope Park to reduce flooding by adding a 2.2 acre detention cell to temporarily store a portion of the flow from a tributary to Antelope Creek. (Preliminary Flood Reduction Study, Antelope Creek, South 27th Street to South 56th Streets, section 3.3) |
| Goal/Objective | Goal 2/Objective 2.1 |
| Hazard(s) Address | Flooding |
| Estimated Cost | Not yet available |
| Potential Funding | PDM, HMGP, Lincoln, State of Nebraska, LPSNRD, NEMA |
| Timeline | 2 years |
| Priority | High |
| Lead Agency | LPSNRD |

| ACTION 2.1.25 | Channel Improvement at Cornhusker Highway |
|---|---|
| Analysis | Channel improvement project to correct the effects of channel constrictions near Cornhusker Highway. This project would involve 3 separate locations where the constriction of flow will be alleviated by increasing the width of the stream channel, creating a two stage channel which allows the smaller stream forming flow to meander within the larger flood channel. Other improvements would be to replace crossing structures with larger capacity structures. (DMR Master Plan, section 8.4.1.1) |
| Goal/Objective | Goal2/Objective 2.1 |
| Hazard(s) Address | Flooding |
| Estimated Cost | $8,304,000 |
| Potential Funding | PDM, HMGP, Lincoln, State of Nebraska, LPSNRD, NEMA |
| Timeline | Consideration pending the availability of future funding |
| Priority | High |
| Lead Agency | Watershed Management |

| ACTION 2.1.26 | Channel Improvements at UNL East Campus |
|---|---|
| Analysis | Channel improvement project on University of Nebraska East Campus. This project would involve two areas where channel constriction would be relieved by implementing a terraced section using natural stone and native plantings. Other improvements would be continuation of stream stabilization improvements performed by the City and LPSNRD. (DMR Master Plan section 8.4.1.2) |
| Goal/Objective | Goal 2/Objective 2.1 |
| Hazard(s) Address | Flooding |
| Estimated Cost | $9,198,000 |
| Potential Funding | PDM, HMGP, Lincoln, State of Nebraska, LPSNRD, NEMA |
| Timeline | Consideration pending the availability of future funding |
| Priority | High |
| Lead Agency | Watershed Management |

| ACTION 2.1.27 | Channel Improvements University Place Park |
|---|---|
| Analysis | Channel improvement project at University Place Park to improve channel by widening it with flood benches and replacing the pedestrian crossing as well as the bridge that extends beneath 48th Street. (DMR Master Plan, section 8.4.1.3) |
| Goal/Objective | Goal 2/Objective 2.1 |
| Hazard(s) Address | Flooding |
| Estimated Cost | $2,474,000 |
| Potential Funding | PDM, HMGP, Lincoln, State of Nebraska, LPSNRD, NEMA |
| Timeline | Consideration pending the availability of future funding |
| Priority | High |
| Lead Agency | Watershed Management |

| ACTION 2.1.28 | Channel Improvements at 52nd Street |
|---|---|
| Analysis | Channel improvement project from 52nd Street to 56th Street involves widening the channel by 20 feet on each side, improving the bridge at 52nd Street, and replacing culverts at 56th Street with a bridge. (DMR Master Plan, section 8.4.1.4) |
| Goal/Objective | Goal 2/Objective 2.1 |
| Hazard(s) Address | Flooding |
| Estimated Cost | $7,764,000 |
| Potential Funding | PDM, HMGP, Lincoln, State of Nebraska, LPSNRD, NEMA |
| Timeline | Consideration pending the availability of future funding |
| Priority | High |
| Lead Agency | Watershed Management |

| ACTION 2.1.29 | Storm Water Detention Project |
|---|---|
| Analysis | Stormwater detention project upstream of 56th Street. This project will create off-line dry detention cells to reduce flood flows by temporarily storing flood waters during severe rain storms. (DMR Master Plan section 8.4.2.1) |
| Goal/Objective | Goal 2/Objective 2.1 |
| Hazard(s) Address | Flooding |
| Estimated Cost | $2,932,000 |
| Potential Funding | PDM, HMGP, Lincoln, State of Nebraska, LPSNRD, NEMA |
| Timeline | Consideration pending the availability of future funding |
| Priority | High |
| Lead Agency | Watershed Management |

| ACTION 2.1.30 | Storm Water Detention at Taylor Park Near 66th |
|---|---|
| Analysis | Stormwater detention project in Taylor Park near 66th and Taylor Park Drive. This project would enhance the functionality of the park using walking trails and trees. (DMR Master Plan 8.4.2.2) |
| Goal/Objective | Goal 2/Objective 2.1 |
| Hazard(s) Address | Flooding |
| Estimated Cost | $1,440,000 |
| Potential Funding | PDM, HMGP, Lincoln, State of Nebraska, LPSNRD, NEMA |
| Timeline | Consideration pending the availability of future funding |
| Priority | High |
| Lead Agency | Watershed Management |

| ACTION 2.1.31 | Seacrest Park Berm |
|---|---|
| Analysis | Seacrest Park Berm Project would include raising an inadequate existing earth berm by approximately 2 feet to provide additional protection. (DMR Master Plan 8.4.2.3) |
| Goal/Objective | Goal 2/Objective 2.1 |
| Hazard(s) Address | Flooding |
| Estimated Cost | $19,000 |
| Potential Funding | PDM, HMGP, Lincoln, State of Nebraska, LPSNRD, NEMA |
| Timeline | Consideration pending the availability of future funding |
| Priority | High |
| Lead Agency | Watershed Management |

| ACTION 2.1.32 | Ditch at 56th Street |
|---|---|
| Analysis | Project on N. 56th Street ditch in the vicinity of Fletcher Street. Adjacent businesses have been flooded twice in the last five years ( 7/10/03 & 6/18/08) |
| Goal/Objective | Goal 2/Objective 2.1 |
| Hazard(s) Address | Flooding |
| Estimated Cost | $1,000,000 |
| Potential Funding | PDM, HMGP, Lincoln, State of Nebraska, LPSNRD, NEMA |
| Timeline | Consideration pending the availability of future funding |
| Priority | High |
| Lead Agency | Watershed Management |

| ACTION 2.1.33 | Middle Creek Project |
|---|---|
| Analysis | Middle Creek flood control project to reduce peak flow from Middle Creek to lower flooding level in Salt Creek. Flooding from Salt Creek threatens several hundred homes and businesses in Lincoln including the downtown area. |
| Goal/Objective | Goal 2/Objective 2.1 |
| Hazard(s) Address | Flooding |
| Estimated Cost | Not yet available |
| Potential Funding | PDM, HMGP, Lincoln, State of Nebraska, LPSNRD, NEMA |
| Timeline | Consideration pending the availability of future funding |
| Priority | Medium |
| Lead Agency | Watershed Management, LPSNRD |

| ACTION 2.1.34 | Oak Creek Project |
|---|---|
| Analysis | Oak Creek flood control project to reduce peak flow from Oak Creek. This will reduce flooding in Oak Creek and the adjacent airport as well as lower flooding levels in Salt Creek. Flooding from Salt Creek threatens several hundred homes and businesses in Lincoln including the downtown area. |
| Goal/Objective | Goal 2/Objective 2.1 |
| Hazard(s) Address | Flooding |
| Estimated Cost | Not yet available |
| Potential Funding | PDM, HMGP, Lincoln, State of Nebraska, LPSNRD, NEMA |
| Timeline | Consideration pending the availability of future funding |
| Priority | Medium |
| Lead Agency | LPSNRD |

| ACTION 2.1.35 | Oak Creek Flood Control |
|---|---|
| Analysis | Oak Creek flood control protection. This project is to increase the protection level of a non-certified levee fro the airport and nearby national guard base. This is associated with the Oak Creek Flood Control Project. |
| Goal/Objective | Goal 2/Objective 2.1 |
| Hazard(s) Address | Flooding |
| Estimated Cost | Not yet available |
| Potential Funding | PDM, HMGP, Lincoln, State of Nebraska, LPSNRD, NEMA |
| Timeline | Consideration pending the availability of future funding |
| Priority | High |
| Lead Agency | LPSNRD |

| ACTION 2.1.36 | Storm Drainage 11th and Harrison |
|---|---|
| Analysis | 11th and Harrison urban storm drainage project. This project is to repair, rehabilitate and enhance an existing urban drainage system to alleviate localized flooding. This system has been constructed in stages from 1915 to 1978. |
| Goal/Objective | Goal 2/Objective 2.1 |
| Hazard(s) Address | Flooding |
| Estimated Cost | $1,300,000 |
| Potential Funding | PDM, HMGP, Lincoln, State of Nebraska, LPSNRD, NEMA |
| Timeline | Consideration pending the availability of future funding |
| Priority | Medium |
| Lead Agency | Watershed Management |

| ACTION 2.1.37 | Storm Drainage 33rd Street |
|---|---|
| Analysis | 33rd Street from Holdrege to Baldwin urban storm drainage project. This project is to repair, rehabilitate and enhance an existing urban drainage system to alleviate localized flooding. This system has been constructed in stages from 1932 to 1983. |
| Goal/Objective | Goal 2/Objective 2.1 |
| Hazard(s) Address | Flooding |
| Estimated Cost | $471,000 |
| Potential Funding | PDM, HMGP, Lincoln, State of Nebraska, LPSNRD, NEMA |
| Timeline | Consideration pending the availability of future funding |
| Priority | Medium |
| Lead Agency | Watershed Management |

| ACTION 2.1.38 | Emergency Electrical Generator for Wastewater Treatment Plant |
|---|---|
| Analysis | Installation of emergency electrical generators at the Theresa Street Wastewater Treatment Plant to provide emergency backup power for wastewater treatment. |
| Goal/Objective | Goal 2/Objective 2.1 |
| Hazard(s) Address | Flooding |
| Estimated Cost | $250,000 design, $1,008,000 construction |
| Potential Funding | PDM, HMGP, Lincoln, State of Nebraska, LPSNRD, NEMA |
| Timeline | 2011-2014 |
| Priority | High |
| Lead Agency | Waste Water |

| ACTION 2.1.39 | Levee at Theresa Street |
|---|---|
| Analysis | Installation of a levee around the Theresa Street Waste Water Treatment Plant to protect it from flooding from Salt Creek. |
| Goal/Objective | Goal 2/Objective 2.1 |
| Hazard(s) Address | Flooding |
| Estimated Cost | $250,000 design, $1,008,000 construction |
| Potential Funding | PDM, HMGP, Lincoln, State of Nebraska, LPSNRD, NEMA |
| Timeline | 2017-2019 |
| Priority | High |
| Lead Agency | Waste Water |

| ACTION 2.1.40 | Protecting the Water Treatment facility |
|---|---|
| Analysis | Protect the new water treatment facility from flooding as flooding can damage the water treatment facility and affect the amount of water produced. |
| Goal/Objective | Goal 2/Objective 2.1 |
| Hazard(s) Address | Flooding, Drought |
| Estimated Cost | Varies |
| Potential Funding | PDM, HMGP, City of Louisville, Cass County, LPSNRD |
| Timeline | Immediate |
| Priority | High |
| Lead Agency | City of Louisville |

| ACTION 2.1.41 | Repair Elk Creek Road Ponds |
|---|---|
| Analysis | Repair the small ponds behind Elk Creek Road outside of town. Ponds were built in 1939 by the Federal Workers Project Administration and are silted in and deteriorating. These repairs will decrease localized flooding. |
| Goal/Objective | Goal 2/Objective 2.1 |
| Hazard(s) Address | Flooding |
| Estimated Cost | $5,000 plus |
| Potential Funding | Flood Mitigation Assistance Program, PDM, NEMA, Village of Malcolm, Lancaster County |
| Timeline | On-going identification, Design and Construction: 2 years |
| Priority | High |
| Lead Agency | Village of Malcolm, Lower Platte South NRD |

| ACTION 2.1.42 | Pave Streets and Storm Sewers |
|---|---|
| Analysis | Paving Streets and Storm Sewers. Curb, gutter and asphalt to streets in original downtown area of the Village. Having streets paved in combination of new storm sewers lessens the effects of flooding as the streets and pipes can convey water out of town. |
| Goal/Objective | Goal 2/Objective 2.1 |
| Hazard(s) Address | Flooding |
| Estimated Cost | Varies |
| Potential Funding | Village of Malcom, LPSNRD, Lancaster County |
| Timeline | 2-5 Years |
| Priority | High |
| Lead Agency | Village of Malcolm, Village Board |

| ACTION 2.1.43 | Improve Influent Pipe |
|---|---|
| Analysis | Improve influent pipe from town to wastewater plant. Pipe goes across creek and could break at high flows. Improvements would ensure water supply to community in the event of a flood. |
| Goal/Objective | Goal 2/Objective 2.1 |
| Hazard(s) Address | Flooding |
| Estimated Cost | varies |
| Potential Funding | Flood Mitigation Assistance Program, PDM, NEMA, Village of Malcolm, Lancaster County |
| Timeline | 2 years |
| Priority | High |
| Lead Agency | Village of Malcolm |

| ACTION 2.1.44 | Piening Flood Control Structure |
|---|---|
| Analysis | Design and construct a flood control structure to help reduce flood damages downstream during a rainstorm event. Structure could be designed for recreation to provide social and economic benefits. |
| Goal/Objective | Goal 2/Objective 2.1 |
| Hazard(s) Address | Flooding |
| Estimated Cost | $200,000 |
| Potential Funding | FMA, PDM, HMGP, NEMA, LPSNRD, Cass County, US Army Corps of Engineers, DNR |
| Timeline | 2 years |
| Priority | High |
| Lead Agency | LPSNRD |

| ACTION 2.1.45 | NW70th Flood Control Structure |
|---|---|
| Analysis | Design and construct a flood control structure to help reduce flood damages downstream during a rainstorm event. Structure could be designed for recreation to provide social and economic benefits. |
| Goal/Objective | Goal 2/Objective 2.1 |
| Hazard(s) Address | Flooding |
| Estimated Cost | $300,000 |
| Potential Funding | City of Lincoln, Lancaster County |
| Timeline | 2 years |
| Priority | High |
| Lead Agency | LPSNRD |

| ACTION 2.1.46 | Gaebel Flood Control Structure |
|---|---|
| Analysis | Design and construct a flood control structure to help reduce flood damages downstream during a rainstorm event. Structure could be designed for recreation to provide social and economic benefits. |
| Goal/Objective | Goal 2/Objective 2.1 |
| Hazard(s) Address | Flooding |
| Estimated Cost | $200,000 |
| Potential Funding | LPSNRD |
| Timeline | 2 years |
| Priority | Medium |
| Lead Agency | LPSNRD |

| ACTION 2.1.47 | Rural Fire Station with Storm Shelter |
|---|---|
| Analysis | Construct a Rural Fire Station and include storm shelters in its design and construction. Storm shelters combined with a fire station not only provide protection to the residents but also provides an efficient way to house emergency operations out of. |
| Goal/Objective | Goal 2/Objective2.1 |
| Hazard(s) Address | All Hazards |
| Estimated Cost | $80,000 - $100,000 per square foot |
| Potential Funding | Various CDBG, HMGP |
| Timeline | 5 to 10 years |
| Priority | High |
| Lead Agency | Village of Panama |

| ACTION 2.1.48 | Channel Infiltration |
|---|---|
| Analysis | Convert concrete-lined channels to natural channels to promote infiltration. Infiltration lessens the amount of water that can cause flooding. |
| Goal/Objective | Goal 2/Objective 2.1 |
| Hazard(s) Address | Flooding |
| Estimated Cost | Varies depending on size |
| Potential Funding | HMGP, Flood Mitigation Assistance Program, PDM, NEMA, City of Waverly, Lancaster County |
| Timeline | 2 years |
| Priority | Medium |
| Lead Agency | City of Waverly |

| ACTION 2.1.49 | Water System Improvements |
|---|---|
| Analysis | Water system improvements to include additional fire hydrants/increase supply and pressure. High pressure is needed in the event of an emergency to effectively fight fires. |
| Goal/Objective | Goal 2/Objective 2.1 |
| Hazard(s) Address | All Hazards |
| Estimated Cost | $50,000 plus |
| Potential Funding | CDGB, SRF, LPSNRD, Governing County & Local Governing Agency |
| Timeline | On-going |
| Priority | Low |
| Lead Agency | LPSNRD, Governing County & Local Governing Agency |

| ACTION 2.1.50 | Central Utility Plant at Department of Corrections |
|---|---|
| Analysis | At the Central utility plant at the department of corrections, where power comes in at, build a floodwall around the facility and build flood gates |
| Goal/Objective | Goal 2/Objective 2.1 |
| Hazard(s) Address | Flooding |
| Estimated Cost | $800,000 |
| Potential Funding | PDM, HMGP, Lincoln, State of Nebraska, LPSNRD, NEMA |
| Timeline | 2 Years |
| Priority | High |
| Lead Agency | LPSNRD, Governing County & Local Governing Agency |

| ACTION 2.2.1 | Drainage Study / Stormwater Master Plan |
|---|---|
| Analysis | Drainage studies can be conducted to identify and prioritize improvements to address site specific localized flooding/drainage problems. Stormwater master plans can be conducted to perform a community-wide stormwater evaluation, identifying multiple problem areas, and potentially multiple drainage improvements for each. |
| Goal/Objective | Goal 2/Objective 2.2 |
| Hazard(s) Addressed | Flooding |
| Estimated Cost | $10,000 to $1000,000+ |
| Potential Funding | CDBG, LPSNRD, Governing County & Local Governing Agency |
| Timeline | One to three years |
| Priority | Medium |
| Lead Agency | Local governments, City Emergency Management |

| ACTION 2.2.2 | Flood-Prone Property Acquisition |
|---|---|
| Analysis | 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 NFIP. |
| Goal/Objective | Goal 2/Objective 2.2 |
| Hazard(s) Addressed | Flooding |
| Estimated Cost | Varies |
| Potential Funding | HMGP, PDM, CDBG, USACE, FMA, SRL, RLC, LPSNRD, Governing County & Local Governing Agency |
| Timeline | One to two years |
| Priority | High |
| Lead Agency | Local governments, LPSNRD |

| ACTION 2.2.3 | Source Water Contingency Plan |
|---|---|
| Analysis | Villages and cities can evaluate and locate new sources of groundwater to ensure adequate supplies to support the existing community and any additional growth which may occur. |
| Goal/Objective | Goal 2/Objective 2.2 |
| Hazard(s) Addressed | Drought |
| Estimated Cost | $500,000+ |
| Potential Funding | CDBG, SRF, NDEQ, LPSNRD, Governing County & Local Governing Agency |
| Timeline | Five years |
| Priority | Low |
| Lead Agency | Local Governments |

| ACTION 2.2.4 | Geographical Information System (GIS) |
|---|---|
| Analysis | Acquire GIS to relocate municipal infrastructure (water & sewer lines). Having infrastructure in GIS is effective in being able to keep track of and assess deficiencies. |
| Goal/Objective | Goal 2/Objective 2.2 |
| Hazard(s) Address | All |
| Estimated Cost | $5,000-$10,000 |
| Potential Funding | Village of Benent |
| Timeline | Immediate |
| Priority | Low |
| Lead Agency | Municipal Government |

| ACTION 2.2.5 | Suspend Water Use Permits |
|---|---|
| Analysis | Suspend water use permits would allow more water to flow downstream to areas that need it in the event of a drought |
| Goal/Objective | Goal 2/Objective 2.2 |
| Hazard(s) Address | Drought |
| Estimated Cost | N/A |
| Potential Funding | Lancaster County SID # 6, LPSNRD |
| Timeline | 1-2 years |
| Priority | High |
| Lead Agency | Lancaster County SID # 6 |

| ACTION 2.2.6 | Emergency Power Contingency Plan |
|---|---|
| Analysis | Development and implementation of an Emergency Power Contingency Plan for the Lincoln Water System. (A comprehensive study and installation of back-up power at critical locations. This will provide the ability to remain operational for minimum water demands and fire suppression in the City of Lincoln.) |
| Goal/Objective | Goal 2/Objective 2.2 |
| Hazard(s) Address | Severe Thunderstorm, Severe Winter Storm, Flooding, Drought, Extreme Heat |
| Estimated Cost | Not yet available |
| Potential Funding | PDM, HMGP, Lincoln, State of Nebraska, LPSNRD, NEMA |
| Timeline | 2 years |
| Priority | Very High |
| Lead Agency | Water Department |

| ACTION 2.2.7 | Implementation of Watershed Master Plan Projects |
|---|---|
| Analysis | Deadman's Run Watershed Master Plan in conjunction with the City of Lincoln to develop potential projects and prioritize these projects to address flooding and drainage deficiencies in the Deadman's Run watershed. Prioritization of projects is essential to effective implementation of these projects in a timely manor. A master plan could compare benefits to cost and take into account many factors to determine which projects should be completed before others. |
| Goal/Objective | Goal 2/Objective 2.2 |
| Hazard(s) Address | Flooding |
| Estimated Cost | $50 Million |
| Potential Funding | NFIP, FMA, PDM, HMGP, NEMA, County, LPSNRD, City of Lincoln, ACOE, State of Nebraska, NRDF |
| Timeline | 12 years |
| Priority | High |

| ACTION 2.2.8 | UV Water Treatment System for Plant |
|---|---|
| Analysis | A UV disinfectant Water Treatment System for Plant can ensure water is clean for public health and safety. This water can be used in the event of any hazard occurring. |
| Goal/Objective | Goal 2/Objective 2.2 |
| Hazard(s) Address | All |
| Estimated Cost | $200,000-250,000 |
| Potential Funding | SRF, CDBG, LPSNRD, Weeping Water, Cass County |
| Timeline | 2 years |
| Priority | Low |
| Lead Agency | City of Weeping Water |

| ACTION 2.3.1 | Tree City USA – Tree Maintenance Programs |
|---|---|
| Analysis | Work to become a Tree City USA through the National Arbor Day Foundation in order to receive direction, technical assistance, and public education on how to establish a tree maintenance program in order to maintain trees in a community to limited potential damages 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. |
| Goal/Objective | Goal 2/Objective 2.3 |
| Hazard(s) Addressed | Severe thunderstorms, tornados and high winds, severe winter storms |
| Estimated Cost | $0-$1,000+ |
| Potential Funding | Arbor Day Foundation, US Forest Service, LPSNRD, Governing County & Local Governing Agency |
| Timeline | Ongoing |
| Priority | High |
| Lead Agency | Local Governments |

| ACTION 2.3.2 | Participate in the Community Rating System (CRS) |
|---|---|
| Analysis | Participation in the CRS, part of the NFIP, can provide a movement for the community to undertake a number of projects and activities designed to increase the flooding mitigation efforts. Participation in CRS can help reduce flood insurance premiums. |
| Goal/Objective | Goal 2/Objective 2.3 |
| Hazard(s) Addressed | Flooding |
| Estimated Cost | N/A |
| Potential Funding | N/A |
| Timeline | Ongoing |
| Priority | High |
| Lead Agency | The City/Village |

| ACTION 2.3.3 | Maintain Good Standing in Community Ratings System (CRS) |
|---|---|
| Analysis | Maintain good standing as a CRS community. Furthermore, work to gain better status and further lower flood insurance premiums. |
| Goal/Objective | Goal 2/Objective 2.3 |
| Hazard(s) Address | Flooding |
| Estimated Cost | $0 |
| Potential Funding | City of Lincoln |
| Timeline | On-going |
| Priority | Medium |
| Lead Agency | City of Lincoln |

| ACTION 2.3.4 | Evaluate and Improve Building Standards |
|---|---|
| Analysis | Improve any existing building standards or establish new standards as deemed necessary to reduce potential of damage to new and existing structures, especially mobile home parks and other highly vulnerable populations such as nursing home facilities. |
| Goal/Objective | Goal 2/Objective 2.3 |
| Hazard(s) Addressed | Flooding |
| Estimated Cost | $5,000+ |
| Potential Funding | CDBG, HMGP, LPSNRD, Governing County & Local Governing Agency |
| Timeline | Three years |
| Priority | Medium |
| Lead Agency | Local Governments, The County |

| ACTION 2.3.5 | Floodplain Regulation Enforcements/ Updates |
|---|---|
| Analysis | 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 building permits by any community or County. Continue education of building inspectors or Certified Floodplain Managers. |
| Goal/Objective | Goal 2/Objective 2.3 |
| Hazard(s) Addressed | Flooding |
| Estimated Cost | $4,000+ |
| Potential Funding | HMGP, CDBG, LPSNRD, Governing County & Local Governing Agency |
| Timeline | Ongoing |
| Priority | High |
| Lead Agency | Local governments |

| ACTION 2.3.6 | National Flood Insurance Program (NFIP) |
|---|---|
| Analysis | Maintain good standing with National Flood Insurance Program (NFIP). |
| Goal/Objective | Goal 2/Objective 2.3 |
| Hazard(s) Addressed | Flooding |
| Estimated Cost | N/A |
| Potential Funding | N/A |
| Timeline | Ongoing |
| Priority | High |
| Lead Agency | Local governments |

| ACTION 2.3.7 | Participate in the National Flood Insurance Program (NFIP) |
|---|---|
| Analysis | Participate in the National Flood Insurance Program (NFIP) if eligible. This will not only benefit the community, but gives them eligibility to specific federal cost share programs. |
| Goal/Objective | Goal 2/Objective 2.3 |
| Hazard(s) Addressed | Flooding |
| Estimated Cost | N/A |
| Potential Funding | N/A |
| Timeline | Ongoing |
| Priority | High |
| Lead Agency | Local governments |

| ACTION 2.3.8 | Water Conservation Awareness Programs |
|---|---|
| Analysis | Improve and/or develop a program to conserve water use by the citizens during elongated periods of drought. Potential restrictions on water could include limitations on lawn watering, car washing, or water sold to outside sources. Work with DNR on farm irrigation restrictions. |
| Goal/Objective | Goal 2/Objective 2.3 |
| Hazard(s) Address | Drought |
| Estimated Cost | $1,000 plus |
| Potential Funding | PDM, HMGP, LPSNRD, Governing County & Local Governing Agency |
| Timeline | On-going |
| Priority | High |
| Lead Agency | Local Governing Agency |

| ACTION 2.3.9 | Micro-Filming Records Policy |
|---|---|
| Analysis | Establish policy for micro-filming of pertinent municipal records |
| Goal/Objective | Goal 2/Objective 2.3 |
| Hazard(s) Address | All Hazards |
| Estimated Cost | Unknown |
| Potential Funding | Village of Bennet, LPSNRD, Lancaster County |
| Timeline | On-going |
| Priority | Medium |
| Lead Agency | Municipal Government |

| ACTION 2.3.10 | Improve GIS Mapping |
|---|---|
| Analysis | Improve Salt Creek Levee GIS Mapping. Getting plans in electronic format. |
| Goal/Objective | Goal 2/Objective 2.3 |
| Hazard(s) Address | Flooding |
| Estimated Cost | $25,000 |
| Potential Funding | City of Lincoln, LPSNRD |
| Timeline | On-going |
| Priority | |
| Lead Agency | LPSNRD |

| ACTION 2.3.11 | Update FIRM maps |
|---|---|
| Analysis | Update FEMA Insurance Rate Maps for City of Plattsmouth |
| Goal/Objective | Goal 2/Objection 2.3 |
| Hazard(s) Address | Flooding |
| Estimated Cost | Unknown |
| Potential Funding | HMGP, Flood Mitigation Assistance Program, City of Plattsmouth, Cass County, LPSNRD |
| Timeline | 2 years |
| Priority | High |
| Lead Agency | City of Plattsmouth, Inspector |

| ACTION 3.1.1 | Public Awareness / Education and Equipment |
|---|---|
| Analysis | 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. Also, educate citizens on water conservation methods. In addition, purchasing equipment such as overhead projectors and laptops. |
| Goal/Objective | Goal 3/Objective 3.1 |
| Hazard(s) Addressed | All hazards |
| Estimated Cost | $0-$5,000+ |
| Potential Funding | HMGP, PDM, LPSNRD, Governing County & Local Governing Agency |
| Timeline | Ongoing |
| Priority | High |
| Lead Agency | Local Governments, NEMA, NDNR |

| ACTION 4.1.1 | Comprehensive City Disaster / Emergency Response Plan |
|---|---|
| Analysis | Update Comprehensive City/Village Disaster and Emergency Response Plan |
| Goal/Objective | Goal 4/Objective 4.1 |
| Hazard(s) Addressed | Tornados and high winds, severe winter storms, severe thunderstorms |
| Estimated Cost | $6,000+ |
| Potential Funding | Emergency Management Performance Grant, Homeland Security Funding, LPSNRD, Governing County & Local Governing Agency |
| Timeline | Ongoing |
| Priority | High |
| Lead Agency | Local Governments |

| ACTION 4.1.2 | Civil Service Improvements |
|---|---|
| Analysis | Improve Fire Department and Rescue squad equipment and facilities. Providing additional, or updating existing emergency response equipment; this could include fire trucks, ATV's, motor boats, etc. This would also include developing backup systems for emergency vehicles, and identifying and training additional personnel for emergency response. |
| Goal/Objective | Goal 4/Objective 4.1 |
| Hazard(s) Address | All Hazards |
| Estimated Cost | $5,000 to $400,000 per vehicle, varies depending on what equipment is needed |
| Potential Funding | PDM, NEMA, LPSNRD, Governing County & Local Governing Agency |
| Timeline | On-going |
| Priority | Low |
| Lead Agency | LPSNRD, Governing County & Local Governing Agency |

| ACTION 4.1.3 | Improve and Revise Snow/Ice Removal Program |
|---|---|
| Analysis | As needed, continue to revise and improve the snow and ice removal program for streets. Revisions should address situations such as plowing snow, ice removal, parking during snow and ice removal, and removal of associated storm debris. Actions under this item should improve the capabilities to rescue those stranded in blizzards and increase the capacity in which snow can be removed from roadways after an event. |
| Goal/Objective | Goal 2/Objective 2.1 |
| Hazard(s) Address | Severe Winter Storm |
| Estimated Cost | $20,000 + |
| Potential Funding | PDM, NEMA, , LPSNRD, Governing County & Local Governing Agency |
| Timeline | On-going |
| Priority | Low |
| Lead Agency | Public Works, Utilities Department, LPSNRD, Governing County & Local Governing Agency |

| ACTION 4.1.4 | Rural Water District and Water System Upgrades |
|---|---|
| Analysis | Upgrade rural water district infrastructure to decrease likelihood of damages and improve water system for emergency uses |
| Goal/Objective | Goal 4/Objective 4.1 |
| Hazard(s) Addressed | Drought |
| Estimated Cost | $20,000+ |
| Potential Funding | SRF, CDBG, LPSNRD, Governing County & Local Governing Agency |
| Timeline | Five years |
| Priority | Low |
| Lead Agency | Lower Platte South Natural Resource District |

| ACTION 4.1.5 | Develop Flood Assistance Strategies |
|---|---|
| Analysis | Develop Strategies to provide necessary services in the event of flooding |
| Goal/Objective | Goal 4/Objective 4.1 |
| Hazard(s) Address | Flooding |
| Estimated Cost | $1,000 plus |
| Potential Funding | HMGP, LPSNRD, Governing County & Local Governing Agency |
| Timeline | On-going |
| Priority | High |
| Lead Agency | Governing County & Local Governing Agency |

| ACTION 4.2.1 | Formal Evacuation Plan |
|---|---|
| Analysis | Develop an evacuation plan to be prepared for any disaster that would require evacuation. |
| Goal/Objective | Goal 4/Objective 4.2 |
| Hazard(s) Address | All |
| Estimated Cost | None |
| Potential Funding | HMGP, LPSNRD, Governing County & Local Governing Agency |
| Timeline | 1 year |
| Priority | High |
| Lead Agency | LPSNRD, Governing County & Local Governing Agency |

| ACTION 4.2.2 | Emergency Operations Center (EOC) |
|---|---|
| Analysis | The EOC for a County the size of Lancaster County is recommended by FEMA to be 3 times the size of the present facility. During an "all call" space is needed for a total of (at minimum) 30 agency or department representatives to function within the EOC. Presently there is space for 18. Also under the "Continuity of Operations" concept adopted by FEMA and Homeland Security, the EOC and 911 Center should be located at different sites. Presently the 911 Canter are right next to each other in the same building. Various locations have been evaluated and a functional site has been identified for the EOC. This site will only require some updating of equipment and presently has all the necessary generators, communication antennas, etc. that are major costs to a relocation. All sustaining costs will become part of the Lincoln-Lancaster County Emergency Management's annual operating budget. |
| Goal/Objective | Goal 4/Objective 4.1 |
| Hazard(s) Address | All Hazards |
| Estimated Cost | $100,000 |
| Potential Funding | HMGP, PDM, Lancaster County, City of Lincoln, NEMA |
| Timeline | 1-2 years |
| Priority | Very High |
| Lead Agency | Lincoln-Lancaster Emergency Management |

| ACTION 4.3.1 | Weather Radios |
|---|---|
| Analysis | Conduct an inventory of weather radios at schools and other critical facilities and provide new radios as needed. |
| Goal/Objective | Goal 4/Objective 4.3 |
| Hazard(s) Addressed | All hazards |
| Estimated Cost | $50/per radio |
| Potential Funding | HMGP, PDM, LPSNRD, Governing County & Local Governing Agency |
| Timeline | Ongoing |
| Priority | High |
| Lead Agency | Local Governments, County |

| ACTION 4.3.2 | Emergency Communications |
|---|---|
| Analysis | Establish an action plan to improve communication between agencies to better assist residents and businesses during and following emergencies. Establish inner-operable communications. |
| Goal/Objective | Goal 4/Objective 4.3 |
| Hazard(s) Addressed | Tornados and high winds, severe winter storms, severe thunderstorms |
| Estimated Cost | $10,000+ |
| Potential Funding | Homeland Security, LPSNRD, Governing County & Local Governing Agency |
| Timeline | Three years |
| Priority | High |
| Lead Agency | Local Governments, Emergency Management |

| ACTION 4.3.3 | Warning Systems |
|---|---|
| Analysis | Improve city cable TV interrupt warning system and implement telephone interrupt system such as Reverse 911. |
| Goal/Objective | Goal 4/Objective 4.3 |
| Hazard(s) Addressed | Tornados and high winds, severe winter storms, severe thunderstorms |
| Estimated Cost | $5,000+ |
| Potential Funding | HMGP, PDM, LPSNRD, Governing County & Local Governing Agency |
| Timeline | Ongoing |
| Priority | High |
| Lead Agency | Local Governments |

| ACTION 4.3.4 | Alert Sirens |
|---|---|
| Analysis | Perform an evaluation of existing alert sirens in order to determine sires which should be replaced or upgraded. Install new sirens where lacking. |
| Goal/Objective | Goal 4/Objective 4.3 |
| Hazard(s) Addressed | All hazards |
| Estimated Cost | $15,000+ |
| Potential Funding | HMGP, LPSNRD, Governing County & Local Governing Agency |
| Timeline | Three to five years |
| Priority | High |
| Lead Agency | County E911, Emergency Management, Local governments |

| ACTION 4.3.5 | First Call System |
|---|---|
| Analysis | The purchase and installations cost associated with a "First Call" system. This type of phone system will inform citizens via a phone message as to the approach of a "life threatening" event. Examples would be a confirmed tornado, hazardous material spill, etc. This system makes up to 3500 phone calls a minute and would set up to affect various zip codes in Lancaster County. At present Lancaster County has this set up on an RFP and will install this particular system regardless of the outcome of the request. A more detailed example of this system is available upon request. All sustaining costs will become part of Lincoln-Lancaster County Emergency Management's annual operating budget. |
| Goal/Objective | Goal 4/Objective 4.3 |
| Hazard(s) Address | All Hazards |
| Estimated Cost | $29,000 |
| Potential Funding | 1-2 years |
| Timeline | Immediate |
| Priority | Very High |
| Lead Agency | Lancaster County |

| ACTION 4.3.6 | Improvements to Flood Warning System |
|---|---|
| Description | Update equipment, make more secure, and install additional gauges. These improvements will allow for quicker, more efficient response when water is threatening the district. |
| Goal/Objective | Goal 4/Objective 4.3 |
| Hazard(s) Address | Flooding |
| Estimated Cost | $50,000 |
| Potential Funding | FMA, PDM, HMGP, LPSNRD |
| Timeline | As needed |
| Priority | High |
| Lead Agency | LPSNRD |

## *LOWER PLATTE SOUTH NRD PARTICIPANT PROJECT MATRIX*

During public meetings each participant was asked to list potential mitigation alternatives which would lead to action items to reduce the affects of natural hazards. Every participating jurisdiction in this plan can pursue project grant applications for any of the actions listed above in Table 21 as all of the actions fall under the goals and objectives of this plan. Tables 22 and 23 on the following pages indicate which actions were selected as highly favorable by each participant for their respective jurisdiction during the planning process.

| | Table 22 | Alvo | Ashland | Avoca | Bennet | Brainard | Cass County | Cass County RWD #1 | Cass County RWD #2 | Cass County SID #1 | Cedar Creek | Ceresco | Davey | Denton | Eagle | Firth | Greenwood | Hallam | Hickman | Lancaster County | Lancaster County RWD #1 | Lancaster County SID #6 | Lincoln | Louisville | Lower Platte South NRD | Malcom | Manley | Murdoch | Murray | Panama | Plattsmouth | Raymond | Roca | Sprague | Union | Valparaiso | Waverly | Waverly School District #145 | Weeping Water |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Goal 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Objective 2.1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Action 2.1.1 | Backup Generators | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | | x | x | x | | x | | x | x | x | x | x | x | x | x | x | x | x | x | | x |
| Action 2.1.2 | Storm Shelter/Safe Rooms | | x | x | | x | x | x | | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | | x | x | x | x | x | | x | x | x | x | x | x | | x |
| Action 2.1.3 | New Municipal Well | | | | | | | | | | | x | | | x | | | | x | | | | | | | x | | | | | | | | | | | | | |
| Action 2.1.4 | Power and Service Lines | | | | | x | | | | | x | | x | x | | | x | x | | | | x | | | | | | | | | | | | | | | | | |
| Action 2.1.5 | NFIP Repetitive Loss Structure Removal/Acquisition | | x | | | | x | | | | x | | | | | | | | | x | | | x | x | | | | | | | | | | | | | | | x |
| Action 2.1.6 | Snow Fences | | | | | | | | x | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Action 2.1.7 | Levee/ Floodwall Construction and/or Improvements | | | | | | | | | x | x | | | | | | | | | | | | | | x | | | | | | | | | | | | | | |
| Action 2.1.8 | River/ Stream Bank Stabilization | | | | | | | | | | x | | | | | | | | | | | | | | x | | | | | | | | | | | | | | |
| Action 2.1.9 | Grade Control Structures | | | | | | | | | | | | | | | | | | | | | | | | x | | | | | | | | | | | | | | |
| Action 2.1.10 | Stormwater System and Drainage Improvements | x | x | x | x | x | x | | x | x | x | x | x | x | x | x | x | | x | x | x | x | x | x | | x | x | | x | x | x | | x | x | x | x | x | | x |
| Action 2.1.11 | GPS System | | | | x | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Action 2.1.12 | New Water Towers | | | | | | | x | | | | | | | | | | | | | x | | | | | x | | | | | | | | | | | | | |
| Action 2.1.13 | Central Sewer System | | | | | | | | | x | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Action 2.1.14 | Cass County SID#1 Levee Improvement Project | | | | | | | | | x | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Action 2.1.15 | Anchor Fertilizer, Fuel & Propane Tanks | | | | | | | | | | x | | | | | | | x | | | | x | | | | | | | | | | x | | | | | | | |
| Action 2.1.16 | Wood Chipper | | | | | | | | | | | | | | x | | | | | | | | | | | | | | | | | | | | | | | | |
| Action 2.1.17 | Well System Improvements | | | | | | | | | | | | | | | | | x | | | | | | | | | | | | | | | | | | | | | |
| Action 2.1.18 | Bury Waterlines | | | | | | | | | | | | | | | | | | | | x | | | | | | | | | | | | | | | | | | |
| Action 2.1.19 | Underground Water Storage | | | | | | | | | | | | | | | | | | | | x | | | | | | | | | | | | | | | | | | |
| Action 2.1.20 | Project at Beal Slough at 40th St | | | | | | | | | | | | | | | | | | | | | | x | | | | | | | | | | | | | | | | |
| Action 2.1.21 | Project at Beal Slough at 14th St | | | | | | | | | | | | | | | | | | | | | | x | | | | | | | | | | | | | | | | |
| Action 2.1.22 | Flood Reduction at Antelope Creek | | | | | | | | | | | | | | | | | | | | | | x | | | | | | | | | | | | | | | | |
| Action 2.1.23 | Antelope Creek Project Near A St | | | | | | | | | | | | | | | | | | | | | | x | | | | | | | | | | | | | | | | |
| Action 2.1.24 | Antelope Creek Dry Detention Project | | | | | | | | | | | | | | | | | | | | | | x | | | | | | | | | | | | | | | | |
| Action 2.1.25 | Channel Improvement at Cornhusker Hwy | | | | | | | | | | | | | | | | | | | | | | x | | | | | | | | | | | | | | | | |
| Action 2.1.26 | Channel Improvements at UNL East Campus | | | | | | | | | | | | | | | | | | | | | | x | | | | | | | | | | | | | | | | |
| Action 2.1.27 | Channel Improvements at University Place Park | | | | | | | | | | | | | | | | | | | | | | x | | | | | | | | | | | | | | | | |
| Action 2.1.28 | Channel Improvements at 52nd St | | | | | | | | | | | | | | | | | | | | | | x | | | | | | | | | | | | | | | | |
| Action 2.1.29 | Storm Water Detention Project (Lincoln) | | | | | | | | | | | | | | | | | | | | | | x | | | | | | | | | | | | | | | | |
| Action 2.1.30 | Storm Water Detention at Taylor Park near 66th St | | | | | | | | | | | | | | | | | | | | | | x | | | | | | | | | | | | | | | | |
| Action 2.1.31 | Seacrest Park Berm | | | | | | | | | | | | | | | | | | | | | | x | | | | | | | | | | | | | | | | |
| Action 2.1.32 | Ditch at 56th St | | | | | | | | | | | | | | | | | | | | | | x | | | | | | | | | | | | | | | | |
| Action 2.1.33 | Middle Creek Project | | | | | | | | | | | | | | | | | | | | | | x | | | | | | | | | | | | | | | | |
| Action 2.1.34 | Oak Creek Project | | | | | | | | | | | | | | | | | | | | | | x | | | | | | | | | | | | | | | | |
| Action 2.1.35 | Oak Creek Flood Control | | | | | | | | | | | | | | | | | | | | | | x | | | | | | | | | | | | | | | | |
| Action 2.1.36 | Storm Drainage 11th & Harrison | | | | | | | | | | | | | | | | | | | | | | x | | | | | | | | | | | | | | | | |
| Action 2.1.37 | Storm Drainage 33rd St | | | | | | | | | | | | | | | | | | | | | | x | | | | | | | | | | | | | | | | |
| Action 2.1.38 | Emergency Electrical Generator for Wastewater Treatment Plant | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Action 2.1.39 | Levee at Theresa St | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Action 2.1.40 | Protecting the Water Treatment Facility | | | | | | | | | | | | | | | | | | | | | | | x | | | | | | | | | | | | | | | |
| Action 2.1.41 | Repair Elk Creek Road Ponds | | | | | | | | | | | | | | | | | | | | | | | | | x | | | | | | | | | | | | | |
| Action 2.1.42 | Pave Streets and Storm Sewers | | | | | | | | | | | | | | | | | | | | | | | | | x | | | | | | | | | | | | | |
| Action 2.1.43 | Improve Influent Pipe | | | | | | | | | | | | | | | | | | | | | | | | | x | | | | | | | | | | | | | |
| Action 2.1.44 | Piening Flood Control Structure | | | | | | | | | | | | | | | | | | | | | | | | x | | | | | | | | | | | | | | |
| Action 2.1.45 | NW 70th Flood Control Structure | | | | | | | | | | | | | | | | | | | | | | | | x | | | | | | | | | | | | | | |
| Action 2.1.46 | Gabel Flood Control Structure | | | | | | | | | | | | | | | | | | | | | | | | x | | | | | | | | | | | | | | |
| Action 2.1.47 | Rural Fire Station with Shelter | | | | | | | | | | | | | | | | | | | | | | | | | | | | x | | | | | | | | | | |
| Action 2.1.48 | Channel Infiltration | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | x | | |
| Action 2.1.49 | Water System Improvements | x | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | x |
| Action 2.1.50 | Central Utility Plant at Department of Corrections | | | | | | | | | | | | | | | | | | | | | | x | | | | | | | | | | | | | | | | |

| | Table 23 | Alvo | Ashland | Avoca | Bennet | Brainard | Cass County | Cass County RWD #1 | Cass County RWD #2 | Cass County SID #1 | Cedar Creek | Ceresco | Davey | Denton | Eagle | Firth | Greenwood | Hallam | Hickman | Lancaster County | Lancaster County RWD #1 | Lancaster County SID #6 | Lincoln | Louisville | Lower Platte South NRD | Malcom | Manley | Murdoch | Murray | Panama | Plattsmouth | Raymond | Roca | Sprague | Union | Valparaiso | Waverly | Waverly School District #145 | Weeping Water |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Goal 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Objective 2.2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Action 2.2.1 | Drainage Study/ Stormwater Master Plan | | x | x | x | | | | | x | x | x | x | X | | X | X | | | X | X | | | X | | | | | X | | X | X | | X | X | X | X | | X |
| Action 2.2.2 | Flood-Prone Property Acquisition | | x | x | x | | x | | | | x | | | X | | X | X | | X | X | | | X | X | | | | | X | | X | X | | X | X | X | X | | X |
| Action 2.2.3 | Source Water Contingency Plan | | | | x | | | | x | | | x | | | | | | X | | | | X | | | | | | | | | | X | | | | | | | | |
| Action 2.2.4 | Geographical Information System (GIS) | | | | x | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Action 2.2.5 | Suspend Water Use Permits | | | | | | | | | | | | | | | | | | | | | X | | | | | | | | | | | | | | | | | |
| Action 2.2.6 | Emergency Power Contingency Plan | | | | | | | | | | | | | | | | | | | | | | X | | | | | | | | | | | | | | | | |
| Action 2.2.7 | Implementation of Watershed Master Plan Projects | | | | | | | | | | | | | | | | | | | | | | | | X | | | | | | | | | | | | | | |
| Action 2.2.8 | UV Water Treatment System for Plant | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | X |
| Objective 2.3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Action 2.3.1 | Tree Maintenance Programs (Tree City USA) | | x | x | x | x | | | | x | x | x | x | X | X | X | X | X | X | X | X | | | X | | X | X | X | X | X | X | X | X | X | X | X | X | | X |
| Action 2.3.2 | Participate in the Community Rating System (CRS) | | x | x | x | | | | | | x | x | | X | | X | | | | | | | | X | | | | | X | | X | X | | X | X | X | X | | X |
| Action 2.3.3 | Maintain Good Standing in CRS | | | | | | | | | | | | | | | | | | | | | | X | | | | | | | | | | | | | | | | |
| Action 2.3.4 | Evaluate and Improve Building Standards | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | X | | | | | | | |
| Action 2.3.5 | Floodplain Regulations | | | | | | | | | | | | | | | | | | X | | | | | | | | | | | | | | | | | | | | |
| Action 2.3.6 | National Flood Insurance Program (NFIP) | | x | x | x | | x | | | | x | x | | X | X | X | X | | | X | | | X | X | | | | | X | | X | X | | X | X | X | X | | X |
| Action 2.3.7 | Participate in the National Flood Insurance Program (NFIP) | x | | | | x | | x | x | x | | | x | | | | | X | | | x | X | | | x | X | X | X | | X | | | X | | | | | X | |
| Action 2.3.8 | Water Conservation Awareness Programs | | x | | | | | | x | | | | | | | | | X | X | | | X | | | | | | | | | | X | | | | | | | |
| Action 2.3.9 | Micro-Filming Records Policy | | | | x | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Action 2.3.10 | Improve GIS Mapping | | | | | | | | | | | | | | | | | | | | | | | | X | | | | | | | | | | | | | | |
| Action 2.3.11 | Update FIRM Map | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | X | | | | | | | | |
| Goal 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Objective 3.1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Action 3.1.1 | Public Awareness / Education and Equipment | x | x | x | x | x | x | x | | x | x | x | x | X | X | X | X | X | X | X | X | | X | X | | X | X | X | X | X | X | X | X | X | X | | X | | X |
| Goal 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Objective 4.1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Action 4.1.1 | Comprehensive City Disaster/ Emergency Response Plan | | | | | | | | | | | x | | | X | | | | | | | | | X | | | | | | | | | | | | | | | |
| Action 4.1.2 | Civil Service Improvements | | x | | x | | | | x | | x | | | | X | | | X | X | | | | X | | | | | | | | | X | | | | X | | | X |
| Action 4.1.3 | Improve and Revise Snow/Ice Removal Program | | | | x | | | | | | | | | | | | | | X | | | | X | | | | | | | | | | | | | | | | |
| Action 4.1.4 | Rural Water District & Water System Upgrades | | | | | | | x | x | | | | | | | | | | | | X | | | | | | | | | | | | | | | | | | |
| Action 4.1.5 | Develop Flood Assistance Strategies | | x | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Objective 4.2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Action 4.2.1 | Formal Evacuation Plan | x | | | x | | | | | | | | | | | | | | | | | X | | | | | | | | | | X | | | | | | | |
| Action 4.2.2 | Emergency Operations Center (EOC) | | | | | | | | | | | | | | | | | | | X | | | | | | | | | | | | | | | | | | | |
| Objective 4.3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Action 4.3.1 | Weather Radios | | x | x | x | x | | x | | x | x | x | x | X | X | X | X | X | | X | X | X | X | X | | X | X | X | X | X | X | X | X | X | X | X | X | | X |
| Action 4.3.2 | Emergency Communications | | | | x | | x | | | | | | | | | | | X | X | | | | | | | | | | | | X | | | | | | | | |
| Action 4.3.3 | Warning Systems | | x | | | | | | | | x | | | | | | | X | X | | | | X | | | | | | | | X | | | | | | | | |
| Action 4.3.4 | Alert Sirens | x | | | | | x | | | x | | | | | X | | | | | X | | | | | | | | | X | | X | | | | | | | | X |
| Action 4.3.5 | First Call System | | | | | | | | | | | | | | | | | | | X | | | | | | | | | | | | | | | | | | | |
| Action 4.3.6 | Improvements to Flood Warning System | | | | | | | | | | | | | | | | | | | | | | | | X | | | | | | | | | | | | | | |

### *PREVIOUS MITIGATION ALTERNATIVES*

Participants were asked to list any past mitigation activities. Table 24 below displays a summary of all previous mitigation actions for the planning area.

**Table 24: Previous Mitigation Efforts**

| JURISDICTION | HAZARD MITIGATED | ACTIVITY | DESCRIPTION | IMPLEMENTED |
|---|---|---|---|---|
| Alvo | All | Community Survey | Initiated a community survey to determine community preparedness | Yes |
| | All | Backup Power | Installation of a backup generator for the Village water system. | Yes |
| Ashland | Flooding | Property acquisition | Removed homes from floodplain and floodway. (1980's and 1990's) | Yes |
| | Flooding | Regulations | Adopted and maintained community floodplain regulations | Yes |
| Bennet | All Hazards | Expansion | Expansion of Bennet Rural Fire District Facility | Yes |
| | All Hazards | Generators | Generators at Sewer Lift Station and Waste Water treatment facility | Yes |
| | All Hazards | Security | Communication and alarm system for the water storage and waste water monitoring | Yes |
| | Flooding | Ordinance | Adoption of floodplain management ordinances to regulate construction in flood hazard areas. | Yes |
| | Flooding | Construction | Raise side banks of Little Nemaha to prevent flooding to park area. | Yes |
| | Flooding | Property acquisition | Approve donation of flood zone area as a future park to prevent residential growth in flood area. | Yes |
| Brainard | All | Grant application | Applied for funding to help purchase one generator for water system in case of power outage. $5,000 (2007) | Yes |
| | All | Grant application | Four Corners health—Applied for funding to purchase switches for generator. $1,500 (2007) | Yes |
| Cass County | Flooding | | Lower Platte River Ice Jam Flooding study and analysis to develop guidance to use in mitigating ice jam flooding. | Yes |
| | Flooding | | Missouri River Levee System Sioux City to the Mouth | Yes |
| | Flooding | | Salt Creek and Tributaries Review | Yes |
| | Flooding | | NRCS Floodplain Management Studies | Yes |
| | All | | US Department of Agriculture, Cooperative Extention | Yes |
| | All | | Small Business Administration | Yes |
| | Flooding | | Plattsmouth Watershed Project | Yes |
| | Flooding | | Weeping Water Watershed Project | Yes |
| Cass County RWD #1 | Flooding Washouts | | Protect Waterlines by lowering waterlines at creek crossings | Yes |
| | Tornado and Earthquake | | Preliminary design specifications were engineered for a new water tower to resist tornado and earthquake damages. | Yes |
| Cass County RWD #2 | Flooding/ Line Washouts | | Rebuilt terraces and extended drainage tubes. At creek crossings, used riprap for stabilization. | Yes |
| | Power Outages | | Installation of backup generator. | Yes |
| | Water Outages | | Put loop in the water system to alleviate water outages south of Hwy 34 during the State's construction of the four-lane highway. | Yes |
| Cass County SID #1 | Flood | Levee | Levee built to protect from Missouri River floods | Yes |
| | Flood | Maintenance | Careful maintenance of levee in accordance with Corps of Engineer recommendations and rules every year. | Yes |
| | Flood | Study | Corps of Engineers Hydrology Study of Missouri River flood potential. (In progress) | Yes |
| | All Hazards | Backup Generator | Provide backup power system to provide redundant power supply | Yes |
| Cedar Creek | Flooding | Construct 100-year levee | Made effort to construct 100 year levee on Platte River, project was not funded | No |
| | Flooding | Mitigation Plan | The U.S. Army Corps of Engineers conducted a Flood Hazard Mitigation Plan, 2006 | Yes |
| | Flooding & River Bank Stabilization | Bank Stabilization | Continuing the Platte River Bank Stabilization from continued erosion by placing rip-rap. The project is partially supported by LPSNRD 2003 funds. | Yes |
| Ceresco | Water Supply/Quality | Water Study | Water study to review and evaluate system deficiencies and water supply issues. Distribution improvement project. (1999)New municipal well SRF loan 2000-2001, $1.5 million. | Yes |
| | Storm/Civil Defense warning | Siren installation | New Battery back up siren installed in the center of town allowing for 95-7 percent coverage for storm/civil defense warnings. $20,000 (2007) | Yes |
| | Floodplain | DNR and FEMA review | Participated with Saunders County and DNR to review and update flood plain information for FEMA review | Yes |

| JURISDICTION | HAZARD MITIGATED | ACTIVITY | DESCRIPTION | IMPLEMENTED |
|---|---|---|---|---|
| Davey | All Hazards | Generator | Purchased one generator for use during power outage at either community center or well house or sewer plant. Cost: $10,000. | Yes |
| | High Nitrate Levels | Reopening Well | Worked with State to reopen a water well that had previously been closed due to high nitrate levels. | Yes |
| | All Hazards | Tree removal | Active removal of dead and dying trees by Village tree board to prevent them from falling on power lines. (On-going) | Yes |
| Denton | All Hazards | Improvements | Water System improvements | Yes |
| | All Hazards | Backup Power | Generator | Yes |
| | All Hazards | Water Supply | Water Tower and new well with improved well house | Yes |
| Eagle | Flooding | Flood Safety | Curb and gutter on 1st street minimized flooding and safety concerns by crosswalks. Village to maintain once project completed. Initial contribution by County: $125,000 | Yes |
| | Well Field | Development | Developed a new well field, 1984 | Yes |
| | Fire Protection | Update | Update Fire protection on fire hydrants, 2007. | Yes |
| Firth | Flooding | Flood | Engineers report on floodplain. FEMA moved floodway out of corporate limits. (2006/2007) | Unknown |
| | Flooding | Drainage | Drainage report from engineering firm in 2003. | No |
| | Flooding | Drainage Maintenance | On-going maintenance and clean out of culverts and ditches. | Yes |
| Greenwood | Flooding | Drainage improvements | Drainage ditches were dug out to improve drainage, 1988. | Yes |
| Hallam | Tonados | | Impemented new building codes. 75% of new buildings have storm shelters | Yes |
| Hickman | Drought | Ordinance | City passed water conservation ordinance (2006) | Yes |
| | Severe thunderstorm | Generator | City purchased emergency back-up generator (2007) | Yes |
| | Flooding | Street improvement | Street improvement district establishing curb and gutter (2005) | Yes |
| Lancaster County | General | | Establish a 24-hour warning point and emergency operations center | Yes |
| | General | Development/Improvement | Develop a formal hazardous weather plan, which includes training severe weather spotters and holding emergency exercises that addresses all possible hazardous weather events | Yes |
| | General | Improvement | Have more than one way to receive severe weather warnings and forecasts and to alert the public | Yes |
| | General | Weather Monitoring | Create a system that monitors weather conditions locally. | Yes |
| | General | Education | Promote the importance of public readiness through community seminars | Yes |
| | General | Increase personnel | Additional personnel for emergency response | Yes |
| | Severe Thunderstorm/ | Improvement | Evaluate and improve building standards | Yes |
| | Severe Thunderstorm/ | Minimize Impact | Anchoring or otherwise protecting fuel tanks from movement in a disaster | Yes |
| | Severe Thunderstorm/ | Improvement | Storm shelter identification, design and development | Yes |
| | All Hazards | Minimize Impact | Bury main power and service lines | Yes |
| | Severe Winter Storm | Improvement | Develop list of volunteers with ATV's and snowmobiles | Yes |
| | Drought/ Extreme Heat | Implementation | Implement drought water conservation regulations | Yes |
| | Drought/ Extreme Heat | Implementation | Support Nebraska Department of Natural Resources water allocation regulations | Yes |
| | Drought/ Extreme Heat | Implementation | Develop a plan to reduce water consumption for agricultural use | Yes |
| | Drought/ Extreme Heat | Implementation | Suspend water use permits in watersheds with low water levels | Yes |
| | Flood | | Update floodplain map (FIRM) | Yes |
| | Flood | Minimize Impact | Improve or acquire high-risk to flooding properties | Yes |
| | Flood | Improvement | Improve subdivision design | Yes |
| | Flood | Minimize Impact | Preserve natural open spaces | Yes |
| | Flood | Implementation | Continue floodplain regulations for current and future development | Yes |
| | Flood | Improvement | Conduct studies to reduce floodplain in developed areas | Yes |
| | Flood | Improvement | Improve storm sewers, flood retention facilities, Bank stabilization, levees, and floodwalls | Yes |
| | Flood | Implement | Floodplain management enhancement | Yes |
| | Wildfire | Implement | Wildfire mitigation plan | Yes |

| JURISDICTION | HAZARD MITIGATED | ACTIVITY | DESCRIPTION | IMPLEMENTED |
|---|---|---|---|---|
| Lancaster County RWD #1 | All Hazards | Expansion | Expansion of Bennet Rural Fire District Facility (Bennet) | Yes |
| | All Hazards | Generators | Generators at Sewer Lift Station and Waste Water treatment facility (Bennet) | Yes |
| | All Hazards | Security | Communication and alarm system for the water storage and waste water monitoring. (Bennet) | Yes |
| | Flooding | Ordinance | Adoption of floodplain management ordinances to regulate construction in flood hazard areas. (Bennet) | Yes |
| | Flooding | Construction | Raise side banks of Little Nemaha to prevent flooding to park area. (Bennet, 1980) | Yes |
| | Flooding | Property acquisition | Approve donation of flood zone area as a future park to prevent residential growth in flood area. (Bennet) | Yes |
| | Flooding | Construction | Lowered water lines through creek to avoid being washed out. $20,000 | Yes |
| Lancaster County SID #6 | Flooding | Construction | Purchased and installed "diaphragms" under man-hole covers to minimize water entering sewer | Yes |
| Lincoln | Flooding | General Obligation Bond | 3 Storm Drainage projects and a Box Rehabilitation, 1994-1996. Cost: $4.0 million. | Yes |
| | Flooding | General Obligation Bond | 13 Storm Drainage projects, 1996-2001. Cost: $8.25 million | Yes |
| | Flooding | General Obligation Bond | 6 Storm Drainage projects and a Channel Stabilization, 2001-2003. Cost: $7.5 million. | Yes |
| | Flooding | General Obligation Bond | 8 Storm Drainage projects, 3 Channel Stabilizations, 4 Rehabilitation projects, Basin Plan Implementations, and primary engineering conducted to prioritize urban drainage system deficiencies, 2003-2005. Cost: $10.0 million | Yes |
| | Flooding | General Obligation Bond | 1 Box Culvert Rehabilitation, Channel Grading project, Stormwater Bypass System, Storm Drain Reconstruction, Channel Rehabilitation, and Tributary in Antelope Park. 8 various site specific improvements, 3 Watershed Master Plans; Cardwell Branch, Little Salt Creek, and Deadmans Run, 2 Watershed Master Plan Implementation projects, various 'Best Management Practice Projects', Engineering Identification and Prioritization Study, and a number of miscellaneous repair and rehabilitation projects, 2005-2007. Cost: $9.95 million. | Yes |
| | Flooding | General Obligation Bond | 10 Urban Storm Drainage projects, 6 projects in Master Planned Basins, Engineering Studies on floodplain, Park Stream Rehabilitations, 'Best Management Practices' pertaining to water quality, Preliminary Engineering for Urban Drainage Deficiencies and for Basin Master Plans, 2007-current. Cost: $8.5 million. | In Progress |
| Louisville | Flooding | Tree and Debris removal | Removed trees and other debris from Mill Creek, 6th street to hwy 50. Including the Depot street bridge | Yes |
| | Streets and Bridges | Repair | Replaced Main Street, 2nd Street, Cherry Street, 3rd Street, Depot Bridge. | Yes |
| Lower Platte South NRD | Flood | Watershed Plans Prepared and Implemented | The following watershed plans have been approved and funded resulting in over 100 flood control structures being built, operated and maintained; Upper Salt Watershed Plan, Plattsmouth Watershed Plan, Oak-Middle Watershed Plan, North Oak Watershed Plan, Weeping Water Watershed Plan, and the Stevens Creek Watershed Plan. | Yes |
| | Flood | Non Structural Plans | The NRD has worked with Ashland, Weeping Water and Lincoln on acquiring flood plain property/structures. The NRD is also obtaining flood plain easements along Stevens Creek to insure the floodplain isn't filled. Partners with adjoining counties and NRDs on efforts to remove ice jams along the Platte River. Operates a flood alert/warning system of rain and stream gauges to increase awareness of potential flooding. | Yes |
| | Flood | Operation and Maintenance | The Salt Creek Levee Operation and Maintenance Manual was updated. | Yes |
| | Flood | Community Assistance Program Projects | The NRD has provided cost-share assistance to many towns, villages, counties, SIDs, and homeowner associations to complete projects that will mitigate future flood hazards by improving stormwater management. Projects have been completed with Valparaiso, Ceresco, Ashland, Louisville, South Bend, Cedar Creek, Plattsmouth, Weeping Water, Cass County SID #6, Hickman, Waverly, Hillcrest Heights Neighborhood Association, and the Willow Point Homeowners Association to name a few. | Yes |
| | Dam Failure | Breach Routing Analysis and Emergency Action Plans | The NRD has prepared emergency Action Plans with Breach Routing Analysis for all High Hazard Dams owned by the NRD. | Yes |

| JURISDICTION | HAZARD MITIGATED | ACTIVITY | DESCRIPTION | IMPLEMENTED |
|---|---|---|---|---|
| Murdock | Injury/Death | | Installed Siren, (1970's) | Yes |
| | Injury/Death and Damage | | New Fire Barn Completed (2006) | Yes |
| | Injury/Death and Damage | | Fire Department and Village Board NIMS IS-100 IS-700 classes certified (March 2006) | Yes |
| | Injury/Death and Damage | | Local Emergency Operations Plan adopted, December 2007 | Yes |
| Plattsmouth | | CSO Study | CSO Study, 2008. Cost: $122,000. | Yes |
| | Flood | Storm Sewer/retention pond | Chicago Avenue storm sewer/retention pond, 2006. Cost:$1.2 million. | Yes |
| | Flood | Dam | NRD dams, 1950's. | Yes |
| | Flood | Watershed study | USDA watershed rehab study | Yes |
| | All Hazards | Siren update | Siren updated 2000. | Yes |
| | Water Tower | Security Fence | Security Fence built around Water Tower, 2006. Cost: $5,000. | Yes |
| Roca | Injury & Damage | Property acquisition | Building was deemed unsafe as a result of severe termite damage. Property was sold to Table Rock Bank. | Yes |
| | Flooding | Relocation | Built a new community center on vacant lot. | Yes |
| Sprague | Flooding | Backup Power | Water Pump backup sewer for water and sewage system. | Yes |
| Union | Flooding | Property acquisition | 12 homes removed, 2 homes moved, 1 café removed and 2 buildings repaired. | Yes |
| | Severe Storm | Repairs | Tree and debris removal. Park equipment repaired and replaced. Gravel roads repaired. | Yes |
| Valparaiso | Flooding | Storm Drain | Installation of storm drainage for parts of main street in. Cost: $75,000 | In Progress |
| Weeping Water | Flooding | Property acquisition | Private individuals relocated two houses from 100 year floodplain (1983) | Yes |
| | Flooding | Property acquisition | Purchased land in 100 year floodplain for recreational trail. $5,000 (2007) | Yes |
| | Flooding | Property acquisition | Removed City water treatment plant from 100 year floodplain. Water supply lakes converted to recreational lands. (1957) | Yes |
| | Flooding | Channel Improvements | Gospel Run Channel Improvements. $12,000 (2002) | Yes |
| | All Hazards | Siren | Installed primary siren behind Fire Station. Installed second sired east end of town. | Yes |

# SECTION 5: PLAN IMPLEMENTATION AND MAINTENANCE

## MONITORING, EVALUATION, AND UPDATING THE PLAN

Participants in this Plan will be responsible for monitoring, evaluating, and updating the Plan. Hazard mitigation projects will be prioritized by each participant's governing body with support and suggestions from the public, as well as property and business owners. Unless otherwise specified by each participant's governing body, the City or Village Administrator/Manager or Clerk (when there is no appointed Administrator/Manager) will be responsible for implementation of the recommended projects. The party responsible for the various implementation actions will report on the status of all projects and will indicate which implementation processes worked well, any difficulties encountered, how coordination efforts are proceeding, and which strategies could be revised.

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

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

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

Worksheets are provided in Appendix D that may also be used to assist in Plan updates.

If major new, innovative mitigation strategies arise and could impact the planning area or elements of this plan and which are determined to be of importance, a plan amendment may be proposed and considered separate from the annual review and other proposed plan amendments. Lower Platte South NRD should compile a list of proposed amendments received annual and prepare a report providing applicable information for each proposal, and recommend action on the proposed amendments.

## INCORPORATION INTO EXISTING PLANNING MECHANISMS

The governing body will be responsible for ensuring that the Plan goals and objectives are incorporated into applicable revisions of each participant's adopted comprehensive plan and any new planning projects undertaken by the participant. The Plan may be adopted as part of each participant's comprehensive development plan. This would enable the mitigation component of the comprehensive plan to be consistently revisited and reviewed. In addition, the Plan should also take into account any changes in the comprehensive plan, and incorporate the information accordingly during its next update. However, care must be taken so that this mitigation portion is reviewed and updated every five years, as the evaluation and updating of the comprehensive plan is currently typically done on a 10-year basis.

## CONTINUED PUBLIC INVOLVEMENT

To ensure continued Plan support and suggestions from the public, property owners, and business owners, public involvement should remain a top priority for each participant. Notice of public meetings involving the discussion of or action on mitigation updates should be published and posted in one or more of the following locations:

- Public spaces/buildings within and around each participant community;
- Posting within each municipal hall;
- Posting to participant web sites;
- Distribution through local newspapers; and
- Publication in regionally-distributed newspapers.

# SECTION 6: PARTICIPANT SECTIONS

Following this upfront portion of the Plan are 'Participant Sections' with information and risk assessments relating specifically to the jurisdictions represented in this plan.

# Participant Section for Lincoln

## Lower Platte South NRD Multi-Jurisdictional Hazard Mitigation Plan

November 2008

JEO project # 385D23

# LINCOLN BACKGROUND

### *LOCATION/GEOGRAPHY/CLIMATE*

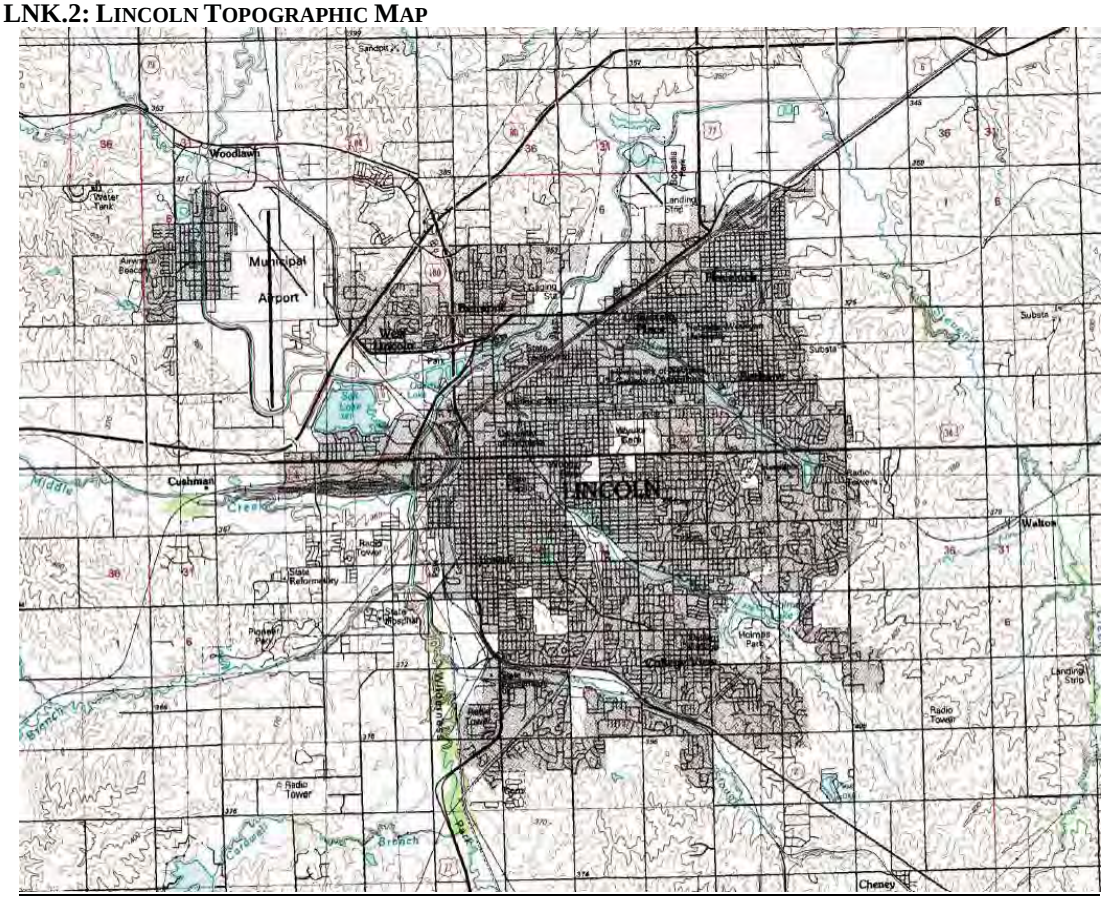
The City of Lincoln is the center and most populated city of Lancaster County. Located 55 miles west of the eastern state border, the City covers an area of 75.4 square miles comprised of 0.98 percent water. Originally laid out near Salt Creek, the area was selected for its salt flats, marshes, and nearly flat saline wetlands. Lincoln's landscape is mainly comprised of gently rolling hills and sits at 1,189 feet above sea level.

Lincoln's Salt Creek Watershed is comprised of a series of sub-basins such as; Antelope Creek, Beal Slough, Cardwell, Dead Man's Run, Haines Branch Salt Creek, Havelock, Little Salt Creek, Lynn, Middle Creek, Oak Creek, Southeast Upper Salt Creek (SEUSC), and Stevens Creek basins. Below in Figure LNK.1, is Lincoln's watershed map as provided by the City of Lincoln's website: http://lincoln.ne.gov/city/pworks/watrshed.

**FIGURE LNK.1: CITY OF LINCOLN WATERSHED MAP**

According to the High Plains Regional Climate Center School of National Resources of the University of Nebraska Lincoln, the average high temperature in July is 89.6 degrees while the average January temperature is 11.5 degrees. The highest and lowest temperatures recorded are 115 degrees on July 25th, 1936 and -33 degrees on January 12, 1974. The average annual precipitation, which falls as rain, snow, and sometimes hail, is approximately 28 inches per year. May has the highest precipitation average of 4.23 inches.

**FIGURE LNK.2: LINCOLN TOPOGRAPHIC MAP**




### *HISTORY AND DEVELOPMENT OF LINCOLN*

Lincoln is the capitol city of Nebraska and is the seat of the county government. Originally known as "Lancaster," the City's name was changed to Lincoln after a legislative motion. The City was incorporated on April 7, 1869.

To insure that the City would prosper, state government and major state institutions were moved to Lincoln. The City also worked hard to recruit railroad services by offering bounties. In fact, the first train arrived and claimed a $50,000 prize on June 26, 1870. Thereafter, the City's population went from 2,500 residents in 1870 to 7,000 residents by 1875, and 13,000 residents by 1880.

Lincoln continued to grow and expand in every direction by 1890, except to the northwest where the rail yards and Salt Creek acted as barriers for the burgeoning 55,000 residents. It was the nationwide depression in the 1890's that adversely impacted Lincoln's population causing a decline to 37,000 by 1900. However, by the early 20th century a significant influx of Germans from Russia helped bolster the city.

In the late 1800's, satellite towns just outside the city began to emerge:

- In 1888, East of Lincoln's city limits, Nebraska Wesleyan University was established. The following year the site was incorporated as "University Place." By 1926 the community had reached 5,000 residents and was incorporated.

- In 1889, Nebraska Christian University was established. The community in 1890 was incorporated as "Bethany Heights." In 1922 the community residents voted to join Lincoln, and it wasn't until four years later was it annexed.

- In 1892, "College View" was incorporated with 1,000 residents. In 1929 Lincoln annexed the community when the population reached 2,900.

- The blue-collar suburban town of "Havelock", northeast of University Place, was incorporated in 1893. Havelock grew to 3,602 residents by 1920 and actively opposed annexation by Lincoln, until a strike by the Burlington Shops in 1922 continued without resolution.

- West Lincoln, which was established in 1887 on the west bank of the Salt Creek, was annexed in the 1960's after an increased interest in aviation was spawned as a result of the Lincoln Army Air Field (1942). Over 25,000 aviation mechanics were trained in Lincoln and 40,000 troopers were processed for combat through the facility.

### *LINCOLN ELECTRIC SYSTEM (LES)*

Lincoln Electric System (LES), formed on February 1, 1966, is a single power utility that provides power in and around Lincoln, and is owned by the City. In 1970 Lincoln voters approved formation of a semi-autonomous administrative board of local citizens to oversee operations of the non-profit, customer-owned utility. LES currently serves an approximate 200 square miles within Lancaster County, including the communities of Lincoln, Prairie Home, Waverly, Walton, Cheney and Emerald. Lincoln Electric System services over 180,000 residential customers and 15,000 commercial and industrial customers.

### *LINCOLN WATER SYSTEM (LWS)*

Lincoln Water System (LWS) is part of the Public Works and Utilities Department. As defined by the Lincoln Municipal Code Title 17-Water/Wastewater, they are the property, organization, and operation of the public water supply system, waterworks, water mains, and each and every part thereof. They have two treatment plants located in Ashland that serves 240,000 citizens in the City of Lincoln by way of 1,200 miles of pipe; Of the approximate 70,000 water services provided by LWS, 90 percent are residential, the remaining ten percent commercial and industrial. Additionally, LWS provides water for recreational facilities such as parks and pools and maintains a fire protection system that involves over 9,000 fire hydrants.

Currently, as of 2008, Lincoln Water System is undergoing the construction of a new sixty-inch water main to increase capacity for ten miles from Greenwood to Ashland. General fund tax dollars do not support the LWS; water rates pay for planned future expansion, operation, and maintenance costs associated with running the system.

### *LINCOLN WASTEWATER SYSTEM TREATMENT FACILITIES*

The Lincoln Wastewater System treats Lincoln's residential and industrial wastewater at two local facilities; the Theresa Street Plant and the Northeast Facility. Lincoln's wastewater collection dates back to 1888, when the first sewer lines were installed, but it wasn't until 1923 that the original wastewater treatment facilities were constructed at the Theresa Street site. Multiple expansions were made to the Theresa Plant until 1980 when it was decided to construct a second plant, the Northeast Facility.

Continual testing, maintenance and improvements are being made by the 100-plus employees of the Lincoln Wastewater System. Between the two facilities, approximately 24.5 million gallons of wastewater are treated daily. The Theresa Street facility receives close to two-thirds of Lincoln's wastewater, presently treating about 18 million gallons per day, the Northeast facility treating around 6.5 million gallons a day.

### *LINCOLN DEMOGRAPHICS*

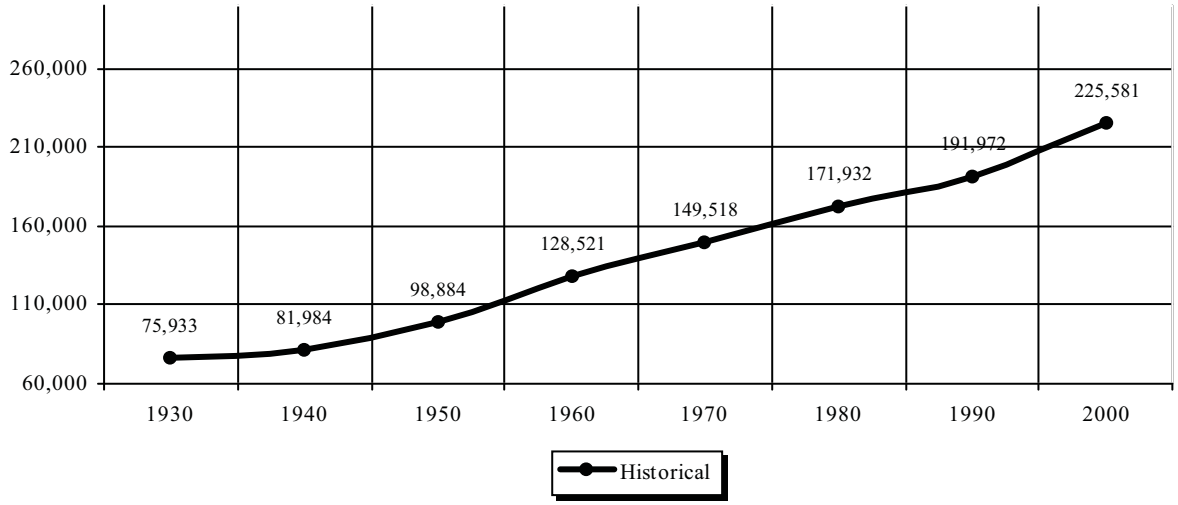
Lincoln's population has steadily increased from 1930 to 2000. Some of the increase was the result of the annexations of surrounding communities. The population has nearly tripled since 1930 to 2000 from 75,933 residents to 225,581 residents.

Between the years of 1990 and 2000, Lincoln and Lancaster County's minority communities more than doubled; markedly occurring within the Black/African Americans, Asians, and "Other" racial groups. This trend is anticipated to continue into the future.

The City of Lincoln's population makes up about 90 percent of Lancaster County's population. The Lincoln/Lancaster County Comprehensive Plan indicates that Lincoln's population is expected to reach 350,000 by 2030, growing at a rate of about 1.5 percent per year.

Lincoln's population density since 1970 has remained about 3,000 persons per square mile. The Lincoln/Lancaster County Comprehensive Plan expects that the overall city-wide population density to stay around 3,000 persons per square mile for the next 25 years.

**FIGURE LNK.3: LINCOLN, NEBRASKA POPULATION 1930-2000**




### *FUTURE DEVELOPMENT TRENDS*

As Lincoln's population grows, so too will the number of structures within. In 1990, Lincoln had 91 percent of Lancaster County's dwelling units at 79,079 units. From 1991 to 2000, dwelling unit construction permits were issued for 17,867 units in Lincoln. In 2000, Lincoln had 91.3 percent of Lancaster County's dwelling units at 95,199. From the 2006 Lincoln/Lancaster County Comprehensive Plan, it is assumed by 2030 that 52 square miles of service limits will be incorporated and somewhere around 53,000 dwelling units will be added. This averages out to be around 2,200 dwelling units per year.

Urban growth in Lincoln is expected to expand in multiple directions around the City. Growth building on the foundations of Lincoln's established neighborhoods, as well as growth and strengthening of its downtown core, are the anticipated primary areas for urban growth and development.

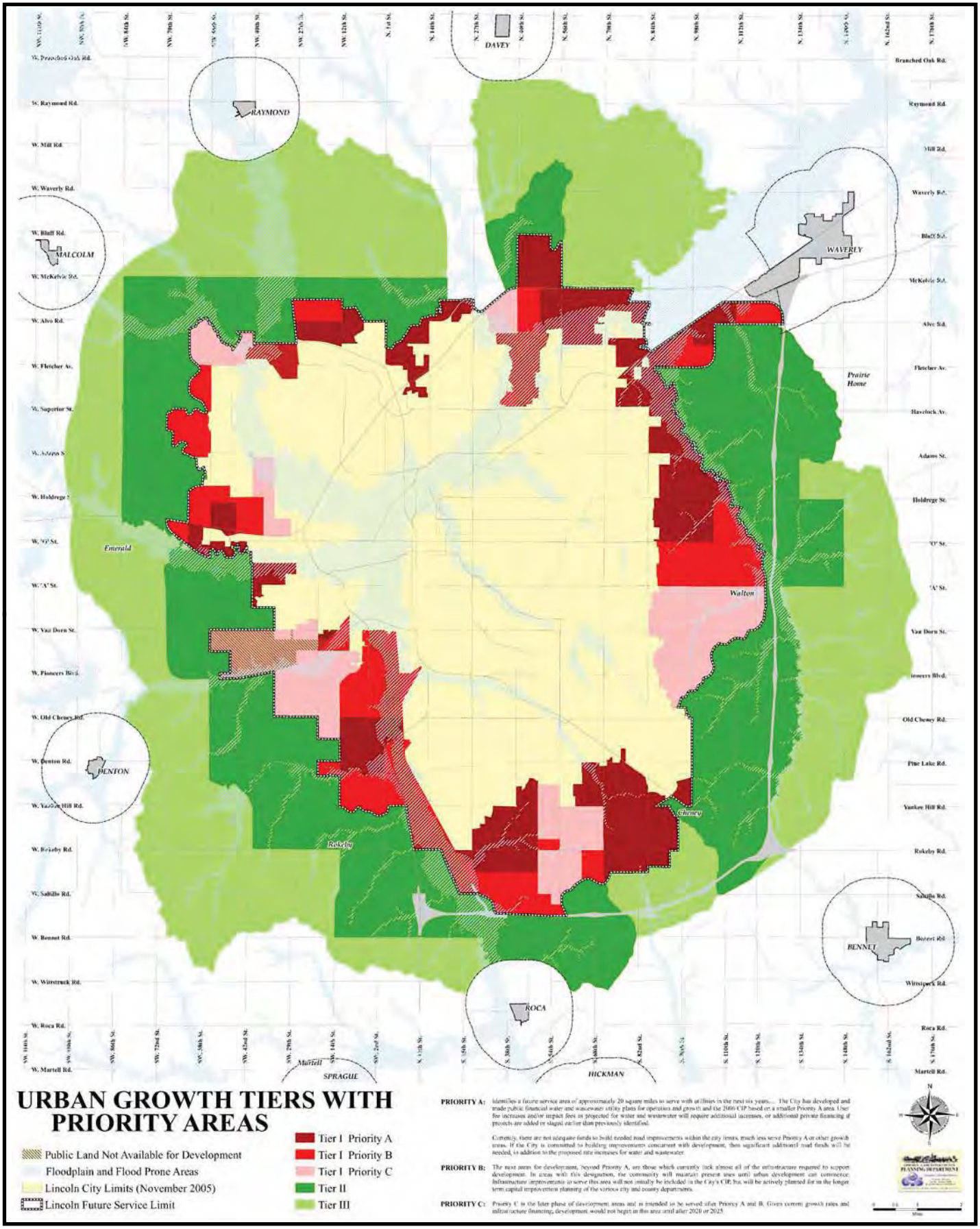
The City of Lincoln encourages the preservation and renewal of historic buildings, districts and landscapes. Development in and around these areas is expected to maintain the integrity of these historical patterns and precedents. Additionally, conservation methods are expected to be implemented when developing in natural, and environmentally sensitive areas.

The following tier map, Figure LNK.4, reflects Lincoln's urban growth tiers with priority areas for the next 50 plus years. This figure is taken directly from the 2006 Lincoln/ Lancaster County Comprehensive Plan.

Tier I is a 52 square mile area that is expected to be developed within the next 25 year period. Land within this area should remain generally in the present use in order to permit future urbanization by the City.

Tier II contains around 70 square miles that is intended to (1) define the geographic area the city is assumed to grow into immediately beyond the 25 year time frame of Tier I; (2) serve as the basis for long term, advanced utility planning; and; (3) act as a secondary reserve area for urban growth should the Tier I area development occur more quickly than assumed for the 25 year period. Tier II should remain in its present use in order to provide for future development.

Tier III is approximately 85 square miles that is indicative of Lincoln's long term growth potential, perhaps 50 years and beyond. No active development or infrastructure planning should occur in this Tier within the next 25 years.




Prepared By: JEO Consulting Group, Inc.
Source of Aerials and City Limits: NDNR
Software Used: ESRI ArcView 9.2 sp2

THIS MAP PREPARED USING INFORMATION FROM RECORD DRAWINGS SUPPLIED BY JEO AND/OR OTHER APPLICABLE CITY, COUNTY, STATE, FEDERAL OR PUBLIC OR PRIVATE ENTITIES. JEO DOES NOT GUARANTEE THE ACCURACY OF THIS MAP OR THE INFORMATION USED TO PREPARE THIS MAP.

Created By: J. Nelson, July 25, 2008
Contact Person: Jared Nelson
JEO Project Number: 385023

**City of Lincoln NE**
**- Lower Platte South NRD Hazard Mitigation Plan -**
**Figure LNK.4: Urban Growth Tiers with Priority Areas**
**From 2006 Lincoln/Lancaster Comprehensive Plan**

JEO Consulting Group, Inc.

## *PLANS, DOCUMENTS, AND INFORMATION USED*

Throughout the planning process, a number of studies, reports and technical information have been used to develop the plan. General sources of information used for all sections of the plan are discussed in *Section 2: Planning Process.* Below is a list of specific sources used to establish Lincoln's participant section and their program status as provided by Lincoln.

**TABLE LNK.1: SOURCEES, REPORTS, REGULATIONS, AND PROGRAMS**

| Source/Report/Regulation | Yes/No | Date Completed | Incorporated into Plan? |
|---|---|---|---|
| http://www.lincoln.ne.gov/ | Yes | Current | Yes |
| Lincoln Journal Star | Yes | Various | Yes |
| Comprehensive Plan | Yes | November 16, 2006 | Yes |
| Zoning | Yes | Adopted May 8, 1979; | No |
| Subdivision Regulations | Yes | May 19, 1975 updated | No |
| Floodplain maps and FIS | Yes | September 21, 2001 | Yes |
| Lancaster County Local Emergency Operations Plan | Yes | January 1, 2007 | Yes |
| Hazard Assessment Plan | Yes | January 27, 2007 | Yes |
| Beal Slough Master Plan Report | Yes | May 2000 | No |
| Cardwell Branch Master Plan Report | Yes | Draft September 2007 | No |
| Lower Little Salt Creek Interim Storm Water Hydrology and Hydraulics Report | Yes | N/A | No |
| Southeast Upper Salt Creek Master Plan Report | Yes | October 2003 | No |
| Stevens Creek Master Plan Report | Yes | March 2005 | No |
| Deadman's Run Master Plan Study | Yes | N/A | Yes |
| Little Salt Creek Master Plan Study | Yes | In Progress | No |
| Floodplain Task Force Report | Yes | March 2003 | No |
| Preliminary Flood Reduction Study Antelope Creek South 27th to South 56th | Yes | In Progress | Yes |
| Lincoln Comprehensive Watershed Management Plan (in conjunction with NRD) | Yes | In Progress | No |
| Phase 1 & 2 Beal Slough at 40th Street, Flood Reduction Study | Yes | November 2007 | Yes |
| Preliminary Flood Reduction Study, Beal Slough—Pioneers Boulevard to Southwood Drive | Yes | July 26, 2007 | Yes |
| **Program** | **Participation?** | **Membership Date** | **Incorporated into Plan?** |
| CRS | Yes | October 1, 1999 | Yes |
| NFIP | Yes | April 23, 1971 | Yes |

# CITY OF LINCOLN RISK ASSESSMENT

The City of Lincoln's risk assessment was established through public input, information provided by participating citizens of Lincoln, government officials, and by research of each hazard identified in the State of Nebraska Hazard Mitigation Plan.

## *HAZARD IDENTIFICATION*

Below, in Table LNK.2 is a composite of hazards identified in the community, their likelihood to occur again, and to what extent damage may occur. The Lincoln 'Public Opinion Composite Hazard Identification' table was compiled after receiving responses from the public and community officials.

**TABLE LNK.2: PUBLIC OPINION COMPOSITE HAZARD IDENTIFICATION TABLE**

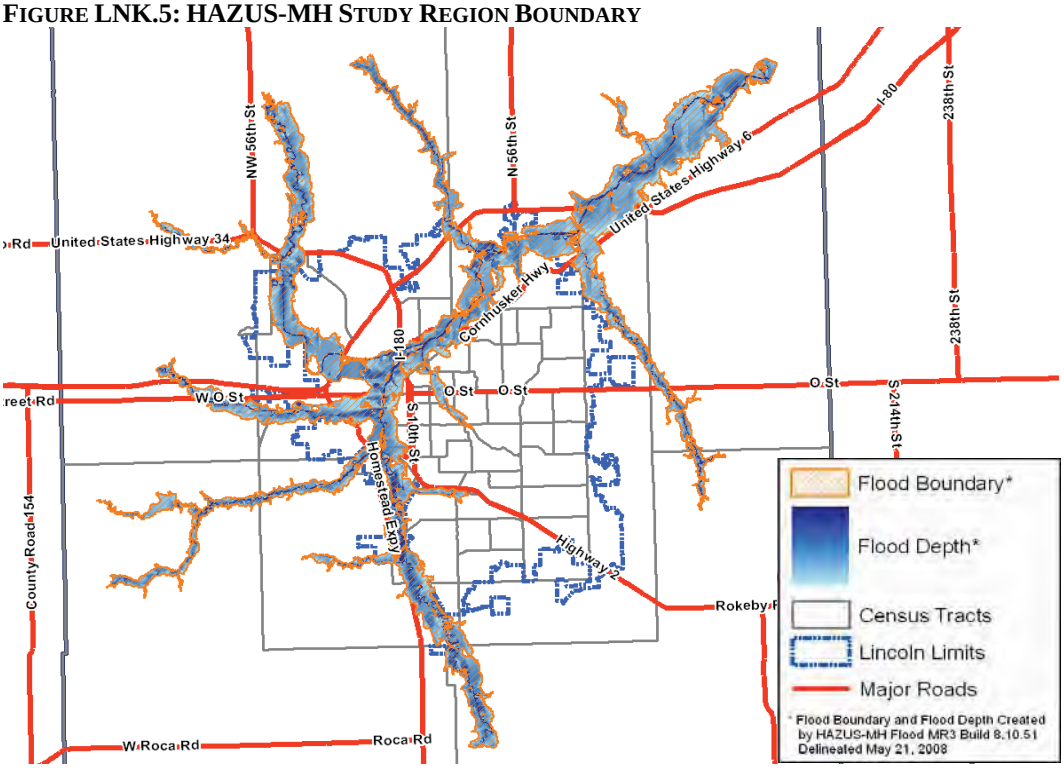
| HAZARD TYPE | PREVIOUS OCCURRENCE? Yes/No | LIKELY TO EXPERIENCE? Yes/No | PROBABILITY Highly Likely/ Likely/Possible/Unlikely | EXTENT Catastrophic/Severe/Limited/None |
|---|---|---|---|---|
| Severe Winter Storm | Yes | Yes | Highly Likely | Severe |
| Tornado/High Winds | Yes | Yes | Likely | Catastrophic |
| Severe Thunderstorm | Yes | Yes | Highly Likely | Severe |
| Flooding | Yes | Yes | Likely | Severe |
| Extreme Heat | Yes | Yes | Possible | Limited |
| Drought | Yes | Yes | Likely | Limited |
| Earthquake | No | Yes | Possible | Limited |
| Wildfire | No | No | Unlikely | Limited |
| Landslide | Yes | Yes | Possible | Limited |
| Dam Failure | No | Yes | Possible | Limited |
| Levee Failure | No | Yes | Possible | Limited |

In the following sections the hazard types which have a significant likelihood of occurring, or have reason to potentially occur, are discussed. Due to geographic location, the following hazard types were not considered: volcanic eruption, avalanches, tidal surges and tsunamis. As discussed in *Section 3: Risk Assessment*, wildfires also do not pose a significant enough threat to warrant a detailed discussion for Lincoln.

## *STRUCTURAL INVENTORY AND VALUATION*

A structural inventory and loss estimate was completed for the corporate limits of Lincoln using FEMA's HAZUS-MH Loss Estimation Software. As described in *Section 2: Planning Process,* the HAZUS software employs a Digital Evolution Model (DEM) and performs hydrology and hydraulic calculations to identify a 100-year flood boundary and obtain flood depths for the study area. See Figure LNK.5 for this estimated flood boundary generated by HAZUS. It shall be noted that this flood boundary and flood depth should not be used for insurance purposes. The structural inventory and loss valuation was calculated by HAZUS using Census Tract data.

**FIGURE LNK.5: HAZUS-MH STUDY REGION BOUNDARY**




The following Table LNK.3 shows the Building Exposure by Occupancy Type for the study region, as calculated by HAZUS. This table indicates the exposure or value of the different general occupancy types. HAZUS estimated that buildings in the region have an aggregate total replacement value of $17,190,725,000 (2006 dollars). This number seems reasonable since the 2008 valuation indicated in the Nebraska Directory of Municipal Officials recorded that the City of Lincoln has a valuation of $15,657,130,261. The discrepancy can be explained due to the fact that the Census Tracts used in HAZUS extended beyond the Corporate Limits of Lincoln.

**TABLE LNK.3: BUILDING EXPOSURE BY OCCUPANCY TYPE**

| Occupancy | Building Exposure |
|---|---|
| Residential | $12,403,109,000 |
| Commercial | $3,038,325,000 |
| Industrial | $800,979,000 |
| Agricultural | $68,504,000 |
| Religion | $292,829,000 |
| Government | $229,113,000 |
| Education | $357,866,000 |
| **TOTAL** | **$17,190,725,000** |

In terms of the number of structures in the City of Lincoln, HAZUS indicated there are 97,179 housing units in Lincoln. The 2006 Lincoln/Lancaster Comprehensive Plan indicated 95,199 housing units in Lincoln. The discrepancy here can also be explained due to the fact that the Census Tracts used in HAZUS extended beyond the Corporate Limits of Lincoln. According to the HAZUS model, 89,445 buildings, or 92.04 percent of Lincoln's 97,179 housing units, are associated with residential housing. Figure LNK.6 shows the parcels in Lincoln broken down by primary use of the parcel. Parcel Data was obtained from the Lancaster County Assessors office. The primary usage in this map utilizes where the different structure types are located.

### *CRITICAL FACILITIES AND SIRENS*

Critical facilities were identified through the Emergency Support Functions (ESF) of Lancaster County's Critical Infrastructure. Critical facilities are structures with either historical significance, or are essential for returning the community's functions to normal during and after a disaster. Critical facilities are those which are vital for disaster response and providing shelter to the public.

The ESF is maintained by the Lincoln/Lancaster County Emergency Operations Center (EOC) as Critical Infrastructures and according to the FEMA website, the ESF provides the structure for coordinating federal interagency support for a federal response to an incident. They are mechanisms for grouping functions most frequently used to provide federal support to states and federal-to-federal support; both for declared disasters, and emergencies under the Stafford Act and for Non-Stafford Act incidents.

The critical infrastructures are organized under the following ESF categories with their coordinating quantities in Lincoln, Table LNK.4. The complete list of structures described by the ESF may be found in the Lincoln/ Lancaster County LEOP for all of Lancaster County.

Due to limited resources and data limitations of locations, locations of all critical facilities in Lincoln was not discussed or displayed in a map for this plan. This could be done in future updates of the plan.

**TABLE LNK.4: LINCOLN CRITICAL INFRASTRUCTURE BY ESF CATEGORY**

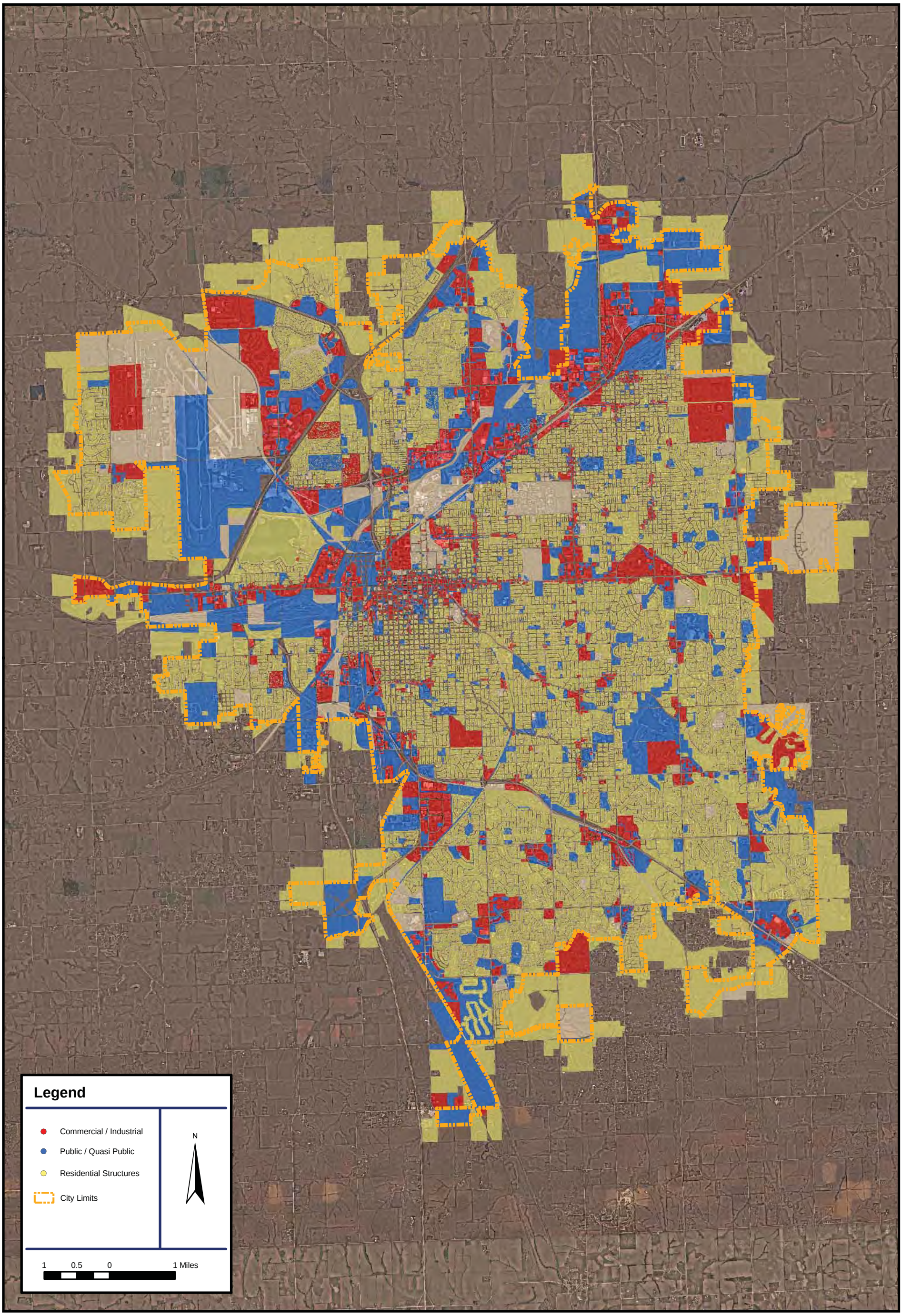
| ESF Category | # of Structures |
|---|---|
| ESF 1- Transportation | 19 |
| ESF 2- Communications | 16 |
| ESF 3- Public Works | 19 |
| ESF 4- Firefighting | 27 |
| ESF 5- Information and Planning | 252 |
| ESF 6- Mass Care | 8 |
| ESF 7- Resource Support | 14 |
| ESF 8- Health and Medical | 47 |
| ESF 9- Search and Rescue | 1 |
| ESF 10- Hazardous Materials | 11 |

The HAZUS model run for the City of Lincoln identified the following "Essential Facilities":

- 5 Hospitals
- 97 Schools
- 19 Fire Stations
- 2 Police Stations
- 1 Emergency Operations Center

Warning siren locations and ranges were identified through discussions with the Lancaster County Emergency Manager. The Lincoln/Lancaster EOC maintains a listing of all sirens in the County and can trigger all of them from their office in Lincoln, NE. All the sirens are on a regular maintenance schedule. In Lincoln, the electric system is organized in a grid style which helps ensure there is power always reaching the sirens. See Figure LNK.7 for a map showing the siren ranges and locations. There are three different types of sirens in Lincoln, as indicated by color in Figure LNK.7:

- Pink: Federal T22 90 decibels 2000 FT Effective Range
- Green: Federal Thunderbolt 104 decibels 4000 FT Effective Range
- Yellow: Federal Signal Sirens 128 decibels 5280 FT Effective Range




LNK.6

Prepared By: JEO Consulting Group, Inc.
Source of Aerials and City Limits: NDNR
Software Used: ESRI ArcView 9.2 sp2

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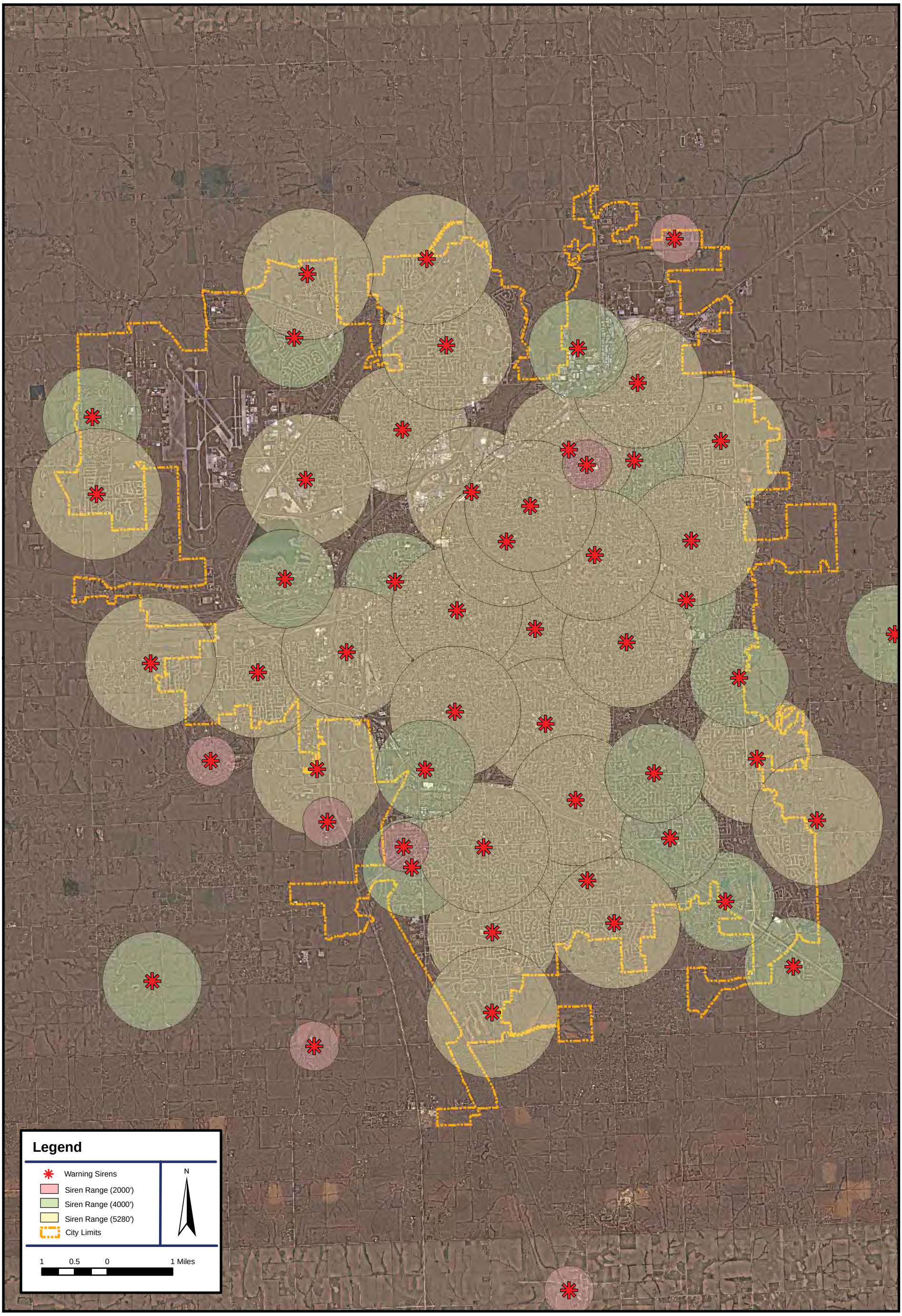
Created By: M Schwab, July 23, 2008
Contact Person: Jared Nelson
JEO Project Number: 385D23

**City of Lincoln, NE**
**- Lower Platte South NRD Hazard Mitigation Plan -**
**Figure LNK.6: Primary Use of Parcels in Lincoln**

JEO Consulting Group, Inc.




LNK.7

Prepared By: JEO Consulting Group, Inc.
Source of Aerials and City Limits: NDNR
Software Used: ESRI ArcView 9.2 sp2

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Created By: M Schwab, July 22, 2008
Contact Person: Jared Nelson
JEO Project Number: 385D23

**City of Lincoln, NE**
**- Lower Platte South NRD Hazard Mitigation Plan -**
**Figure LNK.7: Warning Siren and Warning Siren Coverage Area**

JEO Consulting Group, Inc.

The following sections provide historical occurrences, vulnerability assessments, potential losses and other hazard specific information for the City of Lincoln. Historical occurrence data was collected from a number of resources including: The National Climatic Data Center (NCDC), the world's largest archive of weather data, administered by the NOAA and U.S. Department of Commerce, The Lancaster County Local Emergency Operations Plan (LEOP), 2007, The Tornado History Project Database, The Lincoln Water System, The Lincoln Journal Star, and reports as documented by, local community members.

For a general background and description of each hazard see S*ection 3: Risk Assessment.*

### *SEVERE WINTER STORM*

Historical Occurrences
The Lancaster County LEOP reports four separate severe winter storm occurrences for the City of Lincoln:

- **October 9, 1970**: The Columbus Day snowstorm dumped 6.6 inches of snow on the City causing extensive tree damage.

- **January 12, 1975:** The snowstorm referred to as "The Blizzard of the Century", produced 16 inches of snowfall that transpired over a 24 hour period. Both of Nebraska's metropolitan cities, Lincoln and Omaha, were brought to a standstill. Record low atmospheric pressures in the region were recorded, and strong winds created snow drifts reaching 15 feet.

- **1982:** An ice storm caused massive power outages. Nearly all of Lancaster County was impacted and some of the county residents were without power for three days.

- **January 26, 1994:** Freezing rain and sleet caused icing of trees and power lines. Some electrical outages also occurred. $50,000 worth of property damage was incurred.

- **September 22, 1995:** Record low temperatures from the lower 20s to the lower 30s put an end to an already stunted growing season across the Midlands. Nearly the entire state fell below 28 degrees. Hardest hit were the milo, soybean, and corn crops. Crop damages reported were $262 million.

- **October 25, 1997:** A rare winter storm brought 13 inches of wet, heavy, snow that weighed down and broke power lines and tree limbs. As a result, many residential areas and businesses were without power for several days and some areas for over a week. "Disaster areas" were declared and accrued over $50 million in public property damage. The clean up was extensive, continuing well into the following summer. The Lincoln Water System reported that they were without power at three critical pumping stations for several hours. The Lincoln Airport and West Lincoln business areas were two pressure districts affected by the storm.

Sever winter storms generally affect a broad area, devastating numerous communities, and sometimes entire counties. Lincoln is no stranger to the affects of severe winter storms. There were no specific historical winter storm occurrences mentioned by the community.

No other historical occurrences in Lincoln were recorded by residents, city officials, or found in any other document.

Potential Losses
During major events, Lincoln's entire structural valuation of $15,657,130,261 is at risk. Based upon statewide information from the NCDC, 543 incorporated communities have recorded personal property damage from ice storm events over the last 57 years. The average amount of damage per event in Nebraska was $1.82

million. Throughout the Midwest, average damage per event was $2.27 million. Based upon previous occurrences of severe winter storms and their damages in eastern Nebraska, it is estimated that Lincoln could likely sustain potential losses between $80 million and $160 million. This does not include loss due to displacement, functional downtime, economic loss, injury or loss of life. A loss of electricity due to downed power lines can negatively affect any jurisdiction's economy, cause loss of power to critical facilities, such as waste water plants and health facilities, and pose a threat to human life.

### *TORNADO AND HIGH WINDS*

Historical Occurrences

Below is a listing of historical occurrences or tornado and high wind events as reported by the Tornado History Project Database, The National Climatic Data Center (NCDC), and the Lancaster County LEOP, 2007. No additional reports were found for the City of Lincoln nor did any community member make reference to any additional tornadic or high wind events. Refer to neighboring communities' 'participant sections' for the tornado and high wind events in their communities.

The following information was reported by the Tornado History Project database:

- **June 6, 1971:** Two tornados hit the City of Lincoln causing a total of $6,000 in damage.
- **April 27, 1975:** A category F0 tornado in the City caused $25,000 in damage.
- **August 15, 1977:** A tornado in the City caused $25,000 in damage.
- **May 22, 2004:** An F4 touched down in Hallam that resulted in one death and $100 million in property damage.

The NCDC reports two tornadic events in Lincoln:

- **May 8, 1995:** A funnel cloud was reported.
- **May 22, 1996:** An F0 tornado was reported. Fortunately no injuries or monetary damages resulted.

Lancaster County LEOP 2007, reports three tornadic occurrences:

- **1957:** An F4 tornado damaged residential structures, there were no deaths or injuries reported.
- **1975:** An F4 tornado touched down in the northwestern portion of Lincoln. A significant amount of property damage was incurred, however there were no deaths or injuries reported.
- **1993:** A strong summer storm with 90 mph straight line winds spawned four small tornados that moved across Lincoln and the northern part of Lancaster County. There were thousands of trees destroyed and several millions of dollars in property damage.

No other historical occurrences in Lincoln were recorded by residents, city officials, or found in any other document.

Potential Losses

A large scale tornado, such as an EF5, has the potential to devastate Lincoln. Nebraska's most devastating tornado even occurred only 15 miles away in Hallam; On May 22, 2004 an F4 tore through the community, causing damages over $100 million effectively destroying the whole community. Based on historical

occurrences in southeast Nebraska, a reasonable estimation of the potential structural damages incurred from a tornadic event could be between $200 million and $1 billion if it were to strike the downtown area. A large EF5 tornado could have a path several miles wide, and every structure and critical facility in its path could be destroyed. Additionally, there could be substantial loss of contents, loss due to displacement, functional downtime cost, economic loss, injury and loss of life.

### *SEVERE THUNDERSTORMS*

Historical Occurrences

According to the NCDC, the City has a reported 95 thunderstorms from 1993 to 2006 with a net total damage of nearly $2 million. Much of the damage was caused by lightning strikes that led to fires. Additional property damage was incurred by strong winds and large, 4.5 inch diameter hail. Other than what is listed below, no other information or details were identified for Lincoln's historical occurrences of severe thunderstorms.

Specific occurrences and monetary damaged incurred as recorded by the NCDC are as follows:

- **May 7, 1993:** $50,000 in property damage was caused by a lightning strike at a radio station that damaged a computer system, telephone and satellite equipment.

- **September 2, 1995:** $20,000 in property damage resulted from 4.5 inch diameter hail.

- **May 22, 1996:** $1.4 million in property damage occurred when 83 mph winds blew the roof off at the Duncan Aviation facility and overturned multiple aircrafts. The roof at the State Fair Park's grandstand was also damaged. The City also suffered damage to power lines and trees.

- **August 14, 1996:** $20,000 worth of property damage occurred when 80 mph winds snapped the gates of a railroad crossing, damaged fences and several businesses.

- **July 10, 1997:** $25,000 worth of property damage was caused when a lightning set fire to the roof of a home.

- **August 19, 2003:** $90,000 in property damage was caused by lightning that struck three businesses resulting in smoke, fire, and electrical damage.

- **August 8, 2006:** $225,000 in property damage resulted from a lightning strike that set fire to a laundry facility.

The Lincoln Journal Star reports:

- **August 1, 1981:** A 25 year storm hit, producing from 4.3 to 5.5 inches of rain in some areas.

- **September 25, 1981:** A storm producing three inches of rain in the southern and eastern part of the City caused two major power outages and six or seven smaller ones. The 911 call center reported receiving an estimated 150 phone calls regarding flooded basements.

- **June 22, 1981:** Hail, heavy rains, flooding, strong wind gusts and lightning damaged power lines, vehicles, and trees.

In August 2007, the Lincoln Water System also reported that a thunderstorm with high winds damaged power lines and transformers in several counties within southeast Nebraska. Electrical power at the Treatment Plant

was sporadic for two hours. They were also unable to pump water from all of Lincoln's well fields to the plant for 10 hours.

No other historical occurrences in Lincoln were recorded by residents, city officials, or found in any other document.

Potential Losses
Severe thunderstorms occur on an irregular basis with varying magnitudes and can cause a wide degree of damages that can range from a few downed limbs to wide spread tree loss, hail damage, and damage to property. Based upon the historical occurrences Lincoln's worst event caused $1.4 million in damage, it would not be unreasonable to predict that this amount of damage could be incurred again. If multiple businesses and homes were affected by hail, lightening, and wind, damages could reach $10 million. Additionally, there could be losses due to displacement, functional downtime, as well as injury, and loss of life.

### *FLOODING*

Historical Occurrences
The NCDC reports three flash flood occurrences, one of which reported damages:

- **August 14, 1996:** $60,000 in reported property damage was caused by four inches of rain that produced a flash flood. Local businesses and homes were also damaged.

The following list of storms and information was provided by the Lancaster County LEOP:

- Salt Creek flooded 136 times between 1900 and 1952. Of these events, 22 were considered major.

- **May 8, 1950:** Salt Creek peaked at a height of 26.05 feet with a flow of 27,800 cfs. This occurred after 5.5 inches of rain fell in six hours and accumulated to 14 inches. 20,000 acres of land was flooded including 600 homes and 80 businesses. The total damage incurred amounted to $1,643,000 and nine deaths.

- **June 2, 1951:** Antelope Creek flooded. Water was waist deep at 28$^{th}$ and D streets, and one foot deep at 33$^{rd}$ and Normal. Salt Creek peaked at 26.15 feet with a flow of 28,200 cfs.

- **June 14, 1951:** Antelope Creek flooded. Eight inches of rain fell and caused $2,000,000 worth of damage. 92 businesses, 298 homes and the railroad were all damaged in the area.

- **June, 1952:** Another Antelope Creek flood occurred when 2.18 inches fell, causing $63,000 in damage.

- Between 1962 and 1993, a series of eight floods occurred on Salt Creek. The total amount of federal funds contributed was $668,800, with the largest lump sum contribution of $487,185 in 1993.

- **June 13, 1984:** Little Salt Creek flooded when three to four inches of rain caused the creek to peak at 16.20 feet and flow 7,500 cfs. The flood was classified as a 10-year flood.

The Lincoln Journal Star recounts the following flood events:

- **1892:** Extensive flooding drove 300 people from their homes.

- **1902:** Flooding left 1,000 residents homeless and caused 9 deaths.

- **July 23, 1993:** Little Salt Creek peaked at 4 feet over flood stage. Lynn and Stevens Creek tributaries left their banks flooding streets, parking lots, businesses, and homes. The City received $823,997 from the Federal Emergency Management Agency for partial damage reimbursement. The total damage to public property was $2.9 million.

- **June 15, 1982:** Stevens Creek peaked at a height of 18.85 feet with a flow of 3,820 cfs. Up to five inches of rain blocked roads, threatened homes, and left cars stranded in high water. There was a police advisory encouraging Lincoln residents not to drive and at one point during the downpour, the police were instructed to park their cruisers unless they were needed somewhere. Lincoln Electric System reported several power outages, one of which was the result of flooded underground cables.

- **June 13, 1984:** Stevens Creek flooded with a peak of 19.57 feet and a flow of 4,620 cfs. The flood was classified as a 10-year flood and it claimed two lives when a car was swept off Highway 34.

- **July 4, 1984:** Water back log from Beal's Slough caused damage to local area businesses. One business reported damage of $4,000.

- **September 13, 1989:** Heavy rains caused $20,000 in damage to Lancaster County rock and gravel roads.

- **July 25, 1990:** Five inches of rain washed out roads, flooded basements, damaged businesses, and flooded parking lots.

Participants from the City of Lincoln recollected the following events:

- **March 1993:** The Lincoln Water System reports an ice jam on the Platte River that caused severe flooding along Salt Creek and Highway 6. The flood waters eroded embankments and exposed a 48-inch and 54-inch water transmission line from one of the Lincoln Water System's well fields. This exposure caused sections of the pipe line to break and float away.

- **July 24, 1993:** Flooding resulted when Lincoln received three times the normal amount of rain for July.

- **July 20, 1996:** Beal Slough flooded when over five inches of rain fell in south Lincoln over an 18 hour period. Flooding occurred on a number of roadways including Highway 2. Residential basements and recreational areas were flooded. Flooding also occurred near 33rd Street and Pioneers Boulevard as well as in many areas along the Tierra Branch in the Tierra, Williamsburg, Seven Oaks, and Cripple Creek Subdivisions. A similar incident occurred in 1989 when heavy rains filled and overtopped the creek. The waters spread to Tierra and Briarhurst Parks, and other nearby open spaces.

No other historical occurrences in Lincoln were recorded by residents, city officials, or found in any other document.

Vulnerability Assessment

It was determined that the flooding hazard area boundaries are limited to the estimated 100-year flood boundary as shown in Figure LNK.8. The estimated 100-year flood boundary shows the up-to-date 'Flood prone Area' boundaries and Floodways that are being submitted to FEMA to update the FEMA floodplains maps. They were obtained from the City of Lincoln, and have been formally recognized by resolution of the

Lincoln City Council as the best available information for local flood regulations. However, they have not been through a final review by FEMA and should not be used for insurance purposes.

The model build in HAZUS was run to simulate a 100-year storm. As previously discussed, HAZUS generated its own estimated flood boundary as shown in Figure LNK.5. These structures along with critical facilities within the flood boundary are susceptible to flooding. HAZUS also estimated that there are 938 structures that could be damaged by a 100-year flood. HAZUS estimates there are two fire stations that would suffer moderate damages, five schools with moderate damage and one school will not be able to be used. These are the only essential facilities that HAZUS reported being affected by flooding. The damages which may be caused by flooding include loss of structures, destruction of infrastructure such as bridges and roads, loss of utilities, and potentially loss of life. Due to limited resources, losses associated with utilities, roads, and bridges were not calculated.

It should be noted that the City of Lincoln identifies 5975 insurable structures in the floodplain within Lincoln city limits and the three mile extraterritorial jurisdiction while the HAZUS program estimates 938 structures damaged in a flood. The discrepancy between the number of structures in the floodplain recorded by the City, and the number of structures damaged reported by HAZUS, is due to the methodology used by the HAZUS program which assigns a 100-year flood hazard boundary that does not include all tributary flooding and determines a percentage of structures within that area that are damaged, based on Census Tract data from the 2000 census. In future updates of the Plan, potential damage to structures in the floodplain could be refined.

Potential Losses

According to HAZUS, the total building exposure by occupancy type for a 100-year flood is $2,207,335,000. Below, in Table LNK.5, the Building Exposure and Damages by Occupancy Type is shown for the flooding scenario. This information in the Table is also taken from HAZUS and can be found in Appendix C.

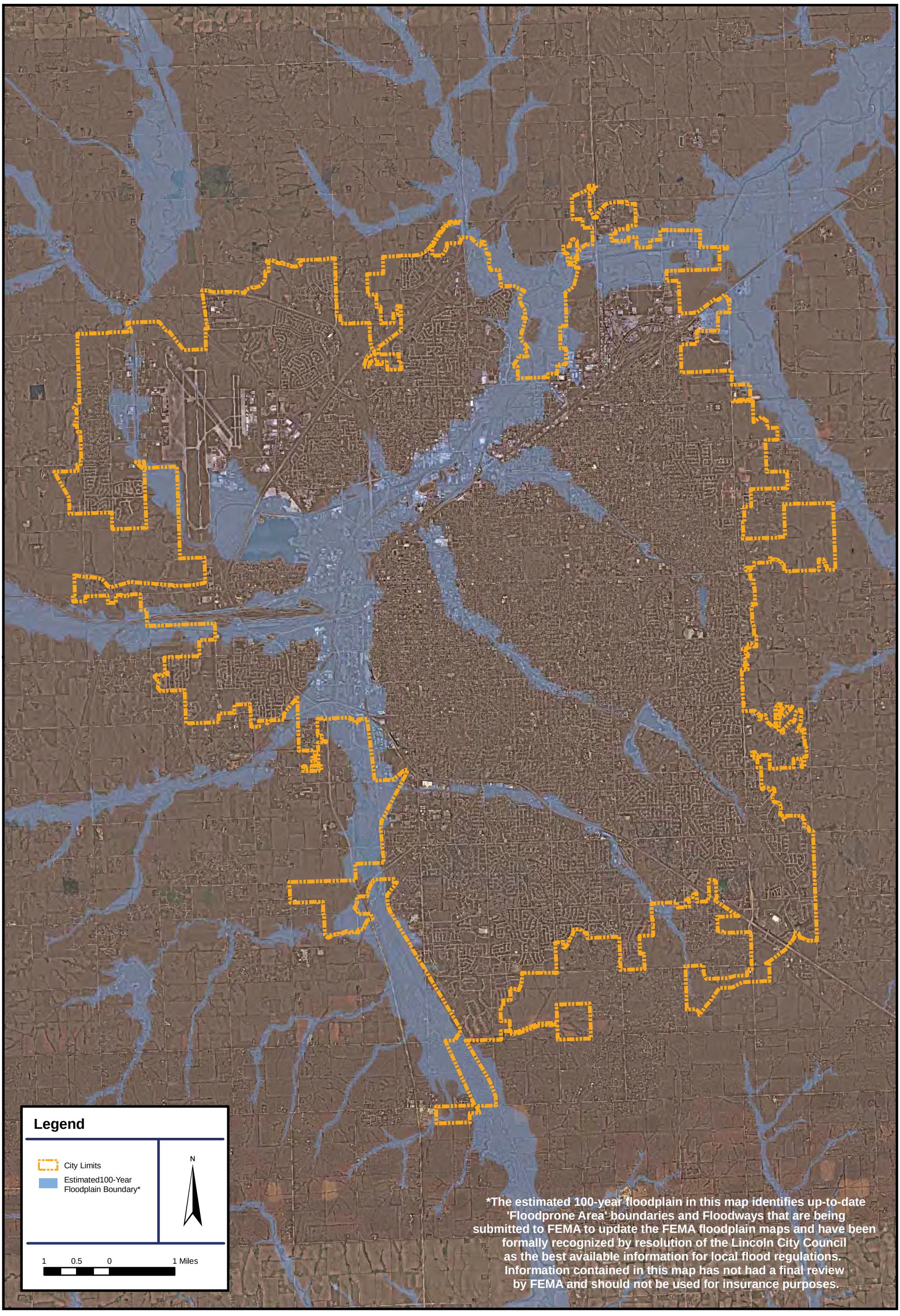
**TABLE LNK.5: BUILDING EXPOSURE AND DAMAGES BY OCCUPANCY TYPE**

| Occupancy | Building Exposure | Slightly Damaged (1-10%) | Moderately Damaged (11-50%) | Substantially Damaged (51-100%) |
|---|---|---|---|---|
| Agriculture | $15,489,000 | 0 | 1 | 0 |
| Commercial | $614,180,000 | 4 | 35 | 0 |
| Education | $86,453,000 | 1 | 0 | 0 |
| Government | $43,316,000 | 1 | 2 | 0 |
| Industrial | $294,127,000 | 0 | 9 | 0 |
| Religion | $27,570,000 | 0 | 1 | 0 |
| Residential | $1,126,200,000 | 8 | 642 | 234 |
| **TOTAL** | **$2,207,335,000** | **14** | **690** | **234** |

HAZUS also estimated that in a 100-year flood event 3,614 households would be displaced. Displacement, as indicated by HAZUS, includes households evacuated from within or very near to the inundated areas. Of these, 9,153 people will need to seek temporary shelter in public shelters. The model further estimates 51,223 tons of debris will be generated and this flooding will cause $547.16 million in total economic loss, 99 percent of which being building-related.

Community Rating System

The City of Lincoln is a Community Rating System (CRS) eligible community. They entered the program on October 1, 1991 and have been current effective date of May 1, 2003. They are currently class seven, their community number is 315273. It is important for Lincoln to remain a CRS community as it educates citizens to reduce risk and reduce insurance rates.




LNK.8

Prepared By: JEO Consulting Group, Inc.
Source of Aerials and City Limits: NDNR
Software Used: ESRI ArcView 9.2 sp2

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Created By:M Schwab, July 23, 2008
Contact Person: Jared Nelson
JEO Project Number: 385D23

**City of Lincoln, NE**
**- Lower Platte South NRD Hazard Mitigation Plan -**
**Figure LNK.8: Structures Located within Estimated 100-Year Flood Boundary**

JEO Consulting Group, Inc.

### *LANDSLIDE*

Historical Occurrences
According to the University of Nebraska Lincoln's School of Natural Resources Landslides in Nebraska Database, there have only been two landslide occurrences in Lincoln:

- **October 1, 1985:** A rotational slide slope movement of earth material, Peorian loess over glacial till, caused by a road cut occurred at I-180 and Superior Street on the east facing slope.

- **March 15, 1987:** A rotational slide slope movement of earth, geologically described as Pleistocene materials, caused by a stream cut occurred on the bike path on Capitol Parkway and Washington on the east facing slope.

Vulnerability Assessment
While landslides don't generally occur in Southeast Nebraska, there are particular man-made areas that are more vulnerable to them. Landslides in Lincoln have only occurred along cuts in the roads and highways. Any area where man-made or constructed slopes are too steep, it is susceptible to landslides. This is especially true along highways in Lincoln such as I-80, I-180, Hwy 2, Hwy 6, Hwy 34 and Hwy 77.

The slopes along these interstates and highways vary greatly and, due to limited resources, it was not feasible to identify specific locations that are vulnerable to landslides.

Potential Losses
Potential losses from a landslide event vary greatly depending on the area it affects. Road damages can vary in repair costs, and it is also possible for a landslide to occur without causing any monetary losses. Landslides also damage the land or the hillsides, making roadway conditions unsafe. It would be accurate to say that, depending on the magnitude and severity of a landslide event, losses could reach $100,000. Additionally, landslides potentially present a threat to life and functional downtime if a road closure occurs.

### *DAM FAILURE*

Historical Occurrences
In Lincoln, there have been no historical occurrences of dam failure recorded by residents, city officials, or found in any other resources.

Vulnerability Assessment
Dam failure has not occurred in the past but could occur in the future. According to the NDNR dam database, 22 high hazard dams are upstream of the City of Lincoln.

After reviewing the NDNR dam database and holding discussions with the NDNR, 14 high hazard dams could potentially inundate parts of Lincoln. The high hazard dams that could inundate parts of Lincoln outside of the 100-year floodplain are noted with an asterisk below. The remaining eight high hazard dams include an inundation area that remains upstream of Lincoln, or is contained within the 100-year floodplain; therefore, if any effects due to these eight dams failing are observed, said effects would be similar to a flood. The effects and damages of flooding are covered under the "Flooding" section of this report.

Figure LNK.9 shows the low, significant and high hazard dams upstream of Lincoln. The 22 high hazard dams, listed by their State Identification Number are as follows:

| NIDID | Dam Name | County | Year Completed | Last Inspected |
|---|---|---|---|---|
| NE00068 | Oak-Middle 82-B | Seward | 1963 | 4/23/2007 |
| NE00076 | Oak-Middle 84-A | Seward | 1964 | 4/23/2007 |
| NE00523 | Upper Salt Creek 35-A | Lancaster | 1961 | 8/24/2007 |
| *NE00527 | Wedgewood Lake Dam | Lancaster | 1961 | 7/5/2006 |
| NE00533 | Upper Salt Creek 10-A | Lancaster | 1963 | 1/5/2006 |
| *NE01055 | Conestoga/Site 12 | Lancaster | 1964 | 5/13/1999 |
| *NE01056 | Wagon Train/Site 8 | Lancaster | 1963 | 5/19/2007 |
| *NE01057 | Pawnee/Site 14 | Lancaster | 1965 | 5/13/1999 |
| *NE01058 | Yankee Hill/Site 10 | Lancaster | 1965 | 8/27/2004 |
| *NE01059 | Stagecoach/Site 9 | Lancaster | 1964 | 5/19/2007 |
| *NE01060 | Twin Lakes/Site 13 | Seward | 1965 | 8/27/2004 |
| *NE01061 | Holmes Lake/Site 17 | Lancaster | 1962 | 5/25/2006 |
| *NE01062 | Olive Creek/Site 2 | Lancaster | 1964 | 5/18/2005 |
| *NE01063 | Branched Oak/Site 18 | Lancaster | 1967 | 5/19/2005 |
| *NE01064 | Bluestem/Site 4 | Lancaster | 1963 | 5/24/2006 |
| *NE02516 | Hartland Homes North Dam | Lancaster | 1972E | 12/23/2005 |
| NE02518 | Upper Little Nemaha 21 | Lancaster | 1998E | 3/23/2007 |
| NE02652 | Korver Dam | Lancaster | 2003 | 1/9/2008 |
| NE02757 | Stevens Creek A17-1 | Lancaster | 2005 | 7/24/2007 |
| *NE02805 | Campbell Dam | Lancaster | 2006 | 1/9/2008 |
| NE02837 | Waterford Estates Dam | Lancaster | 2008 | N/A |
| *NE02366 | Highlands Golf Course Dam | Lancaster | 1992 | 3/11/2005 |

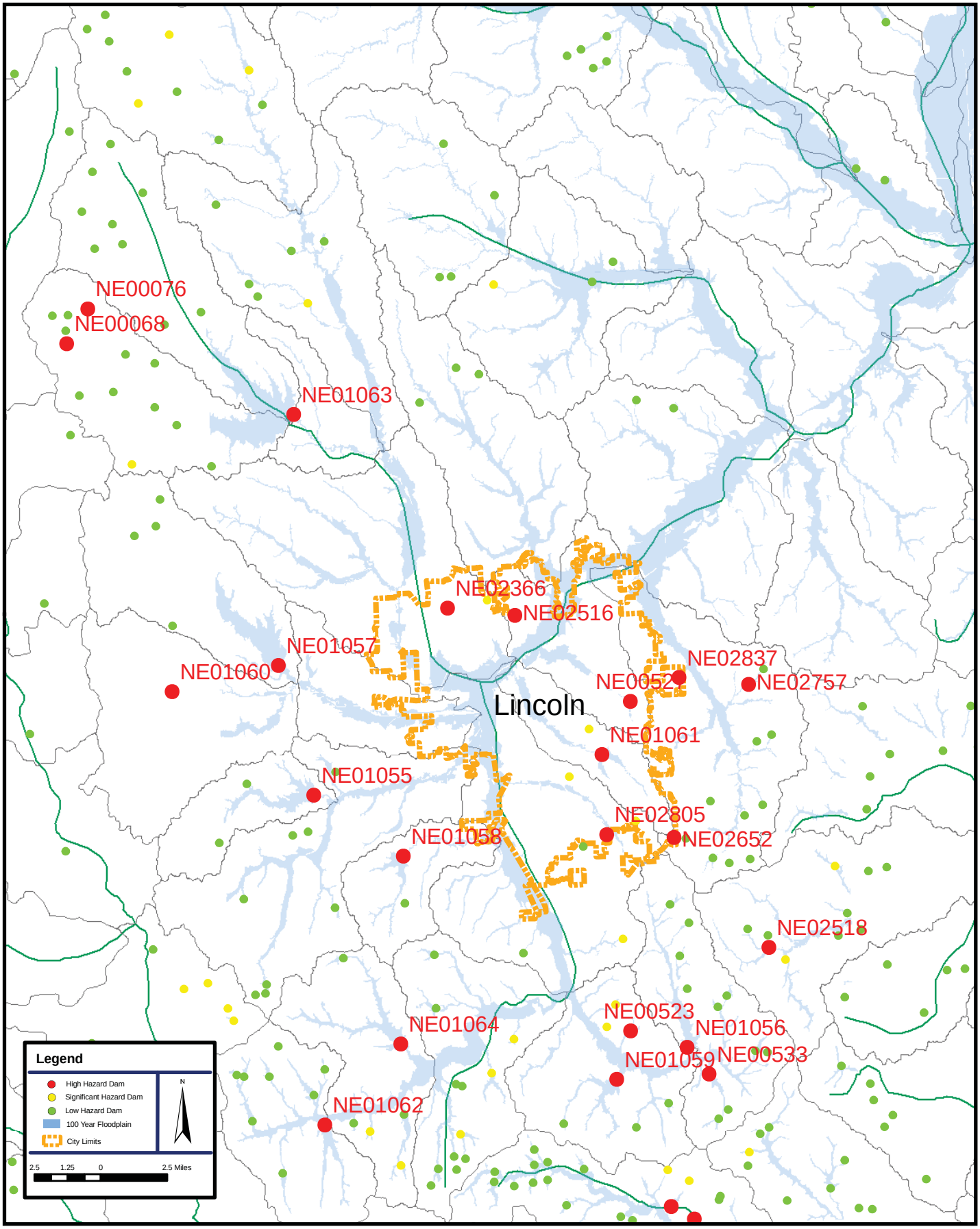
The vulnerability of Lincoln to dam failure is high and effects will vary depending on the magnitude of the dam failure. It shall be noted that the inundation maps for the above 22 dams are not available for public viewing. More detailed information can be sought after through the NDNR.

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

Due to data limitations on where the inundations areas occur and what structures get inundated, a complete assessment of the structures could not be completed. This could be completed in future updates of the plan.

Potential Losses

Due to limited resources and the sensitivity of the inundation maps from high hazard dams, it is beyond the scope of this hazard mitigation plan to estimate potential losses from dam failure. Losses could occur to structures and human life if significant enough.

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Created By: E. Wright, July 23, 2008
Contact Person: Jared Nelson
JEO Project Number: 385023

**City of Lincoln, NE**
**- Lower Platte South NRD Hazard Mitigation Plan -**
**Figure LNK.9: High Hazard Dam Locations**

JEO Consulting Group, Inc.

## *LEVEE FAILURE*

Historical occurrences
There have been no recorded instances of levee failure in the City of Lincoln.

Vulnerability Assessment
Levee failure has not previously occurred in Lincoln but could possibly occur in the future. Investigation into the FIRM map floodplain indicated that the 13.5 miles of the Salt Creek Levee System (owned and maintained by the Lower Platte South NRD) **does not provide 100 year flooding protection**. It is not FEMA certified. This levee could be providing some protection to the areas behind the levee, but due to data limitations, a more accurate vulnerability analysis could not be completed at this time. The number of structures protected by this levee, if any, could not be determined either due to these data limitations. In the event that a levee failure occurred, effects would be similar to those of a flood. The effects, damages, and locations of flooding are covered under the "Flooding" section of this report. Damages which may be caused by flooding include loss of structures, destruction of infrastructure such as bridges and roads, loss of utilities and potential for loss of life. The location of the Salt Creek Levee System can be viewed in the Lower Platte South NRD participant section.

See the critical facility map for Lower Platte South NRD participant section for a map showing the location of the levee.

Due to lack of resources and data limitations, there was not enough information to fully assess the vulnerability of levee failure in Lincoln. A more in-depth vulnerability assessment could be completed for the next plan update.

Potential Losses
Due to the lack of resources and data deficiencies, potential losses were not calculated for a levee failure. Losses could be similar to those of a flood, damaging or destroying structures that are protected by the levee, displacing people and losses of functional down time, economic effects, or recovery and replacement costs. An estimate for losses for structures protected by the levee could be completed for the next plan update.

# Appendix A – Adoption Letters

**Contains the following:**

- Village of Alvo Resolution of Adoption
- City of Ashland Resolution of Adoption
- Village of Avoca Resolution of Adoption
- Village of Bennet Resolution of Adoption
- Village of Brainard Resolution of Adoption
- Cass County Resolution of Adoption
- Cass County RWD #1 Resolution of Adoption
- Cass County RWD #2 Resolution of Adoption
- Cass County SID #1 Resolution of Adoption
- Village of Cedar Creek Resolution of Adoption
- Village of Ceresco Resolution of Adoption
- Village of Davey Resolution of Adoption
- Village of Denton Resolution of Adoption
- Village of Eagle Resolution of Adoption
- Village of Firth Resolution of Adoption
- Village of Greenwood Resolution of Adoption
- Village of Hallam Resolution of Adoption
- City of Hickman Resolution of Adoption
- Lancaster County Resolution of Adoption
- Lancaster County RWD #1 Resolution of Adoption
- Lancaster County SID #6 (Emerald) Resolution of Adoption
- City of Lincoln Resolution of Adoption
- City of Louisville Resolution of Adoption
- Lower Platte South NRD Resolution of Adoption
- Village of Malcolm Resolution of Adoption
- Village of Manley Resolution of Adoption
- Village of Murdock Resolution of Adoption
- Village of Murray Resolution of Adoption
- Village of Panama Resolution of Adoption
- City of Plattsmouth Resolution of Adoption
- Village of Raymond Resolution of Adoption
- Village of Roca Resolution of Adoption
- School District 145 Board of Education Resolution of Adoption
- Village of Sprague Resolution of Adoption
- Village of Union Resolution of Adoption
- Village of Valparaiso Resolution of Adoption
- City of Waverly Resolution of Adoption
- City of Weeping Water Resolution of Adoption

# Appendix B – Documentation of Public Involvement

**Contains the following:**

1. Letters
2. Sign-in Sheets
3. Articles
4. Flyers
5. Meeting Minutes & Agendas
6. Authorized Representatives

LOWER PLATTE SOUTH
NATURAL RESOURCES DISTRICT

3125 Portia St., Box 83581, Lincoln NE 68501-3581
(402) 476-2729 • FAX (402) 476-6454
www.lpsnrd.org

November 19, 2007

David Mach
County Board Member
4460 X Rd
Linwood, NE 68036

RE: Lower Platte South NRD Multi-Jurisdiction Hazard Mitigation Plan
Hazard Mitigation Plan Split County Participation

Dear David:

Lower Platte South Natural Resources District (LPSNRD) has secured grant funding from FEMA and is in the process of establishing a multi-jurisdictional Hazard Mitigation Plan with assistance from JEO Consulting Group, Inc. Another letter has been sent explaining the project.

This letter has been sent because only part of your county is within the Lower Platte South NRD. Please see attached Exhibit A for a map displaying the LPSNRD boundary. Due to the fact that your county is split by the LPSNRD boundary, there are four scenarios from which you may determine your participation in the planning effort.

The four scenarios are as follows:

1. Join the LPSNRD planning effort and include only a portion of your county.
2. Do not join the LPSNRD planning effort, and create a county-wide plan at a later time.
3. Do not participate in hazard mitigation planning, or
4. Join the LPSNRD planning effort and negotiate with JEO to complete the non-LPSNRD portion of your plan.

Please review the scenarios and notify me of what your County Board would like to do. It should be noted that if you choose scenario one, only that portion of your county within the LPSNRD will be covered by the plan and it is likely that only that portion of your county will be eligible for project grants until a plan is completed for the remainder of the county.

Please contact me via letter or email me at pzillig@lpsnrd.org to inform me of your decision or to further discuss these scenarios.

Sincerely,

Paul Zillig
Assistant Manager
Encl.

LOWER PLATTE SOUTH
NATURAL RESOURCES DISTRICT

3125 Portla St., Box 83581, Lincoln NE 68501-3581
(402) 476-2729 • FAX (402) 476-6454
www.lpsnrd.org

November 19, 2007

Doris Boettner
Board Chair
135 Main St.
PO Box 68
Alvo, NE 68304

RE: Lower Platte South NRD Multi-Jurisdiction Hazard Mitigation Plan

Dear Doris:

The Lower Platte South Natural Resources District (LPSNRD) (see map) has secured grant funding from FEMA and is in the process of establishing a multi-jurisdictional Hazard Mitigation Plan with assistance from JEO Consulting Group, Inc. A hazard mitigation plan identifies the vulnerability of a jurisdiction to various natural hazards (flood, drought, earthquake, wildfire, winter storm, etc.) and assesses the potential losses associated with each hazard. In addition, the plan identifies projects to decrease the threat from identified hazards. The plan will establish a prioritized list of mitigation projects for each participating entity.

Once the plan is approved by FEMA, participants will be eligible for grant funding to cover project costs. Project examples include drainage evaluations, improved stormwater infrastructure, educational activities, storm shelters, bridge elevation improvements, and a number of other possible mitigation activities. For your information, "Under the Disaster Mitigation Act of 2000 (DMA 2000), all state and local units of government are required to have a hazard mitigation plan to be eligible for project construction grant assistance under the FEMA Hazard Mitigation Grant Program (HMGP)."

**In order to be included as part of the plan, and qualify for project grants, at least one representative from your jurisdiction must first be present at one of several public meetings to be held in Lincoln and Weeping Water in December.** Specific dates, times, and locations will be specified in a future letter along with announcements in local newspapers.

We highly encourage you to participate in this project. If your jurisdiction (county, city, village, school district, etc.) is interested in participating in this effort, please designate a representative for your jurisdiction and contact me via letter or email me at pzillig@lpsnrd.org. If you have any questions concerning this project, please feel free to give me a call.

Sincerely,

Paul Zillig
Assistant Manager

Encl. 1

LOWER PLATTE SOUTH
NATURAL RESOURCES DISTRICT

3125 Portia St., Box 83581, Lincoln NE 68501-3581
(402) 476-2729 • FAX (402) 476-6454
www.lpsnrd.org

November 30, 2007

Dr. Richard Hasty
Cass County/Plattsmouth Community Schools
1912 East Hwy 34
Plattsmouth, NE 68048-5676

RE: Lower Platte South NRD Multi-Jurisdiction Hazard Mitigation Plan
Public Meetings to Identify Hazards

Dear Dr. Richard Hasty:

Lower Platte South NRD (LPSNRD) has scheduled two public meetings to obtain information required to complete the district wide multi-jurisdictional hazard mitigation plan. As mentioned in the previous letter, **in order to participate in this plan a representative of your community/jurisdiction must be present at one of the meetings listed below.**

- **Wednesday December 12th, 6:00 PM, Cass County Emergency Management Office, 8400 144th St., in Weeping Water, NE (Cass County Fairgrounds)**
- **Wednesday December 13th, 6:00 PM, Lower Platte South NRD, 3125 Portia, in Lincoln, NE**

The participation of your community in the planning process will determine whether your community can be included as part of the plan and qualify for project grants, as per FEMA guidelines. The purpose of these meetings will be to cover the following six items for **each** participating community, and hand out packets that you can take back and get additional input on hazards from others.

1) Introduction to hazard mitigation planning
2) Identify potential hazards
3) Determine the probability/extent of each hazard
4) Document the historical occurrence of hazard events
5) Discussion of goals/objectives for mitigation of hazards
6) Discuss potential mitigation alternatives/projects

Again, we think it is in your jurisdictions best interest to be part of the hazard mitigation plan and we highly encourage you to attend. **In order to better plan for the meeting I'd like for you to let me know who will be representing your jurisdiction at this meeting and which meeting you plan to attend.** Please RSVP me at pzillig@lpsnrd.org or 476-2729.

Sincerely,

Paul Zillig
Assistant Manager

Pc: Jared Nelson/Lalit Jha, JEO

LOWER PLATTE SOUTH
NATURAL RESOURCES DISTRICT

3125 Portia St., Box 83581, Lincoln NE 68501-3581
(402) 476-2729 • FAX (402) 476-6454
www.lpsnrd.org

December 3, 2007

Upper Big Blue NRD
John Turnbull
105 North Lincoln Avenue
York, NE 68467

RE: Lower Platte South NRD Multi-Jurisdiction Hazard Mitigation Plan
Notification Letter to Neighboring Jurisdictions

Dear John:

The Lower Platte South NRD (LPSNRD), located in Lincoln, Nebraska, has secured grant funding from FEMA and is in the process of developing a Multi-jurisdictional Hazard Mitigation Plan with assistance from JEO Consulting Group, Inc. A hazard mitigation plan identifies the vulnerability of each community and county to various natural hazards (flood, drought, earthquake, wildfire, winter storm, ice storms, etc.) and assesses the potential losses associated with each hazard. In addition, the plan identifies projects to decrease the threat from identified hazards. The plan will also establish a prioritized list of these mitigation projects for participating communities.

LPSNRD's plan is currently being prepared and will be submitted to FEMA for approval in approximately 18-24 months. Once approved, planning participants will be eligible for project grant funding to assist with implementation of the plan.

This letter is being sent to you to inform you of the LPSNRD planning effort, as per FEMA's requirements. If you have any input or would like more information about the plan email me at pzillig@lpsnrd.org.

Sincerely,

Paul Zillig
Lower Platte South NRD Assistant General Manager

cc: Jarod Nelson/Lalit Jha, JEO

# Lincoln - Lancaster County
# Emergency Management

575 S. 10th Street
Lincoln, Nebraska 68508
Phone: (402) 441-7441
Fax: (402) 441-7407


December 17, 2007

Dear Chief:

Last evening I attended a meeting with NRD. They have obtained a "Hazard Mitigation" grant from FEMA. This grant applies to all hazards from floods to tornado awareness.

I am forwarding you a survey that we would like returned by January 3, 2008. This survey will allow for future FEMA grants again ranging from flooding to tornado shelter construction.

I realize this is short notice and you may not be able to complete all the information, however if you have projects that you would like funded, put those on the project sheet.

Again, I would like these back no later than 1/3/08. Thank you for your assistance.

Yours truly,

Doug Ahlberg
Director
Lincoln-Lancaster County E.M.

LOWER PLATTE SOUTH
NATURAL RESOURCES DISTRICT

3125 Portia St., Box 83581, Lincoln NE 68501-3581
(402) 476-2729 • FAX (402) 476-6454
www.lpsnrd.org

January 25, 2008

Ginger Neuhart, Alvo Clerk
135 Main Street
PO Box 68
Alvo, NE 68304

Dear Ginger:

I'm looking forward to assisting your community in being included in the Multi-Jurisdictional All Hazards Mitigation Plan. At this point we have over thirty communities that will be included in the plan and eligible for federal grant funding for projects that protect their community and citizens from disasters.

In order to catch up with the communities that have met the first FEMA requirement of public involvement/public participation by attending one of the public meetings we held in December you need to do the following:

1. Place on the next Board/Council regularly scheduled meeting agenda **"Participation in the LPSNRD Hazard Mitigation Plan".**
2. At the Board/Council meeting review the attached "Description of Current Project".
3. Have the Board/Council take formal action to participate in the LPSNRD Hazard Mitigation Plan.
4. At the Board/Council meeting complete at least one of the enclosed Hazard Identification Worksheets, if done ahead of time please review it with the Board/Council/Public at the meeting. I've attached directions and a few copies, please feel free to make additional copies, if needed for anyone in attendance that wants to submit a worksheet.
5. Provide me with a copy of the attached sign-in sheet for those attending this agenda item.
6. Provide me with a copy of the Board/Council Meeting Minutes, including the action to participate in the plan.

By completing these 6 steps your community will be caught up and we can then proceed on with preparing the plan, drafting maps of the community, and including potential projects of interest to you. We will come back later this year to get additional input from you.

Please complete these items as soon as possible and return to me at LPSNRD, P.O. Box 83581, Lincoln, NE. We look forward to working with you on this important plan for your community!

Sincerely,

Paul D. Zillig
Assistant Manager

Cc: Lalit Jha/Jared Nelson, JEO
Doug Ahlberg, Lancaster Co Emergency Mgt.
Bill Cover, Cass Co. Emergency Mgt.

LOWER PLATTE SOUTH
NATURAL RESOURCES DISTRICT

3125 Portia St., Box 83581, Lincoln NE 68501-3581
(402) 476-2729 · FAX (402) 476-6454
www.lpsnrd.org

March 27, 2008

Jackie Barnes, Village Clerk
512 Colorado Street
PO Box 308
Murdock, NE 68407

Dear Jackie:

Progress on the Hazard Mitigation Plan is moving along and we will be scheduling two more public meetings in late April (23rd in Lincoln & 24th in Louisville) one of the purposes of the meeting will be to present the draft plan for each of the 30+ communities.

**At this point we really need some additional information from you on hazard identification, hazard occurrence, Goals and Objectives, and potential mitigation alternatives.** In talking to the clerks of several communities it is apparent that you could use some help to do this. To assist you with this task JEO has put together an "Example" information sheet that is pretty typical of most towns in this area. I'd encourage you to review the enclosed "Example", personalize it for your community, make any corrections, and return it to me in early April, preferably by April 7th. This information can then go into the first draft plan for your community and your community can modify it at anytime.

Please feel free to give me a call if you have any questions. Completing this information sheet by early April will really help keep us on schedule and is critical in making sure your community has a plan that will be of assistance to you in the future.

Sincerely,

Paul D. Zillig
Assistant Manager

PDZ/pdz

cc: Jared Nelson, JEO (ph. 435-3080)

LPSNRD HMP Kick-off Meeting 10/19/07

| | |
|---|---|
| Paul Zillig | LPSNRD |
| Glenn Johnson | " |
| ED UBBEN | " |
| MIKE MASCOE | " |
| Lalit Jha | JEO |
| Steve McMaster | NDNR |
| Dan Fricke | JEO |
| J.D. Johnson | JEO |
| Ed Kouma | City of Lincoln PW&U |

*Lower Platte South NRD Multi-Jurisdiction Hazard Mitigation Plan*
*Hazard Identification Meeting*
*Weeping Water, NE - December 12, 2007*

***Sign In Sheet***

| Name | Jurisdiction | Address | Phone | Email Address |
|---|---|---|---|---|
| Jessica Preister | City of Ashland | 2324 Silver St. Ashland | 944-3387 | ctyadm@microlnk.com |
| Joshua Groteau | Cass County (Emn) | P.O. Box 175 WW | 297-4340 | JGroteau@wernerr.com |
| Eileen Murdoch | Village of Murray | P.O. Box 79, Murray | 235-2119 | murrayclerk@alltel.net |
| Richard Hasty | Plattsmouth Schools | 1912 E. Hwy. 34 Plattsmouth | 296-3361, 2813 | rhasty@plattsmouthschools.org |
| Dave Holman | Ashland Greenwood School | 1200 Boyd St Ashland | 944-2128 | DHolman@ESU2.org |
| Scott Sparks | Cass Co Rural Water #1 | 308 N Rail Road Ave Murray | | |
| Marilyn Kirchhoff | Avoca | PO Box 694 Avoca NE | 275-3757 | avocavillage@windstream.net |
| Calit Jha | JEO | | | |
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*Lower Platte South NRD Multi-Jurisdiction Hazard Mitigation Plan*
*Hazard Identification Meeting*
*Weeping Water, NE - December 12, 2007*

***Sign In Sheet***

| Name | Jurisdiction | Address | Phone | Email Address |
|---|---|---|---|---|
| Wm M. Cover | Cass County EMA | 8400 144th St Ste 200 POB Weeping Water NE | 402 267 6765 | ccema@aol.com |
| Ray Frew | City Council Weep Water | 101 East P<br>P.O Box 453 | 402-267-6795 | |
| Chuck Paukert | Village Cedar Creek | Box 133<br>Cedar Creek, Ne 68016 | 402-290-5199 | cpaukert@sehinc.com |
| Kevin Larson | Plattsmouth | 136 N. 5th St. Plattsmouth 68048 | 402-296-4168 | klarson@plattsmouth.org |
| Dale Miller | Cass Co RWD 2 | 108 S. 4th Elmwood 68349 | 402-994-2555 | CCRWD2@Ellipse.net |
| Doug Ahlberg | Lincoln-Lancaster Co. Emergency Management | 575 So. 10th Lincoln, Ne 68508 | 402-441-7441 | dahlberg@ci.lincoln.ne.us |
| Jason McClun | City of Louisville<br>Louisville Fire Dept. | 811 3rd St. Circle | 402-234-4161 | j_mcclun@yahoo.com |
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*Lower Platte South NRD Multi-Jurisdiction Hazard Mitigation Plan*
*Hazard Identification Meeting*
*Lincoln, NE - December 13, 2007*

***Sign In Sheet***

| Name | Jurisdiction | Address | Phone | Email Address |
|---|---|---|---|---|
| Michael Wenzel | Village of Eagle | 115 N 4th | 781-9295 | MWenzel@Alvine.com |
| Eric Johnson | Village of Panama | 600 Locust | 788 2522 | Panamaboard@diafi.com.net |
| Fred Gardy | UNL | 300 N 17th | 472-4467 | fgardy2@unl.edu |
| Glenda Wood | Waverly | 14130 Lancashire St | 786-2312 | glendaw@citywaverly.com |
| Robin Sullivan | Village of Bennard | 111 E Washington, Bennard, Ne | 545-2701 | benndcityhall@yahoo.com |
| Phil Warrick | Waverly Schools Dist. 145 | 10110 North 149th, Waverly | 786-2321 | pwarrick@esu6.org |
| Gary Vocasek | Village of Hallam | | 787-713 | |
| Paul Zillig | LPSNRD | | 476-2729 | pzillig@lpsnrd.org |
| MIKE MASCOE | LPSNRD | | " | mmascoe@lpsnrd.org |
| Ed Kouma | City of Lincoln | | 441-7018 | ekouma@lincoln.ne.gov |
| Jeffrey Kohn | Metropolitan Utilities District | 1723 Harney St. Omaha 68102 | 504-7403 | jeff_kohn@mudnebr.com |
| Jeanell Walker | Southeast Community College ~~City of Lincoln~~ | 8800 "O" Street | 437-2534 | jwalker@southeast.edu |
| Emily Bausch | City of Hickman | 115 Locust | 792-2212 | ebausch@hickman.ne.gov |
| Doug Ahlberg | Emergency Management | 575 So. 10 Lincoln | 441-7441 | dahlberg@ci.lincoln.ne.us |

*Lower Platte South NRD Multi-Jurisdiction Hazard Mitigation Plan*
*Hazard Identification Meeting*
*Lincoln, NE - December 13, 2007*

***Sign In Sheet***

| Name | Jurisdiction | Address | Phone | Email Address |
|---|---|---|---|---|
| - BRYAN (KUBIK) KUBICEK | DAVEY | 3510 MAPLE ST | 785-9206 | |
| - Nadine Link | Malcolm | 137 E 2nd PO Box 228 | 796-2250 | malcolmne@msn.com |
| - BILL EDWARDS | DENTON | 7100 LANCASTER, DENTON | 797-2125 | |
| - Ken Halvorsen | Lan RWD #1 | Box 98 310 fir Bennet NE 68317 | 782-3495 | KcHalvorsen@alltel.net |
| Jared Nelson | JEO | 650 J St Lincoln NE 68508 | 435-3080 | Jnelson@jeo.com |
| Dan Fricke | JEO | " | " | DFricke@jeo.com |
| - John Miriovsky | LWS | 2021 N. 27th; Lincoln | 441-7571 | jmiriovsky@lincoln.ne.gov |
| - Steve McMaster | Nebraska DNR | P.O. Box 94676; 68509-4676 | 471-3957 | smcmaster@dnr.ne.gov |
| - Sheri Henderson | Ceresco | PO Box 160 Ceresco 68017 | 665-2391 | perkyclerky@aol.com |
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*Lower Platte South NRD Multi-Jurisdiction Hazard Mitigation Plan*
*Structural Inventory Meeting*
*Lincoln, NE - January 17, 2008*

## *Sign In Sheet*

| Name | Representing | Address | Phone | Email Address |
|---|---|---|---|---|
| Doug Ahlberg | Lincoln-Lancaster Co. Emergency Manage. | 575 So. 10 Lincoln, NE 68508 | 402-441-7441 | dahlberg@lancaster ne.gov. |
| Ed Kouma | PW&U Lincoln | 901 N. 6th Lincoln NE68508 | 402 441-7018 | ekouma@lincoln.ne.gov |
| Paul Zillig | LPSNRD | P.O. Box 83581 | 476-2729 | pzillig@lpsnrd.org |
| Ed Ubben | LPS NRD | " " | " " | eubben@lpsnrd.org |
| Lalit Jha | JEO | 650 J St. Lincoln, NE | 435-3080 | LJha@Jeo.com |
| Jared Nelson | JEO | 650 J st. Lincoln, NE | 435-3080 | jnelson@Jeo.com |
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*Lower Platte South NRD Multi-Jurisdiction Hazard Mitigation Plan*
*2nd Key Personnel Meeting*
*Lincoln, NE - April 16, 2008*

## *Sign In Sheet*

| Name | Representing | Address | Phone | Email Address |
|---|---|---|---|---|
| Doug Ahlberg | Lincoln-Lancaster Co. Emergency Management | 575 So. 10th Lincoln, NE. 68508 | 402-441-7441 | dahlberg@lancaster.ne.gov. |
| Ed Kouma | City of Lincoln PW&U | 901 N. 6th St | 402-441-7018 | ekouma@lincoln.ne.gov |
| Mike Magee | LPSNRD | P.O. Box 83581 | 402.476-2729 | mmagee@lpsnrd.org |
| Paul Zillig | LPSNRD | " | " | pzillig@lpsnrd.org |
| Ed Ubben | LPS NRD | " | " | eubben@lpsnrd.org |
| Steve McMaster | Nebraska DNR | PO Box 94676 68509-4676 | 471-3957 | smcmaster@dnr.ne.gov |
| Colit Jha | JEO | 650 'J' Street, #215 | 435-3080 | ejha@jeo.com |
| Jared Nelson | JEO | 650 "J" St, #215 | 435-3080 | jnelson@jeo.com |
| Wm M. Cover | Cass County EMA | PO Box C Weeping Water, NE 68463 | 267-6765 | ccema@aol.com |
| DAN SEAMAN | CASS COUNTY EMA | " " " " | (402) 932-1365 | dseaman74@cox.net |
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*Lower Platte South NRD Multi-Jurisdiction Hazard Mitigation Plan*
*'Mitigation Alternative' Meeting*
*Lincoln, NE - April 23, 2008*

***Sign In Sheet***

| Name | Representing | Address | Phone | Email Address |
|---|---|---|---|---|
| Fred Gardy | UNL | 300 N 17th Lincoln, NE | 472-3555 | fgardy2@unl.edu |
| Bill Edwards | Denton | 7100 Lancaster, Denton | 797-2125 | BANDDEDWARDS@WINDSTREAM.NET |
| Dale Miller | Cass Co RWD #2 | 108 S 4th Elmwood NE | 994-2555 | ccrwd2@Ellipse.net |
| Ruth Anderson | Davey | 3645 Elm Davey 68336 | 785-3295 | damrev@aol.com |
| Larry Swoboda | NRD | 616 N 86 | 483-1274 | |
| * Emily Bausch | City of Hickman | P.O. Box 127 | 792-2212 | ebausch@hickman.ne.gov |
| Nadine Link | Malcolm | PO Box 228 | 7962250 | Malcolmne@msn.com |
| Roy Rasmussen | Malcolm | PO Box 228 | 7962250 | " |
| Steve McMaster | Waverly | 10870 N. 136th St. | 471-3957 | smcmaster@dnr.ne.gov |
| Jonathan Mohr | JEO | | | |
| Dave Ahlberg | Lincoln-Lancaster Co. Emergency Management | 575 So 10th Lincoln (68) | 441-7441 | dahlberg@lancaster.ne.gov |
| Shane Cuttlers | Village of Raymond Emergency Mgmt Deputy Director | 14001 NW 56th St Raymond 68428 | 783-2120 | scuttlers@yahoo.com |
| Greg Bouc | Valparaiso | P.O. Box 353 | 784-2313 | waterpd@windstream.net |
| Wm M. Cover | Cass County | PO Box C Weeping Water 68463 | 267 6765 | ccema@aol.com |

* Send Pdf's of information on Hickman (Both participant ~~instruction~~ section and worksheet instruction)

Send list to Paul w/ LPSNRD.

*Lower Platte South NRD Multi-Jurisdiction Hazard Mitigation Plan*
*'Mitigation Alternative' Meeting*
*Lincoln, NE - April 23, 2008*

***Sign In Sheet***

| Name | Representing | Address | Phone | Email Address |
|---|---|---|---|---|
| DAVE THURBER | Lincoln Water System | 2021 N. 27th Lincoln, NE | 323-3869 | dthurber@lincoln.ne.gov |
| Bonnie Harms | Village-Roca | Roca NE | 423 8783 | |
| Dan & Marge Schlitt | | 2600 C Street Lincoln 68502 | | schlitt@theworld.com |
| Jessica Preister | City of Ashland | 2304 Silver St. Ashland | 944-3387 | ctyadm@micidnr.com |
| Michael Wenzel | Village of Eagle | 115 N 4th Eagle | 781-9295 | MWenzel@AlviNE.com |
| Lori Streeter | Davey | P.O. Box 1, Davey | 785-5351 | loristreeter@att.net |
| Steve Vandenberg | Emerald | 8301 W. "O" | 476-3590 | uddoitto@yahoo |
| Patricia Rule | Bennet | 685 Monroe St. | 782-3300 | bennetvlg@diodecom.net |
| Ed Kouma | Lincoln | 901 N. 6th St. | 441-7018 | ekouma@lincolnne.gov |
| Doug Samuelson | LPS NRD | Lincoln, NE | | |
| Becky Vandenberg | Emerald | 8301 W. "O" | 476-3590 | uddoitto@yahoo |
| Floyd Marrish | Valparaiso | P.O. Box 147 | 784-2233 | — |
| Phil Warrick | Waverly School Dist | 14511 Heywood PO Box 426 Waverly, NE 68462 | 786-2321 ext. 105 | pwarrick@esu6.org |
| | | | | |

*Lower Platte South NRD Multi-Jurisdiction Hazard Mitigation Plan*
*'Mitigation Alternative' Meeting*
*Lincoln, NE - April 23, 2008*

## *Sign In Sheet*

| Name | Representing | Address | Phone | Email Address |
|---|---|---|---|---|
| Eric Johnson | Village of Panama | PO Box 117 Panama | 788 2520 | panamaboard@diadecom.net |
| Jared Nelson | JEO Consulting Group | 650 'J' St, Suite 215 Lincoln, 68508 | 435-3080 | jnelson@jeo.com |
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*Lower Platte South NRD Multi-Jurisdiction Hazard Mitigation Plan*
*'Mitigation Alternative' Meeting*
*Louisville, NE - April 24, 2008*

## *Sign In Sheet*

| Name | Representing | Address | Phone | Email Address |
|---|---|---|---|---|
| Kermit Reisdorf | Plattsmouth Community School | 1812 K St 34 Plattsmouth NE | 402-296 3361 | KRReisdorf@plattsmouthschools.org |
| Bob Scheer | CASS COUNTY SID #1 | 2371 W SHORE DR UNION NE 68455 | 402-263 5775 | BIELEC+ALLTEL.NET |
| Larry Hathaway | Cass County SID #1 | 2200 W Shore Dr Union NE. 68455 | 402-263 3265 | Larry.Hathaway@.NET |
| Will M Cover | Cass County EMA | | 267-6765 | |
| GAYLE SCHOKEY | VILLAGE OF EAGLE | 540 C ST EAGLE NE | 432-9873 | |
| James Ringer | Cass County | 145 N 9T. Plattsmouth Ne 68048 | 296-9354 | JimR@CassNe.org |
| Robin Tunnicliff | Bradford, Ne. | 112 E. Washington Bradford, Ne. 68626 | 545-2701 | braindeadtyphoon@yahoo.com |
| Jared Nelson | JEO Consulting Group | 650 J St Lincoln, NE 68508 | 435-3080 | Jnelson@JEO.com |
| Mike Schwab | JEO Consulting Group | 650 J St Lincoln, NE 68508 | 435-3080 | mschwab@jeo.com |
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*Lower Platte South NRD Multi-Jurisdiction Hazard Mitigation Plan*
*'Mitigation Alternative' Meeting*
*Louisville, NE - April 24, 2008*

## *Sign In Sheet*

| Name | Representing | Address | Phone | Email Address |
|---|---|---|---|---|
| Mary Terry | Cedar Creek | Bx 71 Cedar Creek 68016 | 402 234-7856 | cedar234@Alltel.net |
| Alan Mueller | Louisville | Box 656 Louisville 68037 | 234-7705 | spookmueller@Hotmail.com |
| Charles Paukert | Cedar Creek | Box 71 C.C. 68016 | 234-2654 | Claukert@sehinc.com |
| Ray Fauser | Weyerhaeuser | PO 453 Wyoming IA | 267-6795 | |
| Kevin Larson | Plattsmouth | 136 N. 5th St. Plattsmouth 68048 | 296-4168 | klarson@plattsmouth.org |
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*Lower Platte South NRD Multi-Jurisdiction Hazard Mitigation Plan*
*'Mitigation Alternative' Meeting*
*Louisville, NE - April 24, 2008*

## *Sign In Sheet*

| Name | Representing | Address | Phone | Email Address |
|---|---|---|---|---|
| Dennis Hdak | RWD #1 Cass County | Box 67 Murray | 402-235-3077 | |
| Tom Burnham | Mudlock | Po Box #67 (305 10th | 867 2036 | Tomandbetty@Hltel |
| Glenda Ward | Waverly | Po box 427 68462 | 786-2312 | glendaw@citywaverly.com |
| Eileen Murdoch | Murray | Po Box 79 68409 | 235-2119 | murrayclerk@windstream.net |
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JOURNAL STAR
Wednesday, November 28, 2007

# Lower Platte South NRD will develop hazard mitigation plan

Lincoln Journal Star

The Lower Platte South Natural Resources District is undertaking a planning effort to develop a multi-jurisdictional hazard mitigation plan for the district.

The plan will be a community-guided document that will identify each participating community's vulnerability to such natural disasters as flood, drought, wildfire, winter storm, tornado/high wind storm and dam failure, the district said in a news release.

The district is working with the state Department of Natural Resources, the Nebraska Emergency Management Agency and the Federal Emergency Management Agency on the plan. Each community and county in the district is eligible and encouraged to participate in the planning process.

The Lincoln-based NRD includes most of Lancaster and Cass and parts of Otoe, Saunders, Butler and Seward counties.

The plan will set goals for each community, establish mitigation alternatives and prioritize projects that can alleviate potential damages to property and life in the event of disaster. Proactive hazard mitigation planning allows a community to take action to reduce or eliminate these threats.

The Disaster Mitigation Act of 2000 requires a FEMA-approved predisaster hazard mitigation program be in place before funding is granted for post-disaster mitigation projects.

Once a hazard mitigation plan is developed and adopted, a given jurisdiction is eligible for predisaster mitigation project grants to implement the mitigation solutions identified in the plan. After the plan is adopted by each local participating community, it must be approved by NEMA and FEMA.

The Lower Platte South NRD has hired JEO Consulting Group Inc. to help develop the plan over the next two years. This project is being funded by a grant from NEMA/FEMA and the Lower Platte South NRD.

## Disaster planning

Two meetings will be held to receive public comment about disaster types, problem areas and potential mitigation solutions in communities and counties within the Lower Platte South NRD. Meetings have been set for:

**Dec. 12,** 6 p.m. at the Cass County Emergency Management office, 8400 144th St., Weeping Water.

**Dec. 13,** 6 p.m. at the Lower Platte South NRD office, 3125 Portia St., Lincoln.

# NRD to develop hazard mitigation plan

LINCOLN - Lower Platte South NRD, located in Lincoln, is undertaking a planning effort to develop a "Multi-jurisdictional Hazard Mitigation Plan" for the District in coordination with the Nebraska Department of Natural Resources (NDNR), Nebraska Emergency Management Agency (NEMA), and the Federal Emergency Management Agency (FEMA). Each community and county located in the District is eligible and encouraged to participate in the planning process.

The hazard mitigation plan will be a community-guided document that will identify each participating community's vulnerability to natural disasters such as flood, drought, earthquake, wildfire, winter storm, tornado/high wind storm, dam failure, etc. The plan will set goals for each community, establish mitigation alternatives and prioritize projects which can alleviate potential damages to property and life when future disasters occur. A series of two public meetings will be conducted around the district to receive public input and comments about the disaster types, problem areas, and potential mitigation solutions. Cass County meeting is 6 p.m. Wednesday, Dec. 12, at Cass County Emergency Management Office, 8400 144th St. in Weeping Water; and 6 p.m. Dec.13, at Lower Platte South NRD, 3125 Portia in Lincoln.

For more information on this planning effort contact Paul Zillig, LPS NRD Assistant Manager, at pzillig@lpsnrd.org or (402) 476-2729.

As the former Family Development Associate in Cass County, I'd like to thank the Cass County church community, businesses, families and individuals, and all organizations who graciously and generously have donated time, money, household necessities and food to the SENCA agency.

-Rena Pugh


# MAGIC MAGIC MAGIC

Sheriff Brueggemann & Deputy Tuttle (Head of the Cass County Sheriff's D.A.R.E. Program) announced their 10th Annual Benefit Christmas Show for the Cass County D.A.R.E. Program

**Saturday, December 15th at 7:00 p.m.**

***at the Plattsmouth High School Auditorium***

There will be lots of fun for everyone. Magic that will mystify and amaze everyone young & old. There will also be music and lots of audience participation (even for adults). To round out the evening of family entertainment, a special guest star, Santa Claus, will be giving away all kinds of door prizes and some lucky boy or girl will win a brand new bike.

So plan on coming out and having a great time while supporting the Cass County D.A.R.E. Program.

**For ticket information, you may call 1-800-813-7560**

**$1.00**

**OFF ADULT ADMISSION**

**AT THE DOOR ONLY!**

*Bring this coupon to the door the night of the show!*

# NRD Issues Call for Hazard Mitigation Planning

The NRD has begun a process it hopes will lead to the availability of federal funds for projects that decrease the effects of natural disasters, such as floods and storms. The NRD along with counties, cities, villages, school districts and other local governments must have a hazard mitigation plan that is approved by the Federal Emergency Management Agency (FEMA) in order to receive FEMA funds to either construct identified projects designed to ease the effects of a natural disaster or for cleanup and repairs following a disaster event.

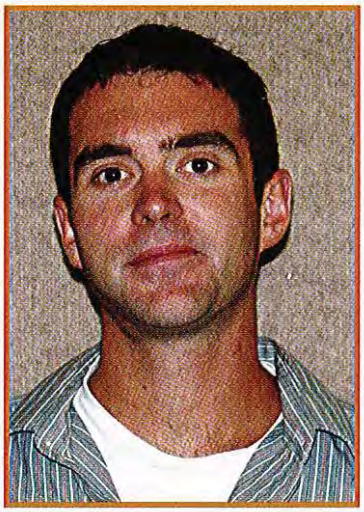
*In 1988 officials decided the best way to protect this house from flooding was to move it across this Salt Creek bridge and out of the Ashland floodplain. A Hazard Mitigation Plan will help public entities secure federal funds that provide assistance from natural disasters like flooding, ice storms and tornados.*

The NRD has secured a FEMA grant to develop such a plan and invited local government entities within the District to be included in the process. Mid-December open houses were held in Weeping Water and at the NRD office in Lincoln for entities interested in being a part of the plan. JEO Consulting Group, Inc. is assisting the NRD with the plan, which will determine the vulnerability of the District to various natural disasters, such as flooding, drought, earthquake, tornados, ice storms, blizzards, etc., assess potential losses and identify projects that would decrease the threat. Once the plan is approved the entity would then be eligible for financial assistance. The NRD hopes a Hazard Mitigation Plan can be completed and submitted to FEMA for final approval early in 2009.

**Seedling Trees**
**for**
**Wildlife Habitat**
**& Windbreaks**
**at a**
**Great Price**

**$0.60 per plant**
**Each species sold in bundles of 25**
**Minimum order, 100**
**Many species while they last**
**See www.lpsnrd.org**

**ORDER DEADLINE:**
**January 28th**



## New Help

Matt Glover is the NRD's new Water Resources Technician. The Kearney native is a UNL graduate in Geology. He works with well and chemigation permits and assists with ground water monitoring and well decommissioning. Prior to coming to the NRD, Matt worked with the Nebraska Department of Environmental Quality and the U.S. Army Corps of Engineers.

Public Notice

The Lower Platte South NRD, located in Lincoln, is developing a "Multi-jurisdictional Hazard Mitigation Plan" for the District. A series of two public meeting will he held around the District to review and receive public input and comments about the draft plan, evaluate & prioritize mitigation alternatives, and identify critical facilities. Meetings have been scheduled for: **Wednesday, April 23rd at 5:30 pm at the Lower Platte South NRD Office, 3125 Portia St. in Lincoln, NE; and Thursday, April 24th at 5:30 pm at the Louisville Senior Center, 423 Elm Street, in Louisville, NE.** For more information on this planning effort contact Paul Zillig, LPSNRD Assistant Manager, at pzillig@lpsnrd.org or (402) 476-2729.

Please publish in the Plattsmouth Journal on April 10th and April 17th.

Please publish in the Lincoln Journal Star on April 14th and April 21st.

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Information Services, Inc
(402) 342-3178

JOURNAL STAR
SUNDAY DAILY
LINCOLN, NE
Circulation = 74795
04/13/2008



# Lower Platte South NRD wants input on hazard mitigation plan

Lincoln Journal Star

The Lincoln-based Lower Platte South Natural Resources District is leading a planning effort to develop a multi-jurisdictional hazard mitigation plan for the district and each community within its boundaries.

NRD officials say each community is encouraged to participate in the planning process. The district covers most of Lancaster and Cass counties and parts of Otoe, Seward, Butler and Saunders counties.

Meetings will be held soon in Lincoln and Louisville to receive public comments on the draft plan, disaster types, problem areas and potential projects.

The hazard mitigation plan is being developed in coordination with the Nebraska Department of Natural Resources, Nebraska Emergency Management Agency and the Federal Emergency Management Agency.

Officials say the plan is a community-guided document that will identify each participating community's vulnerability to natural disasters such as flood, drought, earthquake, wildfire, winter storm, tornado, wind storm, dam failure, etc.

Officials say the plan will set goals for each community, establish mitigation alternatives, and prioritize projects that can alleviate potential damages to property and life when future disasters occur. Pro-active hazard mitigation planning allows a community to take actions to reduce or eliminate threats.

In order to reinforce the importance of hazard mitigation planning and to emphasize planning for disasters before they occur, the Disaster Mitigation Act was signed into law in 2000. The act established that a pre-disaster hazard mitigation program would be required before funding post-disaster mitigation projects.

According to the federal legislation, a community must have a FEMA-approved hazard mitigation plan in order to receive project grant funds. Once such a plan is developed and adopted, the jurisdiction also will be eligible for grants to implement the mitigation solutions identified in the plan.

The Lower Platte South NRD's hazard mitigation plan will be adopted locally by each participating community once the overall plan is approved by both NEMA and FEMA.

The district has hired JEO Consulting Group Inc. to assist with development of the plan over the next two years. The majority of the project is being funded by grants from FEMA.

## If you go:

Citizens who live within the Lower Platte South NRD boundaries are encouraged to attend one of the following public meetings to discuss a proposed hazard mitigation plan for their respective communities. Meetings will be held on:

**April 23**, beginning at 5:30 p.m. at the Lower Platte South NRD office, conference room, 3125 Portia St.

**April 24**, beginning at 5:30 p.m. at the Louisville Senior Center, 423 Elm St., in Louisville.

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(402) 342-3178

NEWSPAPER
THURSDAY WEEKLY
WAHOO, NE
Circulation = 4556
04/17/2008

# Lower Platte South NRD leading planning effort

LINCOLN – Lower Platte South Natural Resources District (NRD) is leading a planning effort to develop a "Multi-jurisdictional Hazard Mitigation Plan" for the NRD and each community located in the NRD.

Each community can be part of the plan and is encouraged to participate in the planning process. The plan is being developed in coordination with the Nebraska Department of Natural Resources (NDNR), Nebraska Emergency Management Agency (NEMA) and the Federal Emergency Management Agency (FEMA).

The hazard mitigation plan is a community-guided document that will identify each participating community's vulnerability to natural disasters such as flood, drought, earthquake, wildfire, winter storm, tornado/high wind storm, dam failure, etc. The plan will set goals for each community, establish mitigation alternatives, and prioritize projects, which can alleviate potential damages to property and life when future disasters occur.

Proactive hazard mitigation planning allows a community to take actions to reduce or eliminate these threats.

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

Once a hazard mitigation plan is developed and adopted, the jurisdiction will also be eligible for pre-disaster mitigation project grants to implement the mitigation solutions identified in the plan.

A public meeting will be held to receive public input on the draft plan and comment about the disaster types, problem areas, and potential projects. A meeting has been scheduled for Wednesday April 23 at 5:30 p.m., Lower Platte South NRD Office, Conference Room, 3125 Portia Street in Lincoln and Thursday April 24 at 5:30 p.m., Louisville Senior Center, 423 Elm Street in Louisville. The Lower Platte South NRD Multi-jurisdictional Hazard Mitigation Plan will be adopted locally by each participating community once approved by both NEMA and FEMA.

For more information on this planning effort contact Paul Zillig, Lower Platte South NRD Assistant General Manager, at 402-476-2729 or pzillig@lpsnrd.org

Lower Platte South
Natural Resources District
To conserve, develop and manage the water and land resources of southeastern Nebraska for the common good.

District Weather
Map to NRD Office

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Recreation
Ground Water
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Stormwater
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# Planning for Disaster

Representatives from communities throughout the Lower Platte South NRD gathered April 23rd for a workshop on developing a FEMA-approved Multi-Jurisdictional Hazard Mitigation Plan to protect their communities in case of disasters, such as flood, tornado, earth quake, etc. The NRD is leading the effort, assisted by JEO Consulting Group, for any District community or other entity that may have a need for future FEMA project funds to either avoid or deal with disasters.

## What we do:

Flood Control
Soil Conservation
Ground Water Management
Forestry & Tree Planting
Recreation & Wildlife
Urban Conservation
Environmental Education

## Special Announcements

**Next regular NRD Board meeting: Wednesday, May 21st, 7 p.m. at the Lower Platte South NRD Office, 3125 Portia Street, Lincoln, NE.**

The March-June issue of Stream Lines Interactive is now available!

## What's New?

Explore Our New Ground Water Section!

"Learn more about how the NRD is protecting the quality and quantity of the District's ground water supply from our newly remodeled, no-scroll Ground Water section. Read-up on proposed changes in the NRD's Ground Water Rules and Regulations, find out about NRD cost-sharing programs and more. AND see my Top Ten Water Tips!"

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### Nature Nights

**The NRD is helping to sponsor Family Nature Nights at schools where we've established after school nature clubs. Families are invited to come and enjoy many nature-awareness activities. Click HERE for a schedule and to view photos of past Nature Nights.**

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### Lincoln's Natural Treasures

**The NRD is a partner in the first-ever Lincoln Safari, a year-long activity inspired by Richard Louv's book, *Last Child in the Woods*, and designed to get kids and their families together in some of Lincoln's most naturally educational settings. Learn More**

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### Missing Stream Lines?

**In order to save printing and mailing costs, only four of the NRD's six yearly newsletter issues are being printed. All Six issues are being distributed via e-mail as *"Stream Lines Interactive,"* featuring internet links to enlarged maps and photos and other special pages to help readers better understand NRD activities and programs. Just like *Stream Lines*, *Stream Lines Interactive* is FREE. Click here to subscribe AND to stay informed.**

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### Next NRD Board Meeting

**The next regular meeting will be on Wednesday, May 21st, at 7 p.m. at the Lower Platte South NRD Office, 3125 Portia Street, Lincoln, NE. Agendas are issued approximately one week prior to Board meetings. If an agenda has been issued for the next meeting a link will appear immediately below. Agendas are subject to change up to 24 hours prior to meetings.**

**MINUTES FROM LAST MEETING**

Home | About | Board & Staff | Budget | Major Projects | Programs
Permits | LPRCA/MapMaker | Recreation | Ground Water | Games | Stormwater
Environmental Ed. | Publications | Links | Contact Us | Employment

# How Can Your Community Become Protected from Natural Disasters?

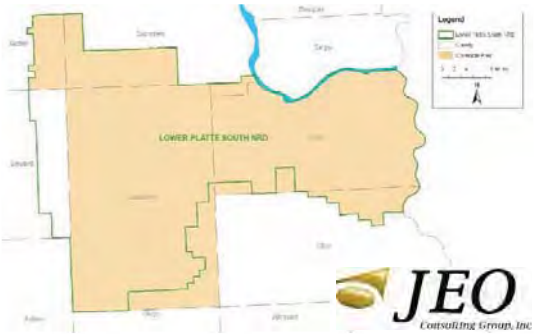
Help determine how to protect your community from future disasters by participating in the Lower Platte South NRD **MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN**!

A second round of public meetings have been scheduled in order to receive your input.

**Wednesday, April 23rd @ 5:30 pm**
**Lower Platte South NRD Office**
**3125 Portia Street - Lincoln, Nebraska**

**Thursday, April 24th @ 5:30 pm**
**Louisville Senior Center**
**423 Elm Street - Louisville, Nebraska**
**(located at east end of town along Hwy 66)**


Contact Information
Paul Zillig, Assistant Manager
Lower Platte South NRD
402.476.2729
pzillig@lpsnrd.org


This 'Lower Platte South NRD Hazard Mitigation Plan' will cover the communities within Lancaster County, Cass County, and those parts of Butler, Saunders, and Otoe County that are within the Lower Platte South NRD.

# Is Your Community Protected from Future Natural Disasters?

Help protect your community from future disasters by attending a public meeting/workshop regarding the development of a **Multi-Jurisdictional Hazard Mitigation Plan** for the Lower Platte South Natural Resources District!

Please attend one of the public meetings to provide information and participate in the planning process!

**Wednesday, December 12th @ 6:00 pm**
**Cass County Emergency Management Office - 8400 144th Street - Weeping Water, Nebraska**

**Thursday, December 13th @ 6:00 pm**
**Lower Platte South NRD - 3125 Portia - Lincoln, Nebraska**


Contact Information
Paul Zillig, Assistant Manager
Lower Platte South NRD
402.476.2729
pzillig@lpsnrd.org

JEO Consulting Group, Inc

This 'Lower Platte South NRD Hazard Mitigation Plan' will cover all of Lancaster County, Cass County, and those parts of Butler, Saunders, and Otoe County that are within the Lower Platte South NRD.

Engineering
Architecture
Surveying
Planning

# KICK-OFF MEETING AGENDA – OCTOBER 19TH, 2007

## LOWER PLATTE SOUTH NATURAL RESOURCES DISTRICT

## MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN

## JEO PROJECT NO. 385D23

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**1. Project Management Plan**
- Project Team Responsibilities
- Project Schedule
- NRD Map and Community List
- Contract
- Scope of Services
- Sample Monthly Progress Report and Invoice
- Payment process with NEMA

**2. Community Participation**
- Identify interested communities
- Discuss participation criteria for inclusion in the NRD's HMP
- Example Kick-off letter

**3. Initial Public Meeting(s) / Involvement**
- # of meetings anticipated
- Potential meeting locations
- Estimated timeframe for meetings

**4. Overview of the Hazard Mitigation Planning (HMP) Process**
- Anticipated Work Schedule

**5. Next Steps**
- Compile available data
- Finalize kick-off letter for NRD's distribution

**6. Other Issues or Concerns?**

# Lower Platte South NRD Hazard Mitigation Plan
# 'Kick-off' Meeting Minutes

**Attendance:** Paul Zillig, , Glenn Johnson, Ed Ubben, Mike Mascoe (LPSNRD); Ed Kouma (City); Steve McMaster (NDNR); Lalit Jha, J.D. Johnson, Dan Fricke (JEO);
**When:** October 19, 2007 10:30 AM
**Where:** LPSNRD Office
3145 Portia Street
**Project No:** JEO 385D23

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## MINUTES

The purpose of this meeting was to meet with interested parties to discuss the procedure for the development of the hazard mitigation plan. The following items were discussed:

1. Project Management Plan
2. Community Participation
3. Initial Public Meeting/Involvement
4. Overview of the HMP process
5. Next Steps

Below are notes from the meeting based upon the above-listed agenda items:

**PROJECT MANAGEMENT PLAN** – An overview of the Project Management Plan was discussed and two draft copies were distributed to attendees. The draft schedule will be changed when specific dates for the plan are finalized. The contract agreement has been executed by the LPSNRD, and a copy included in the Project Management Plan. Invoicing will be submitted monthly, on an hourly not-to-exceed basis. An electronic copy of the plan will be provided to the LPSNRD. Comments or revisions to the plan will be provided to JEO by the end of October (approximate).

**COMMUNITY PARTICIPATION –** JEO has prepared a series of letters to inform potential participants about LPSNRD's HMP. The first 'kick-off' letter will be sent to potential participants and neighboring entities to inform them in general about the planning process. A second letter will follow to inform potential participants about a specific time and date of the first 'public' meeting. Dates for mailing the 'kick-off' letter and second letter will be determined. JEO will coordinate with Mike Mascoe to produce letters and flyers to be used for public meeting notices. JEO will also prepare a news release discussing the upcoming meeting; Mike Mascoe is to provide information about local publications. JEO will provide a mailing database which includes any potential participant or neighboring community; mailing database will be finalized by the end of October..

Plan will be written such that entities have the ability to have multiple sponsors, i.e. town, county, NRD. The communities/entities will adopt only the portion of the plan that applies to that entity. NRD and communities will supply a list of historically recorded hazards - flooding, tornadoes, etc. Time spent by sponsor and participating entities should be tracked to help reach the matching funding. A system will be developed to help track time spent during the HMP process; the total should be updated on a monthly or quarterly basis. All meetings should have a sign-in sheet to record attendance which is necessary for plan approval and will also help in tracking 'in-kind' time.

Paul Zillig will serve as the primary contact for the LPSNRD. Lalit Jha will be the primary contact from JEO while Jared Nelson will be the lead engineer. Discussion of creating an 'advisory group' was covered. The LPSNRD will narrow down a list of possible candidates based upon availability and their own criteria.

The advisory group will be finalized by the sponsor by mid-November, 2007. Their primary responsibility will be to establish criteria for public participation for involvement in the planning process. The LPSNRD will be responsible for the completion of the field work portion of the structural inventories for each participating community. The LPSNRD will work with City of Lincoln staff to gather available data for the City's structural inventory.

**INITIAL PUBLIC MEETING/INVOLVEMENT –** It was decided to conduct two initial public meetings, tentatively scheduled for December 12th and 13th, 2007. One will be held in Lincoln and the other possibly in Weeping Water. After the first two meetings have been conducted, it will be decided if a third is needed and where it should be held to target a specific audience. If necessary, the third meeting likely would be conducted in mid-January. In order for a community/entity to participate in the HMP process at least one representative of the community must attend one of the initial public meetings and another later to discuss goals/objectives of HMP, establish mitigation alternatives, and prioritize projects. The first advisory group meeting is tentatively scheduled for the week beginning December 3rd, 2007. The meeting times are tentatively scheduled for 7:00 PM.

**OVERVIEW OF THE HMP PROCESS** – Lalit discussed the general procedure to develop a plan (see attached revised work schedule).

**NEXT STEPS –** JEO will work with the City of Lincoln and NRD staff to collect data. The City will most likely have a large amount of data readily available. JEO will provide NRD staff with a general list of data that will be needed to complete plan. Steve McMaster will coordinate with JEO to submit completed windshield survey data; data should be submitted on an "as completed" basis for each community, which will allow JEO to start work on individual areas as soon as possible. JEO will provide base maps and instructions to guide the window surveys.

| | |
|---|---|
| Mid-November, 2007 | Finalize advisory group |
| Early November, 2007 | Send first letter about public meeting |
| Week of December 3rd, 2007 | Hold first advisory group meeting |
| December 12th and 13th, 2007 | Initial public meetings, Lincoln and Weeping Water |
| December 15th, 2007 | Determine need for third public meeting |
| Mid-January, 2007 | Hold third public meeting (if necessary) |

# Lower Platte South NRD Hazard Mitigation Plan
# 'Hazard Identification' Meeting Minutes

**Attendance:**

| Name | Jurisdiction | Name | Jurisdiction |
|---|---|---|---|
| Doug Ahlberg | Lancaster County | Ray Frew | Weeping Water |
| M. Cover | Cass County | Jessica Preister | Ashland |
| Joshua Groleau | Cass County | Richard Hasty | Cass County/Plattsmouth Community Schools |
| Marilyn Kirchhoff | Avoca | Dave Holman | Saunders County/Ashland-Greenwood Public Schools |
| Chuck Paukert | Cedar Creek | Dale Miller | Cass County RWD #1 |
| Jason McClun | Louisville | Scott Sparks | Cass County RWD #1 |
| Eileen Murdoch | Murray | Lalit Jha | JEO |
| Kevin Larson | Plattsmouth | Jared Nelson | JEO |

**When:** December 12, 2007 7:00 PM
**Where:** Cass County Emergency Management Office
8400 144th Street
Weeping Water, NE
**Project No:** JEO 385D23

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## MINUTES

The purpose of this meeting was to meet with participating jurisdiction representatives to explain the procedure for the development of the hazard mitigation plan. Lalit Jha and Jared Nelson presented a Power Point presentation discussing the following six items:

1) Introduction to hazard mitigation planning
2) Identify potential hazards
3) Determine the probability/extent of each hazard
4) Document the historical occurrence of hazard events
5) Discussion of goals/objectives for mitigation of hazards
6) Discuss potential mitigation alternatives/projects

Overall, the Plan is a community-guided document that requires the participation of its members to make it viable. The jurisdictions represented in the plan will be eligible for funding and cost share for the projects identified in the plan.

JEO provided attendees with a description of the project as well as a "Hazard Identification Worksheet" packet. The worksheet packet was provided for jurisdictions to complete with jurisdiction-specific information including: Hazard Identification, Hazard Occurrence Record, Goals and Objectives, and Potential Mitigation Alternatives.

The presentation portion of the meeting then ended and the attendees were encouraged to ask questions and fill out the worksheets as well as take extras back to their jurisdictions along with envelopes addressed to Paul Zillig. Some of the attendees asked general questions during this period of the meeting about specific hazards in their areas and if they should be included on the worksheets as well as what types of projects would be eligible for funding. It was recommended that, at this point in the planning process, any hazards that can be identified should be included; if certain hazards are decided to be of little importance then they can be excluded later. A few completed worksheets were returned during the meeting and the representatives took the worksheet packets and return envelopes with them.

NEXT STEPS – JEO will work with the NRD staff and Steve McMaster (DNR) to collect data and interpret completed worksheets. Steve McMaster will coordinate with JEO to submit completed windshield survey data. After compiling attendance records, discussions will be held regarding the need for a third public "Hazard Identification" meeting, or another way to get jurisdictions involved with the plan that have not attended either of the public meetings.

# Lower Platte South NRD Hazard Mitigation Plan
# 'Hazard Identification' Meeting Minutes

**Attendance:**

| Name | Jurisdiction | Name | Jurisdiction |
|---|---|---|---|
| Bryan Kubicek | Davey | Sheri Henderson | Ceresco |
| Bill Edwards | Denton | Phil Warrick | Lancaster County/Waverly School District 145 |
| Gary Vocasek | Hallam | Jeanette Volker | Southeast Community College |
| Emily Bausch???????sp | Hickman | Fred Gardy | University of Nebraska - Lincoln |
| Ed Kouma | Lincoln | Ken Halvorsen | Lancaster Co RWD #1 |
| Doug Ahlberg | Lincoln | Paul Zillig | LPSNRD |
| John Miriovsky | Lincoln | Mike Mascoe | LPSNRD |
| Nadine Link | Malcolm | Jeffrey Kohn | MUD |
| Eric Johnson | Panama | Steve McMaster | DNR |
| Glenda Wood | Waverly | Lalit Jha | JEO |
| Michael Wenzel | Eagle | Jared Nelson | JEO |
| Robin Sullivan | Brainard | Dan Fricke | JEO |

**When:** December 13, 2007 7:00 PM
**Where:** LPSNRD Office
3145 Portia Street
Lincoln, NE
**Project No:** JEO 385D23

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## MINUTES

The purpose of this meeting was to meet with participating jurisdiction representatives to explain the procedure for the development of the hazard mitigation plan. Lalit Jha and Jared Nelson presented a Power Point presentation discussing the following six items:

1) Introduction to hazard mitigation planning
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6) Discuss potential mitigation alternatives/projects

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# STAFF MEETING AGENDA
# LANCASTER COUNTY BOARD OF COMMISSIONERS
# THURSDAY, JANUARY 17, 2008
# COUNTY-CITY BUILDING
# CHAMBERS, 8:30 A.M.

| AGENDA ITEM | | |
|---|---|---|
| 1 | | **APPROVAL OF STAFF MEETING MINUTES OF THURSDAY, JANUARY 10, 2008** |
| 2 | | **ADDITIONS TO AGENDA** |
| 3 | 8:30 AM | **LEGISLATIVE UPDATE** - Gordon Kissel and Kristen Crawford Kissel/E&S Associates |
| 4 | 9:00 AM | **CONSTRUCTION MANAGER AT RISK RFP** - Vince Mejer, Purchasing Agent |
| 5 | 9:15 AM | **VIDEO ARRAIGNMENT AND CONFERENCING** - Mike Thurber, Corrections Director |
| 6 | 9:30 AM | **INTRODUCTION OF GREG MACLEAN, CITY PUBLIC WORK DIRECTOR** |
| 7 | 10:00 AM | **LOWER PLATTE SOUTH NATURAL RESOURCES DISTRICT MITIGATION GRANT PROGRAM** - Doug Ahlberg, Emergency Management Director |
| 8 | 10:15 AM | **PENDING AND POTENTIAL LITIGATION** - Mike Thew, Chief Deputy County Attorney; Tom Fox, Deputy County Attorney |
| 9 | 10:45 AM | **LANCASTER MANOR FIRE SUPPRESSION BID UPDATE** - Bob Walla, Assistant Purchasing Agent |
| 10 | | **ACTION ITEMS**<br>a. Microcomputer Requests:<br>(1) C#2008021, $264.62 from Microcomputer Fund for a 19" LCD Monitor for County Attorney<br>(2) C#2008027, $1,975.83 from Microcomputer Fund for a PC, 19" LCD Monitor, etc. for Juvenile Court<br>(3) C#2008025, $3,692.14 from Microcomputer Fund for 2 PC's, 2 19" Monitors, Software, Etc. For Community Corrections |
| 11 | | **CONSENT ITEMS** |
| 12 | | **ADMINISTRATIVE OFFICER REPORT**<br>a. Committee Assignments |

b. Visitors Promotion Committee Appointment (Steve Hilton, Embassy Suites)
c. Commissioners Award of Excellence Committee Appointment
d. Youth Services Center Connectivity
e. Lancaster Manor Director Salary
f. Correspondence from LIBA Regarding Construction Manager at Risk and Project Manager for Jail Construction
g. Informational Meetings Regarding NPPD Transmission Line Route

13 **PENDING**

14 **DISCUSSION OF BOARD MEMBER MEETINGS**

a. **Information Services Policy Committee Meeting** - Stevens
b. **Parks Advisory Board Meeting** - Stevens
c. **Monthly Meeting of County Board Chair/Vice Chair and Mayor** - Workman, Heier
d. **District Energy Corporation Meeting** - Heier
e. **General Assistance Monitoring Committee Meeting** - Schorr, Stevens
f. **Joint Budget Committee Special Meeting** - Stevens, Schorr

15 **SCHEDULE OF BOARD MEMBER MEETINGS**

a. **NACO Board of Directors Meeting** - Thursday, January 17, 2008 at 2:00 pm at the Cornhusker Marriott Hotel - Heier
b. **NACO Legislative Meeting** - Friday, January 18, 2008 at 9:30 am at the Cornhusker Marriott Hotel - Heier
c. **LPS/City/County Meeting (Tentative)** - Tuesday, January 22, 2008 at 7:30 am at the Health Department - All Commissioners

16 **INVITATIONS TO BOARD MEMBERS**

a. **Lincoln-Lancaster County Health Department/Nebraska Well Drillers Association/Department of Health and Human Services Well Education Workshop** - Tuesday, January 22, 2008 at 7:00 pm to 8:30 pm at the Health Department, 3140 "N" Street
b. **Nebraska Public Power District Meeting on the Electric Transmission Reliability Project for East-Central Nebraska** - Wednesday or Thursday, January 23rd or 24, 2008 at different meeting times
c. **Diesel Power Equipment Company Open House** - Friday, January 25, 2008 at 11:30 am to 5:00 pm at 15225 Industrial Road, Omaha, NE
d. **Interlock Ignition Device Demonstration** - Friday, January 25, 2008 at 9:30 am - Press Conference, 10:00 am - Device Demonstrations at the County Sheriff's Office, 575 So. 10th Street

Engineering
Architecture
Surveying
Planning

# 2nd KEY PERSONNEL MEETING AGENDA – APRIL 16TH, 2008

## LOWER PLATTE SOUTH NATURAL RESOURCES DISTRICT

## MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN

## JEO PROJECT NO. 385D23

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### 1. Revised Schedule

- Original Deadline: 2 years from start - October 2009
- Revised Deadline: January, 2009 (due to Beal Slough project)
- Anticipated Schedule:
  - April 23rd & 24th – Second Round of Public Meetings
  - June 1st – Collect information from 2nd round of public meetings
  - July 15th – Preliminary Final Plan (to be posted on website)
  - August 15th – Finalize Plan and 1st Submittal to FEMA
  - October 5th – Address FEMA's comments and submit 2nd time
  - November 20th – Address FEMA's comments and submit Final Plan and fact sheet to Chris Koll at City of Lincoln
  - December 1st – Lincoln City Council Introduction
  - December 8th – Lincoln City Council hearing and action (hopefully)
  - December 15th – Lincoln City Council hearing and action
  - December 16th – Submit Final Plan and Approval letters to FEMA
  - January 7th, 2009 – Have plan approved by FEMA

### 2. Community Participation

### 3. Current Progress

- Draft 'Front End' Completed
  - Introduction, The Planning Process, Hazard Background, Mitigation Strategy, Plan Implementation and Maintenance
- Draft 'Participant Sections'
  - Background of Jurisdiction, Hazard Identification, Structural Inventory/Valuation/Critical Facilities/Sirens, Risk Assessment (for each hazard), Mitigation Strategy (projects)

### 4. 2nd Round of Public Meetings

- *When & Where:* April 23rd – Lincoln - NRD Conference Room – 5:30pm; April 24th – Louisville Senior Center – 5:30pm
- *Purpose:* To provide an opportunity for public and communities to comment on the plan. Get input on the following:
  - Review draft plan and maps
  - Review and update critical facilities
  - Review and update siren locations and ranges

- Provide input on "Future Development Trends"
- Prioritize Projects and provide additional information on them
- Gain input on previous mitigation efforts

**5. Next Steps**

- Get comments back from communities to complete plan
- Work closely with the following to complete their section:
  - Lower Platte South NRD
  - City of Lincoln
  - Counties
  - Communities that decide to 'jump on board'
  - SID/RWD/MUD
- Work with DNR and NEMA to refine hazards (ie dam inundation and levees)

**6. Additional Information Needed**

- Input from communities

**7. Other Issues or Concerns?**

- How to get input back from communities in a timely manner

# Lower Platte South NRD Hazard Mitigation Plan
# 2nd Key Personnel Meeting Minutes

**Attendance:** Paul Zillig, Ed Ubben, Mike Mascoe (LPSNRD); Ed Kouma (City of Lincoln); Doug Ahlberg (Lancaster County Emergency Management); Bill Cover, Dan Seaman (Cass County Emergency Management); Steve McMaster (DNR); Lalit Jha, Jared Nelson (JEO)
**When:** April 16, 2008
**Where:** LPSNRD Office
3145 Portia Street
**Project No:** JEO 385D23

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## MINUTES

The purpose of this meeting was to meet with the Key Personnel involved in the Lower Platte South NRD Multi-Jurisdictional Hazard Mitigation Plan. The purpose was to get input and insight on the public meetings to be held on April 23rd and 24th and how to gather additional information from the communities. Also, the purpose was to discuss progress, schedule, and the next steps. The following items were discussed:

1. Revised Schedule
2. Community Participation
3. Current Progress
4. 2nd Round of Public Meetings
5. Next Steps
6. Additional Information Needed
7. Other Issues or Concerns

Below are notes from the meeting based upon the above-listed agenda items:

**REVISED SCHEDULE** – The original deadline of October 2009 was discussed and the revised schedule was explained due to the Beal Slough project that the City of Lincoln wants to get funding for. The revised deadline is January 2009. Tentative dates for the remainder of the project were discussed as outlined in the meeting agenda. The goal is for JEO to have the 'preliminary final plan' completed by July 15th. This will then be reviewed by the key personnel, including the Lower Platte South NRD, City of Lincoln, as well as Cass and Lancaster County's. By August 1st, JEO is to have the plan finalized and submitted to FEMA. It will then be a matter of time for FEMA to review the plan and for JEO to work with them to get it conditionally approved.

By November 20th, the hope is that all FEMA comments will be addressed and at this point the Final Plan and fact sheet will be submitted to Chris Koll at the City of Lincoln as well the Lancaster County Board. Lalit had made mention too, that around this time, Ed and JEO should work together to set up a Pre Council meeting with the City of Lincoln.

In December the plan will move to the Lincoln City Council for hearing and action with the goal to have the plan adopted by Lincoln and submitted to FEMA on December 16th for final approval. The deadline is January 7th, 2009.

**COMMUNITY PARTICIPATION** – Discussion was held about the communities that have and have not participated. It was noted that Paul has packet for several of the communities that JEO did not have. Paul mentioned that he does not see any reason to make extra effort for schools. It was noted that Jared

and Paul will review the list together of which communities are involved and what they still need. Steve McMaster noted that he can represent Waverly if no one shows up from their community. It was also noted by Doug Ahlberg that these communities usually meet the first week of the month and we should plan accordingly.

**CURRENT PROGRESS** – Jared reviewed the current progress with the group. He reviewed that a rough draft of the 'front end' was completed as well as draft 'participant sections' for each community. The participant sections were very scarce for those communities that did not return anything.

**2ND ROUND OF PUBLIC MEETINGS** – Lalit and Jared discussed the game plan for the upcoming meetings on April 23rd and 24th. They discussed the purpose of the meetings is largely to meet the FEMA requirements of having open public involvement and allow the public as well as neighboring communities and business comment and provide input to the plan. This second round of public meetings also serves the purpose of supplying the communities their draft 'participant section' and gives them an opportunity to comment on it as well as supply pertinent information back.

Examples of the handouts/worksheets of the material that was to be handed out at the public meetings was passed around to the key personnel and discussed. Many people had comments on this worksheet, providing ways to make it better. Some of the comments, suggestions are as follows:

- Have a cover letter explaining that there is 1) a document to use and 2) directions to fill out the document.
- Don't give them very long to return the sheets. Ie: one month would be sufficient.
- Have a glossary of definitions of terms
- Suggestions on the wording of the floodplains in the draft sections
- Simplify the documents
- Provide examples of everything

Jared was to make changes to the worksheets and prepare the final ones for the public meetings on April 23rd and 24th.

**NEXT STEPS** – Jared with JEO will work closely with: Lower Platte South NRD, the City of Lincoln, Counties, communities that decide to jump on board, and SIDs/RWDs.

JEO to meet with the DNR to refine hazards such as dam inundation and levees.

**ADDITIONAL INFORMATION NEEDED** – It was discussed that there is still additional information needed from some of the communities.

**OTHER ISSUES OR CONCERNS** – The main issue/concern was how to get input from the communities and get them involved in this process.

# Lower Platte South NRD Hazard Mitigation Plan
# 'Mitigation Alternative' Meeting Minutes

**Attendance:**

| Name | Jurisdiction | Name | Jurisdiction |
|---|---|---|---|
| Dave Thurber | Lincoln Water System | Bill Edwards | Denton |
| Bonnie Harms | Village-Roca | Dale Miller | Cass Co. RWD #2 |
| Dan & Marge Schlitt | Lincoln | Ruth Anderson | Davey |
| Jessica Preister | City of Ashland | Larry Swanson | Lower Platte South NRD |
| Michael Wenzel | Village of Eagle | Emily Bausch | City of Hickman |
| Lori Streeter | Davey | Nadene Link | Malcolm |
| Steve Vandenberg | Emerald | Roy Rasmussen | Malcolm |
| Patricia Rule | Bennet | Steve McMaster | Waverly |
| Ed Kouma | Lincoln | Jonathan Mohr | JEO Consulting Group |
| Doug Samuelson | Lower Platte South NRD | Doug Ahlberg | Lincoln & Lancaster County |
| Becky Vandenberg | Emerald | Shane Cuttlers | Village of Raymond |
| Floyd Maresh | Valparaiso | Greg Bouc | Valparaiso |
| Phil Warrick | Waverly/Eagle School District | William M. Cover | Cass County |
| Fred Gardy | UNL | Eric Johnson | Village of Panama |
| Paul Zillig | Lower Platte South NRD | Jared Nelson | JEO Consulting Group |

**When:** April 23, 2008 5:30 PM
**Where:** Lower Platte South Office
3145 Portia Street
Lincoln, NE
**Project No:** JEO 385D23

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## MINUTES

The purpose of this meeting was to meet with participating jurisdiction representatives and the general public interested in the planning process to explain the procedure for the development of the hazard mitigation plan and get input. Lalit Jha and Jared Nelson presented a Power Point presentation discussing the following six items:

1) Introduction to hazard mitigation planning
2) Hazard Mitigation Planning Process
3) Review Of Work Completed
4) Discuss 'Mitigation Worksheets'
5) Review Draft Plan Materials
6) Next Steps

Overall, the Plan is a community-guided document that requires the participation of its members to make it viable. The jurisdictions represented in the plan will be eligible for funding and cost share for the projects identified in the plan.

JEO provided attendees with a description of the project as well as a "Mitigation Alternative Worksheet" packet and draft 'participant section'. The worksheet packet was provided for jurisdictions to get additional input on the mitigation alternatives or projects. Projects identified in previous meetings were listed with a table to complete the STAPLEE process. The worksheets also contained sections asking for input on the 'future development trends', 'previous mitigation efforts', 'critical facilities' and 'siren locations'. The presentation focused on explaining these worksheets and what the communities will need to provide to ensure a extensive section for their community.

A draft 'participant section' was also handed out to the representatives of each community. JEO asked that they review this draft section and provide any comments or recommendations in it.

JEO and Lower Platte South NRD asked that communities return the worksheets and comments on draft plan by June 2nd, 2008. Information should be returned to Paul Zillig at the NRD.

**NEXT STEPS** – JEO will work with the NRD staff and Steve McMaster (DNR) to collect data on levees and dam structures in and above the communities. JEO and the Lower Platte South NRD will collect the comments on the draft plans and make the changes necessary. Also, the Mitigation Alternative worksheets will be collected and the information will be incorporated into the plan by JEO. JEO is expected to have the final plan submitted to FEMA by August 15th, with expected adoption and approval by January 2009.

# Lower Platte South NRD Hazard Mitigation Plan
# 'Mitigation Alternative' Meeting Minutes

**Attendance:**

| Name | Jurisdiction | Name | Jurisdiction |
|---|---|---|---|
| Kermit Rhisdozal | Plattsmouth Community School | Mary Jerry | Cedar Creek |
| Bob Scheer | Cass County SID #1 | Alan Mueller | Louisville |
| Larry Hathaway | Cass County SID #1 | Charles Paukert | Cedar Creek |
| William M. Cover | Cass County EMA | Ray Frent | Weeping Water |
| Gayle Schakes | Village of Eagle | Kevin Larson | Plattsmouth |
| James Ruhge | Cass County | Dennis Hobak | RWD #1 Cass County |
| Robin Sullivan | Brainard, NE | Tom Burmham | Murdock |
| Jared Nelson | JEO Consulting Group | Glenda Wood | Waverly |
| Mike Schwab | JEO Consulting Group | Eileen Murdoch | Murray |

**When:** April 24, 2008 5:30 PM
**Where:** Louisville Senior Center
423 Elm Street
Louisville, NE
**Project No:** JEO 385D23

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## MINUTES

The purpose of this meeting was to meet with participating jurisdiction representatives and the general public interested in the planning process to explain the procedure for the development of the hazard mitigation plan and get input. Lalit Jha and Jared Nelson presented a Power Point presentation discussing the following six items:

1) Introduction to hazard mitigation planning
2) Hazard Mitigation Planning Process
3) Review Of Work Completed
4) Discuss 'Mitigation Worksheets'
5) Review Draft Plan Materials
6) Next Steps

Overall, the Plan is a community-guided document that requires the participation of its members to make it viable. The jurisdictions represented in the plan will be eligible for funding and cost share for the projects identified in the plan.

JEO provided attendees with a description of the project as well as a "Mitigation Alternative Worksheet" packet and draft 'participant section'. The worksheet packet was provided for jurisdictions to get additional input on the mitigation alternatives or projects. Projects identified in previous meetings were listed with a table to complete the STAPLEE process. The worksheets

also contained sections asking for input on the 'future development trends', 'previous mitigation efforts', 'critical facilities' and 'siren locations'. The presentation focused on explaining these worksheets and what the communities will need to provide to ensure a extensive section for their community.

A draft 'participant section' was also handed out to the representatives of each community. JEO asked that they review this draft section and provide any comments or recommendations in it.

JEO and Lower Platte South NRD asked that communities return the worksheets and comments on draft plan by June 2nd, 2008. Information should be returned to Paul Zillig at the NRD.

**NEXT STEPS** – JEO will work with the NRD staff and Steve McMaster (DNR) to collect data on levees and dam structures in and above the communities. JEO and the Lower Platte South NRD will collect the comments on the draft plans and make the changes necessary. Also, the Mitigation Alternative worksheets will be collected and the information will be incorporated into the plan by JEO. JEO is expected to have the final plan submitted to FEMA by August 15th, with expected adoption and approval by January 2009.

# Lower Platte South NRD Hazard Mitigation Plan
# Lancaster Draft Plan Meeting Agenda

**Attendance:** Doug Ahlberg (Lancaster County Emergency Management); Jared Nelson (JEO)
**When:** April 28th, 2008 11:00 AM
**Where:** JEO Office
650 'J' St, Lincoln, NE
**Project No:** JEO 385D23

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## AGENDA

The purpose of this meeting is to meet with Doug Ahlberg, the Lancaster County Emergency Manager to discuss items that relate to Lancaster County and the communities within. These items concern the Lower Platte South NRD Hazard Mitigation Plan.

1. **COMMUNITY PARTICIPATION**
    - Communities that did not attend first meeting
    - Communities that did not return information
    - Communities that did not attend second meeting

2. **SIRENS** – New sirens, locations, ranges

3. **PROJECTS** – Lancaster County projects / unincorporated areas

4. **HAZARDS IN LANCASTER COUNTY AND COMMUNITIES**

5. **STRUCTURES THAT COUNTY OWNS**
    - Critical Facilities
    - Other Structures – Structural Inventory

6. **WORKSHEETS**
    - Will provide a new worksheets once information is received from Lancaster
    - Input on communities worksheets?

7. **DRAFT PLAN**
    - Will provide a new draft plan once information is received from Lancaster
    - Review of communities draft plans?

8. **ADDITIONAL INFORMATION NEEDED**
    - See above items

9. **OTHER ISSUES OR CONCERNS**

# Lower Platte South NRD Hazard Mitigation Plan
# 'Lancaster Draft Plan' Meeting Minutes

**Attendance:** Jared Nelson (JEO); Doug Ahlberg (Lancaster County Emergency Management)
**When:** May 14th, 2008 1:30 PM
**Where:** JEO Office
650 J St. Lincoln, NE
**Project No:** JEO 385D23

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## MINUTES

The purpose of this meeting was to meet with Doug Ahlberg, the Lancaster County Emergency Manager to discuss items that relate to Lancaster County and the communities within. These items concern the Lower Platte South NRD Hazard Mitigation Plan. Items and notes that were discussed:

1. **COMMUNITY PARTICIPATION**
   - Doug talked to the Deputy Director for Firth and he should be returning the items needed.
   - Doug said he talked to Sprague/Martel and they should be getting items returned soon.
   - Doug also agreed that Lancaster County SID #6, Emerald, should have their own section in the plan as they are 'on their own.'

2. **SIRENS**
   - The sirens in Lancaster County were discussed. The map that Doug gave JEO several months ago has the latest siren information to go by. The sirens that Jeff McReynolds supplied JEO have a few errors in them. (i.e. Panama should be 4000 range)

3. **PROJECTS**
   - Doug supplied projects for the County.
   - Doug emphasized wanting to show just a few important projects in the plan they the County will do.
   - The 1st project is to install a DC powered warning siren in each of the incorporated cities/villages and also Emerald, but not the City of Lincoln. Lincoln has a loop system instead of single source power. The 13 cities/villages and Emerald all have single source power.
   - The 2nd project is a 'first call' system. Doug noted that this is set up by zip code and the coverage would actually reach beyond Lancaster County. System will also reach acreages and rural areas of County since it's by zip code.

4. **HAZARDS IN LANCASTER COUNTY AND COMMUNITIES**
   - Discussion was held about the hazards that are present in Lancaster County. It was agreed that Jared will use the information that Doug supplied from the first worksheet as well as the LEOP to identify the natural hazards that are a threat. Doug will review this information once a new draft participant section is supplied to Doug.

5. **STRUCTURES THAT COUNTY OWNS**
   - Doug will supply Jared with a list of all Critical Facilities in Lancaster County.
   - Doug and Jared will work together in the future to refine these critical facilities and how to display them in the plan.

6. **WORKSHEETS**

- Doug and Jared worked on completing the first worksheet. As for the 2nd worksheet, Doug will look through some of the 'recommended projects' to see if he wants to add any. He will then add his projects on to the list (the yellow sheet) and will prioritize them using STAPLEE.
- Doug will supply Jared with a list of all Critical Facilities in Lancaster County.
- JEO has the Lancaster Comprehensive plan and will use it to complete the 'future development' portion of the plan.
- Doug, at this meeting, went through the list of project from the first worksheet and put a checkmark next to the projects that Lancaster County has done or is currently doing, i.e. "previous mitigation efforts."

7. **DRAFT PLAN**
    - Jared will provide new draft 'participant section' once new information from worksheets is incorporated. Doug will review this.
    - Once the 2nd worksheets are supplied from the different communities in Lancaster County, Jared will supply Doug all the 'participant sections' for him to review. Doug will also look through the projects in each community to see if they are missing any.

8. **ADDITIONAL INFORMATION NEEDED**
    - See above items

9. **OTHER ISSUES OR CONCERNS**
    - Doug will contact the Department of Roads to get the number of bridges in the County and their class. The class is determined by their weight capacity.

**RESOLUTION**

WHEREAS, *School District 145* has limited capability to undertake extensive participation in the preparation of a hazard mitigation plan; and

WHEREAS, the *Village of Eagle, Nebraska* is able to act on behalf of *School District 145* in the analysis and development of a hazard mitigation plan; and

WHEREAS, the *Village of Eagle, Nebraska* shall prepare a hazard mitigation plan in accordance with FEMA requirements at 44 C.F.R. 201.6; and

WHEREAS, the *Village of Eagle, Nebraska* shall deliver a draft copy of the Plan for public comment as well as the governing body's comment during the planning process and prior to adoption.

NOW THEREFORE, the School District 145 Board of Education authorizes the City of Waverly to participate in the preparation of the Lower Platte South NRD Multi-jurisdictional Hazard Mitigation Plan on behalf of School District 145 which shall be reviewed and considered for adoption by the District 145 Board of Education upon completion.

ADOPTED this 7th day of July, 2008 at the meeting of the *District 145 Board of Education.*

Marcia K. Herring
*School Board President*

*Attested By:*
Lindi Bevan
*School Board Secretary*

Michael Wenzel
*City/Village/County Mayor/Chair*

*Attested By:*
Donna Stevens
*City/Village/County Clerk*

**RESOLUTION**

WHEREAS, *School District 145* has limited capability to undertake extensive participation in the preparation of a hazard mitigation plan; and

WHEREAS, the *City of Waverly, Nebraska* is able to act on behalf of *School District 145* in the analysis and development of a hazard mitigation plan; and

WHEREAS, the *City of Waverly, Nebraska* shall prepare a hazard mitigation plan in accordance with FEMA requirements at 44 C.F.R. 201.6; and

WHEREAS, the *City of Waverly, Nebraska* shall deliver a draft copy of the Plan for public comment as well as the governing body's comment during the planning process and prior to adoption.

NOW THEREFORE, the School District 145 Board of Education authorizes the City of Waverly to participate in the preparation of the Lower Platte South NRD Multi-jurisdictional Hazard Mitigation Plan on behalf of School District 145 which shall be reviewed and considered for adoption by the District 145 Board of Education upon completion.

ADOPTED this 7th day of July, 2008 at the meeting of the *District 145 Board of Education.*

*School Board President*

*Attested By:*

*School Board Secretary*

*City/Village/County Mayor/Chair*
Council President

*Attested By:*

*City/Village/County Clerk*

# Appendix C – Worksheets and Information from Communities

**Contains the following:**

1. Example of Worksheet #1
2. Example of Worksheet #2
3. Description of Project
4. Website Instructions
5. City of Lincoln- HAZUS Model

## *HAZARD IDENTIFICATION*

**Which Jurisdiction are you representing?:** _____
**Name:** _____
**Title:** _____
**Email:** _____
**Address:** _____
**City, State, Zip:** _____
**Date Completed:** _____

**For each Hazard, please fill out the table below based on the following questions:**

**Previous Occurrence:** Is there a historic record of this type of hazard in the jurisdiction? (Yes / No)

**Likely to Experience:** Is your jurisdiction likely to experience this type of hazard in the future? (Yes / No)

**Probability:** Based on history, what is the likelihood of this event happening again? (Highly Likely, Likely, Possible, Unlikely)

**Extent:** If this hazard event were to happen, how extensive could the damage be? (Catastrophic, Severe, Limited, None)

| Hazard Type | Previous Occurrence? | Likely to Experience? | Probability | Extent |
|---|---|---|---|---|
| | Yes / No | Yes / No | Highly Likely, Likely, Possible, Unlikely | Catastrophic, Severe, Limited, None |
| Drought | | | | |
| Earthquake | | | | |
| Flooding | | | | |
| Severe Thunderstorm | | | | |
| Tornado/High Winds | | | | |
| Severe Winter Storm | | | | |
| Wildfire | | | | |
| Landslide | | | | |
| Dam Failure | | | | |
| Extreme Heat | | | | |

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

*Comprehensive Plan* Yes / No Date Completed_____
*Zoning* Yes / No Date Completed_____
*Current Membership with NFIP* Yes / No
*Additional Studies / Reports* Yes / No
(If yes, please list below)

_____ Date Completed_____
_____ Date Completed_____
_____ Date Completed_____

**Return To**: Paul Zillig, LPSNRD Assistant Manager, 3125 Portia St., Box 83581, Lincoln, NE 68501, pzillig@lpsnrd.org, 402-476-2729

## *HAZARD OCCURRENCE RECORD*

**Please provide details of past hazard events below:**

| | |
|---|---|
| **Hazard:** | **Date of Occurrence:** |
| Description of Hazard Event (Include location, damages, critical facilities, etc.): | |
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| **Hazard:** | **Date of Occurrence:** |
| Description of Hazard Event (Include location, damages, critical facilities, etc.): | |
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| Description of Hazard Event (Include location, damages, critical facilities, etc.): | |
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| Description of Hazard Event (Include location, damages, critical facilities, etc.): | |
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| **Hazard:** | **Date of Occurrence:** |
| Description of Hazard Event (Include location, damages, critical facilities, etc.): | |
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**Return To:** Paul Zillig, LPSNRD Assistant Manager, 3125 Portia St., Box 83581, Lincoln, NE 68501, pzillig@lpsnrd.org, 402-476-2729

## *GOALS AND OBJECTIVES*

Goals and Objectives provide specific direction for the jurisdiction for reducing future hazard related losses. Goals are general guidelines that portray what the jurisdiction is striving to achieve. They are global and general ideas. Objectives are more specific in that they identify strategies and implementation steps that are required to achieve goals. Please review the following generic goals and objectives that are found in many Hazard Mitigation Plans:

Goal 1: Protect the Health and Safety of Residents

(Overall purpose of plan)

Goal 2: Reduce Future Losses from Hazard Events

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

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

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

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

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

Goal 4: Improve Emergency Management Capabilities

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

Objective 4.2: Develop or improve Evacuation Plan and procedures.

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

Goal 5: Pursue Multi-Objective Opportunities Whenever Possible

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

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

**Do you agree with these Goals and Objectives for your jurisdiction? yes / no**

**If no, what comments, revisions, or additions do you have?**

_____

_____

_____

_____

**Return To:** Paul Zillig, LPSNRD Assistant Manager, 3125 Portia St., Box 83581, Lincoln, NE 68501, pzillig@lpsnrd.org, 402-476-2729

## *POTENTIAL MITIGATION ALTERNATIVES*

**Please describe potential mitigation projects in your jurisdiction below:**

| Hazard Mitigated: | Potential Project: |
|---|---|
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**Return To:** Paul Zillig, LPSNRD Assistant Manager, 3125 Portia St., Box 83581, Lincoln, NE 68501, pzillig@lpsnrd.org, 402-476-2729

# GENERAL ALTERNATIVES

- Increase Public Awareness of Vulnerability to Hazards
- Develop and Improve the Comprehensive City Disaster and Emergency Response Plan
- Improve Communication to Residents and Businesses During and Following Emergencies
- Local Weather Radio Service
- Cable TV Interrupt Warning System
- Telephone Interrupt Warning System
- Purchase and Issue Weather Radios for Schools and Critical Facilities
- Additional Personnel for Emergency Response

# HAZARD SPECIFIC ALTERNATIVES

### Severe Thunderstorm / Tornadoes

- Evacuation plan
- Evaluate and improve building standards
- Bury main power and service lines
- Pad-mounted transformers – elevating above the base flood elevation, or lowering them or burying them in non-flood, high-wind areas.
- Education on tree types and planting
- Anchoring or otherwise protecting fuel tanks from movement in a disaster.
- Adding guy wire or other additional support to power lines.
- Removing large diameter communication lines from power poles.
- Replacing damaged poles with higher-class pole or with a different material pole such as replacing wood poles with spun concrete.
- Providing looped distribution service or other redundancies in the electrical service to critical facilities.
- Tree planting program and maintenance
- City ordinance for trees
- Using multiple poles to support transformers.
- Additional warning systems
- Education (Tornado Safety Week)
- Storm shelter Identification, design, and development
- Improve existing backup systems
- Work with other utility providers to provide mutual aid through a regional power pool
- Additional personnel for emergency response

### Severe Winter Storm

- All terrain vehicles
- Coordination with surrounding communities
- Improve the maintenance of roadway snow routes
- Revise emergency snow plan
- Bury main power and service lines
- Using multiple poles to support transformers.
- Providing looped distribution service or other redundancies in the electrical service to critical facilities.
- Removing large diameter communication lines from power poles.
- Adding guy wire or other additional support to power lines.
- Replacing damaged poles with higher-class pole or with a different material pole such as replacing wood poles with spun concrete.
- Develop list of volunteers with ATV's and snowmobiles

- Snow fences
- Heaters and backup systems for emergency vehicles
- Work with other utility providers to provide mutual aid through a regional power pool
- Additional personnel for emergency response

**Drought / Extreme Heat**

- Implement drought water conservation regulations
- Support Nebraska Department of Natural Resources water allocation regulations
- Coordinate with National Drought Mitigation Center at the University of Nebraska
- Develop plan to reduce water consumption for agricultural use
- Additional municipal wells
- Implement water conservation awareness programs
- Publish and distribute pamphlets on water conservation techniques
- Prepare sample ordinances on water conservation
- Investigate potential new sources of water
- Issues emergency irrigation permits for using state waters for irrigation
- Suspend water use permits in watersheds with low water levels
- Identify existing community shelters/centers

**Flooding**

- Evacuation plan
- Update the floodplain map (FIRM)
- Conduct studies to reduce floodplain in developed areas
- Improve or acquire high-risk to flooding property
- Continue floodplain regulations for current and future development
- Preserve natural open spaces
- Improve subdivision design
- Pad-mounted transformers – elevating above the base flood elevation, or lowering them or burying them in non-flood, high-wind areas.
- Providing looped distribution service or other redundancies in the electrical service to critical facilities.
- Develop strategies to provide necessary services in the event of flooding
- Storm sewer improvements
- Flood retention facilities
- Bank stabilization/channel improvements
- Levees and floodwalls
- Flow diversions/drainage improvements and maintenance
- Community ratings system
- Increase public awareness of vulnerability to hazards
- Develop and improve the comprehensive city disaster and emergency response plan
- Improve communication to residents and businesses during and following emergencies
- Floodplain management enhancement

**Wildfire**

- Evacuation plan
- Wildfire mitigation plan
- Increase public awareness of vulnerability to hazards
- Develop and improve the comprehensive city disaster and emergency response plan
- Improve communication to residents and businesses during and following emergencies

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# MEMO

**DATE:** April 23rd & 24th, 2008
**TO:** Lower Platte South NRD Hazard Mitigation Plan Participants
**FROM:** Paul Zillig, Lower Platte South NRD; Jared Nelson, JEO
**RE:** Worksheet Instructions / Mitigation Alternative Public Meeting

Below is a list of the five (5) worksheets which are required to be completed for each participating jurisdiction based upon FEMA 'public participation' guidelines.

1) **RANKING OF PROJECTS USING 'STAPLEE'** – Planning participants will need to finalize the listing of projects using the STAPLEE process. Refer to attached YELLOW HANDOUT for detailed instructions.

2) **IDENTIFICATION OF CRITICAL FACILITIES AND SIRENS** – Each 'planning participant' needs to identify critical facilities and sirens in the community. Refer to attached BLUE HANDOUT for detailed instructions.

3) **FUTURE DEVELOPMENT** – Each 'planning participant' needs to identify the number of structures anticipated to be constructed as well as the areas of growth expected to occur over the next 5 years. Refer to attached GREEN HANDOUT for detailed instructions.

4) **PREVIOUS MITIGATION EFFORTS** – FEMA requires that any past mitigation efforts be identified in the plan. Use the attached WHITE HANDOUT to document any past mitigation efforts for your jurisdiction.

5) **REVIEW DRAFT PLAN** – The hazard mitigation plan consist of two portions: 1) the upfront portion which contains FEMA required information; and 2) the 'participant sections' which include jurisdiction specific information. Please review the information in your 'participant section' and provide any comments you may have.

*** Please return the completed worksheets and comments on your 'participant section' to Paul Zillig no later than JUNE 1st!**

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# RANKING OF PROJECTS USING STAPLEE

DATE_____
COMMUNITY: _____
COMPLETED BY: _____

**INSTRUCTIONS ON RANKING** – On the following page is a list of projects that can be completed in your community to reduce the losses or damages from hazards. This list of projects has been completed based on your input from the last round of meetings and by researching projects that would be beneficial to your community. By listing these projects in the plan does not mean your community is required to do them. These are potential activated your community could do in the future should funds become available. **Please complete the following on the worksheet:**

1) Add any additional projects that may be beneficial.
2) Place a **'yes'** or **'no'** in each of the columns referring to the STAPLEE criteria. (See below for a description.) For example, if a project is 'socially' beneficial to your community then place a 'yes' under the *Social* column. If the project would have a negative impact 'politically' then place a 'no' under the *Political* column.
3) Fill in the blank of who the **'responsible department/agency'** would be. If your community were to follow through with implementing this project, what department or agency would be primarily responsible for seeing the project through?

**DEFINITION OF STAPLEE** – Mitigation alternatives or actions need to be prioritized based on certain considerations. FEMA recommends using the STAPLEE evaluation, as this process addresses all the major factors when weighing the costs to the benefits of implementing one action over another. Below is an explanation of the STAPLEE criteria taken from FEMA's Multi-Hazard Mitigation Planning Guidance (March 2004):

**S – Social:** Mitigation actions are acceptable to the community if they do not adversely affect a particular segment of the population, do not cause relocation of lower income people, and if they are compatible with the communities social and cultural values.

**T – Technical:** Mitigation actions are technically most effective if they provide long-term reduction of losses and have minimal secondary adverse impacts.

**A – Administrative:** Mitigation actions are easier to implement if the jurisdiction has the necessary staffing and funding.

**P – Political:** Mitigation actions can truly be successful if all stakeholders have been offered an opportunity to participate in the planning process and if there is public support of the action.

**L – Legal:** It is critical that the jurisdiction or implementing agency have the legal authority to implement and enforce a mitigation action.

**E – Economical:** Budget constraints can significantly deter the implementation of mitigations actions. Hence, it is important to evaluate whether an action is cost-effective, as determined by a cost-benefit review, and possible to fund.

**E – Environmental:** Sustainable mitigation actions that do not have an adverse effect on the environment, that comply with Federal, State, and local environmental regulations, and that are consistent with the community's environmental goals, have mitigation benefits while being environmentally sound.

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# RANKING OF PROJECTS USING STAPLEE

DATE_____
COMMUNITY: _____
COMPLETED BY: _____

**Is the project Beneficial? Place a 'Yes' or 'No' in each STAPLEE criteria column.**

## Hickman Projects

| | Social | Technical | Administrative | Political | Legal | Economical | Environmental | Responsible Department/Agency |
|---|---|---|---|---|---|---|---|---|
| 1. Storm sewer improvements | | | | | | | | |
| 2. Increase public Awareness | | | | | | | | |
| 3. City tree planting and maintenance | | | | | | | | |
| 4. Storm Shelter | | | | | | | | |
| 5. Additional Snow Plows | | | | | | | | |
| 6. Additional Municipal Wells | | | | | | | | |
| 7. Water conservation Awareness program | | | | | | | | |
| 8. Distribute pamphlet on water conservation | | | | | | | | |
| 9. Improve Communication to Residents and Businesses During and Following Emergencies | | | | | | | | |
| 10. Improve or acquire high-risk to flooding property | | | | | | | | |
| 11. Continue floodplain regulations | | | | | | | | |
| 12. Improve drainage patterns in and around the community | | | | | | | | |

* Projects listed in RED were identified by the project team that could be beneficial to your community.

Return To: Paul Zillig, Lower Platte South NRD, pzillig@lpsnrd.org, 402.476.2729, 3125 Portia St., P.O. Box 83581, Lincoln, NE 68501

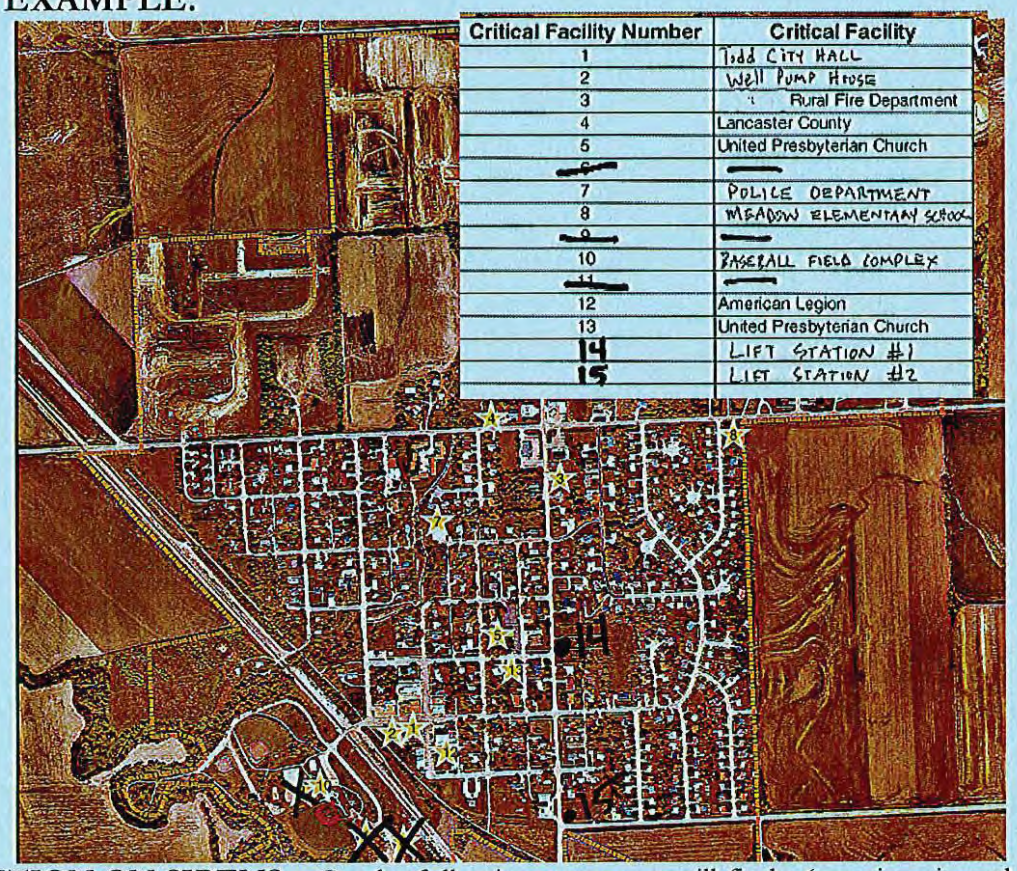
# IDENTIFICATION OF CRITICAL FACILITIES AND SIRENS

**DEFIINITION OF CRITICAL FACILITIES** – For planning purposes, a jurisdiction should determine critical facilities based on the relative importance of its various assets for the delivery of vital services, the protection of special populations, and other important functions. 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.

**INSTRUCTIONS ON CRITICAL FACILITIES** – On the next page you will find a map for your community. Each participating jurisdiction needs to identify 'critical facilities'. **Please indicate the following on your communities map:**

1) Some of the critical facilities are already identified by the project team. Please review the accuracy of these.
2) Please mark the location of additional critical facilities with a large dot and assign a number.
3) Write the name/description of the critical facility in the table shown on the map with the corresponding number. (See the example below)

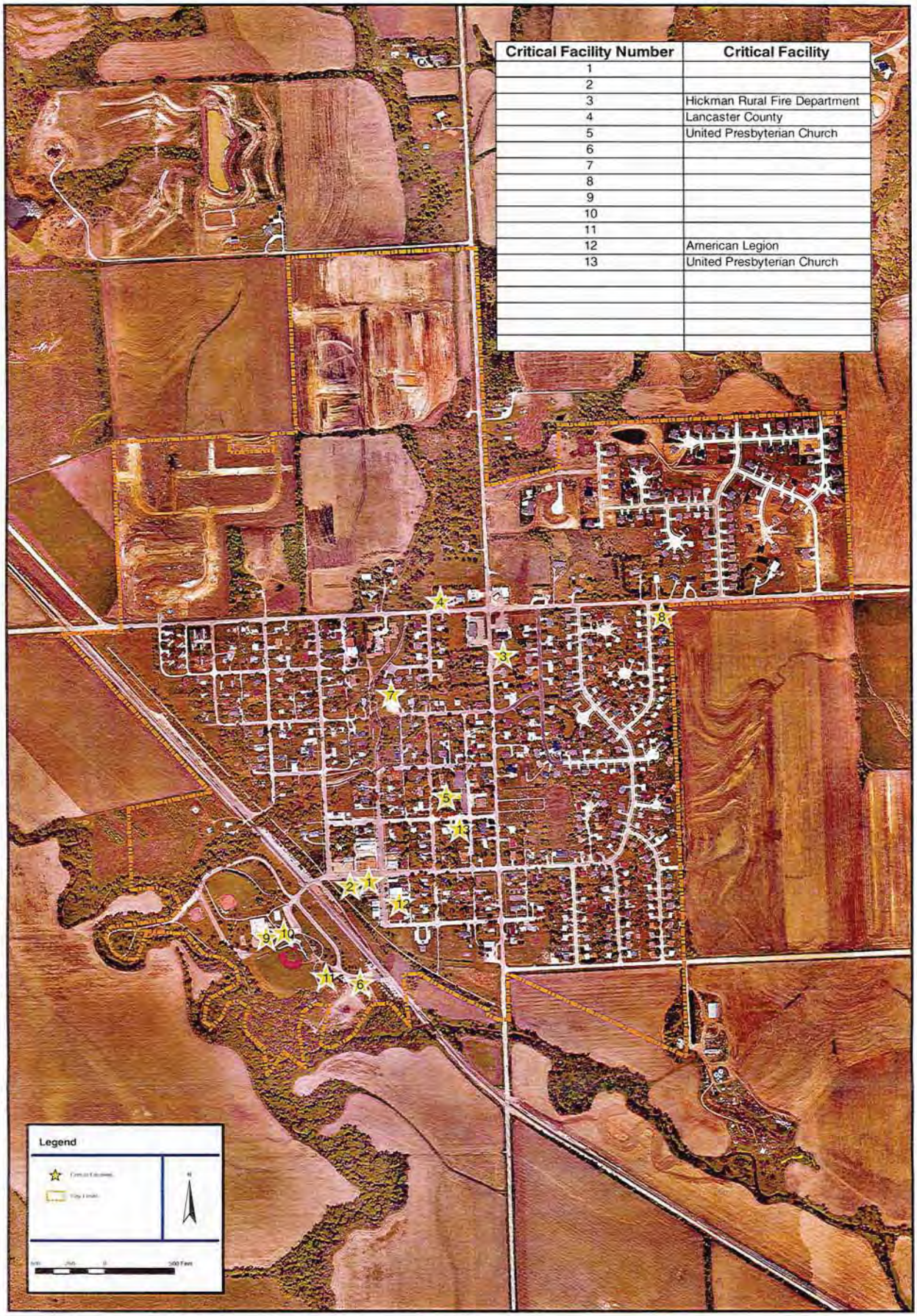
## EXAMPLE:



| Critical Facility Number | Critical Facility |
|---|---|
| 1 | Todd City Hall |
| 2 | Well Pump House |
| 3 | Rural Fire Department |
| 4 | Lancaster County |
| 5 | United Presbyterian Church |
| ~~6~~ | — |
| 7 | Police Department |
| 8 | Meadow Elementary School |
| ~~9~~ | — |
| 10 | Baseball Field Complex |
| ~~11~~ | — |
| 12 | American Legion |
| 13 | United Presbyterian Church |
| 14 | Lift Station #1 |
| 15 | Lift Station #2 |

**INSTRUCTION ON SIRENS** – On the following pages you will find a 'warning sirens location and coverage area' map. For many communities, we do not have any information on the locations and ranges of these sirens. **Please verify or indicate the following on your map:**

1) The location of the sirens in your community.
2) The model and make of the siren OR the range of the sirens in miles.




| Critical Facility Number | Critical Facility |
|---|---|
| 1 | |
| 2 | |
| 3 | Hickman Rural Fire Department |
| 4 | Lancaster County |
| 5 | United Presbyterian Church |
| 6 | |
| 7 | |
| 8 | |
| 9 | |
| 10 | |
| 11 | |
| 12 | American Legion |
| 13 | United Presbyterian Church |
| | |
| | |
| | |
| | |
| | |

Figure XX

**City of Hickman, NE**
**- Lower Platte South NRD Hazard Mitigation Plan -**
**Figure XX: Critical Facilities Locations**

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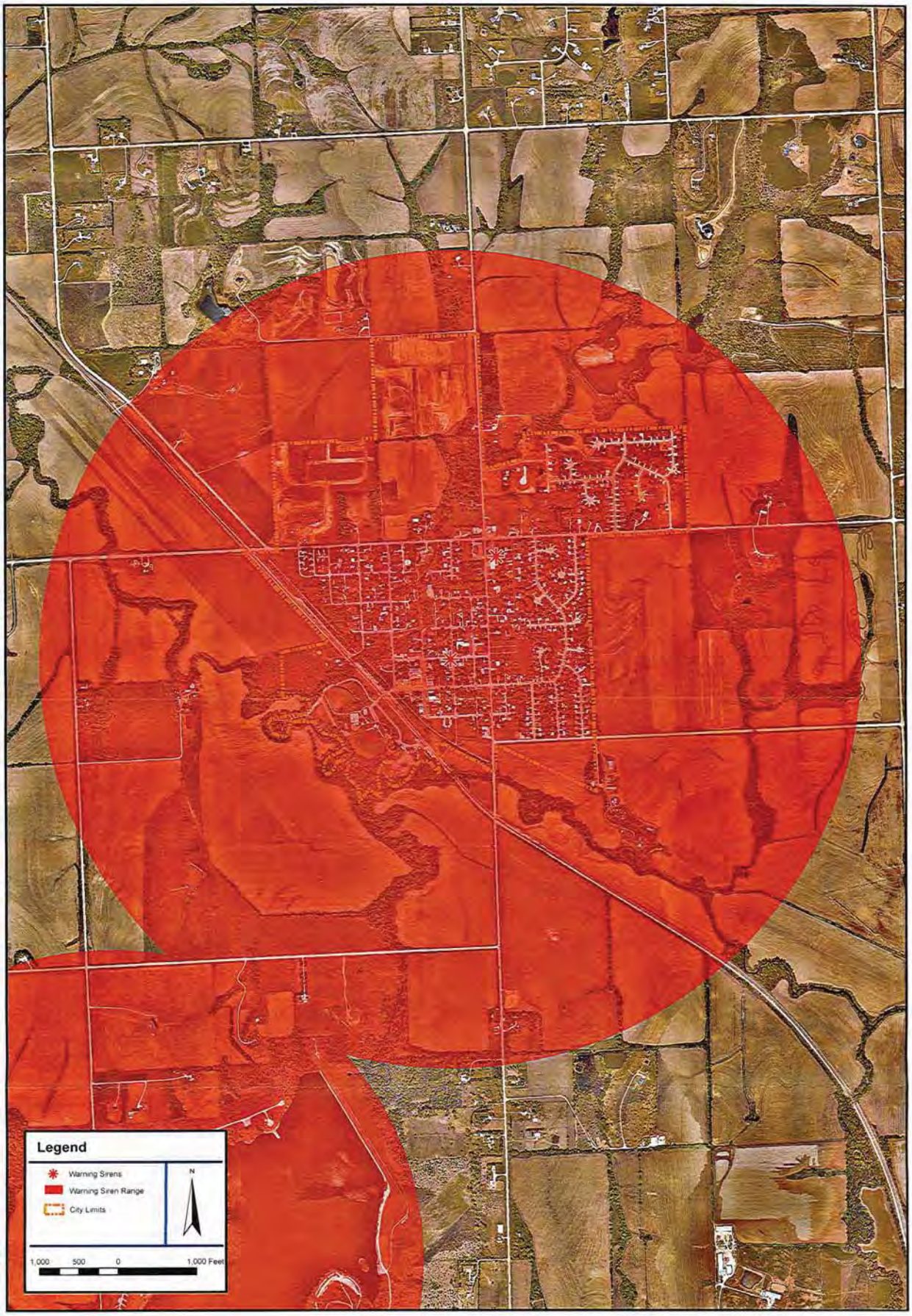


Figure XX

Prepared By: JEO Consulting Group, Inc.
Source of Results and City Limits: NDNR
Software Used: ESRI ArcView 9.2 sp2

THIS MAP PREPARED USING INFORMATION FROM RECORD DRAWINGS SUPPLIED BY JEO AND/OR OTHER APPLICABLE CITY, COUNTY, STATE, FEDERAL OR PUBLIC OR PRIVATE ENTITIES. JEO DOES NOT GUARANTEE THE ACCURACY OF THIS MAP OR THE INFORMATION USED TO PREPARE THIS MAP.

Created By: M Schwab, April 14, 2008
Contact Person: Jared Nelson
JEO Project Number: 369023

**City of Hickman, NE**
**- Lower Platte South NRD Hazard Mitigation Plan -**
**Figure XX: Warning Siren and Warning Siren Coverage Area**

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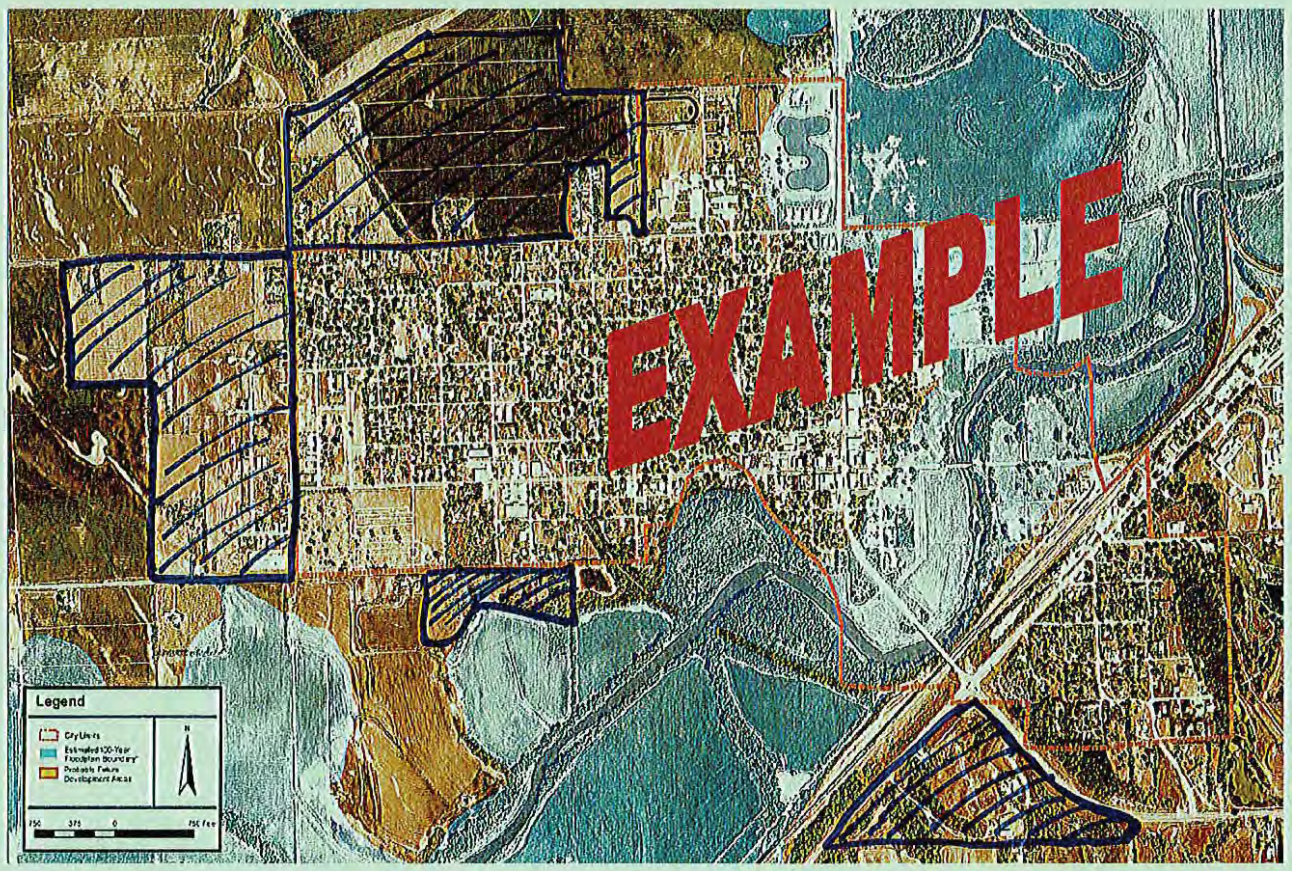
# FUTURE DEVELOPMENT

DATE_____
COMMUNITY: _____
COMPLETED BY: _____

The table below describes five speculative scenarios of future development over a 5-year timeframe. **Please use your best judgment to select one which most accurately describes your community:**

| SELECT ONE | GROWTH POTENTIAL | NUMBER OF STRUCTURES | DESCRIPTION |
|---|---|---|---|
| | None | 0 | No foreseeable significant development anticipated in the next 20-years |
| | Slight | 1-5 | Gradual and sporadic development expected |
| | Moderate | 6-20 | Continuing development expected within subdivided areas |
| | Extensive | 21-100 | Significant development expected throughout the area |
| | Widespread | 101+ | Continual development expected throughout the area |

On the next page you will find a map for your community. **Please show the general location of future development on your communities map. (See Example below):**




Return To: Paul Zillig, Lower Platte South NRD, pzillig@lpsnrd.org, 402.476.2729, 3125 Portia St., P.O. Box 83581, Lincoln, NE 68501

Figure XX

Prepared By: JEO Consulting Group, Inc
Source of Aerials and City Limits: NDNR
Software Used: ESRI ArcView 9.2 sp2

THIS MAP PREPARED USING INFORMATION FROM RECORD DRAWINGS SUPPLIED BY JEO AND/OR OTHER APPLICABLE CITY, COUNTY, STATE, FEDERAL OR PUBLIC OR PRIVATE ENTITIES. JEO DOES NOT GUARANTEE THE ACCURACY OF THIS MAP OR THE INFORMATION USED TO PREPARE THIS MAP

Created By: M Schmeis April 14, 2008
Contact Person: Jacob Nelson
JEO Project Number: 3050221

**City of Hickman, NE**
**- Lower Platte South NRD Hazard Mitigation Plan -**
**Figure XX: Future Development Map**

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# PREVIOUS MITIGATION EFFORTS

DATE_____
COMMUNITY: _____
COMPLETED BY: _____

In order to get a more accurate picture of your community and its proactive stance on hazard mitigation, it is beneficial to include a description of previous mitigation efforts whether or not they were successful. **Please list some projects or efforts your community has done in the past to mitigate for hazards.** (See example at bottom of page)

| Hazard Mitigated: | Previous Project/Effort Description: |
|---|---|
| | |
| | |
| | |
| | |
| | |

## EXAMPLE:

| Hazard Mitigated: | Previous Project/Effort Description: |
|---|---|
| Flooding | Removal of two residential structures from the Todd Valley 100-year floodplain in 1994, a cost of $110,000. A park was established in the vacated location. |
| All | Applied for funding for stormwater study, $46,450. (Project not funded) January 1994, City of Todd |

# LOWER PLATTE SOUTH NRD MULTI-JURISDICTION HAZARD MITIGATION PLAN

## DESCRIPTION OF CURRENT PROJECT

Lower Platte South NRD (LPSNRD) is undertaking a planning effort to develop a "Multi-jurisdictional Hazard Mitigation Plan" for the District and communities within the District in coordination with the Nebraska Department of Natural Resources (NDNR), Nebraska Emergency Management Agency (NEMA), and the Federal Emergency Management Agency (FEMA). Each community located in the LPSNRD is eligible and encouraged to participate in the planning process.

The hazard mitigation plan is a community-guided document that will identify each participating community's vulnerability to natural disasters such as flood, drought, earthquake, wildfire, winter storm, tornado/high wind storm, dam failure, etc. A series of public meetings will occur to obtain information necessary for plan development including identification of hazards and establishment of mitigation alternatives.

Through these meetings, participants will identify areas which are vulnerable to events and identify projects to alleviate damages. The plan will set goals for each participating entity, establish mitigation alternatives, and prioritize these mitigation projects which can alleviate potential damages to property and life when future disasters occur. Hazard mitigation planning allows a community to take actions to reduce or eliminate these threats prior to an event.

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

JEO Consulting Group, Inc., in coordination with the NDNR and NEMA, will provide professional services for this planning project. Plan development will take approximately two years. Upon completion, the hazard mitigation plan will need to be formally adopted by each of the participating communities. This plan also must be submitted to NEMA and FEMA for review and approval.

For more information on this planning effort contact Paul Zillig, LPSNRD Assistant Manager, at pzillig@lpsnrd.org or 402-476-2729.

Your Goals - Our Team - One Vision

JEO

## JEO Projects Website Instructions

- Go to the JEO Consulting Group, Inc. website www.jeo.com.
- On the left side of the homepage, select 'JEO Projects Site'.
- A second screen will open which will feature a number of JEO Projects, select your project.
- Select "Hazard Mitigation Planning"
- Enter the 'username' and 'password' you received at the public meeting
- Select 'Upfront Section' to view Sections 1-5 of the draft plan.
- Select your communities 'Participant Section' to view Section 6 of the draft plan.
- Instructions to view documents and/or download them are listed above the list of documents.

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142 West 11th Street | Wahoo, NE 68066 | P:: 402.443.4661 | F: 402.443.3508

Your Goals - Our Team - One Vision

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# Quick Assessment Report

*May 23, 2008*

| | |
|---|---|
| **Study Region :** | Lincoln_1 |
| **Scenario :** | Lincoln2 |
| **Return Period:** | 100 |
| **Analysis Option:** | 0 |

## Regional Statistics

| | |
|---|---|
| **Area (Square Miles)** | 839 |
| **Number of Census Blocks** | 6,550 |
| **Number of Buildings** | |
| Residential | 89,445 |
| Total | 97,179 |
| **Number of People in the Region (x 1000)** | 250 |
| **Building Exposure ($ Millions)** | |
| Residential | 12,403 |
| Total | 17,191 |

## Scenario Results

| | |
|---|---|
| **Shelter Requirements** | |
| Displaced Population (# Households) | 3,614 |
| Short Term Shelter (# People) | 9,153 |
| **Economic Loss** | |
| Residential Property (Capital Stock) Losses ($Millions) | 172.22 |
| Total Property (Capital Stock) Losses ($ Millions) | 541.19 |
| Business Interruptions (Income) Losses ($ Millions) | 5.97 |

***Disclaimer:***

*Totals only reflect data for those census tracts/blocks included in the user's study region.*

*The estimates of social and economic impacts contained in this report were produced using HAZUS loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific flood. These results can be improved by using enhanced inventory data and flood hazard information.*

# HAZUS-MH: Flood Event Report

**Region Name:** Lincoln_1

**Flood Scenario:** Lincoln2

**Print Date:** Friday, May 23, 2008

***Disclaimer:***

*Totals only reflect data for those census tracts/blocks included in the user's study region.*

*The estimates of social and economic impacts contained in this report were produced using HAZUS loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Flood. These results can be improved by using enhanced inventory data and flood hazard information.*

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| General Building Stock | |
| Essential Facility Inventory | |
| Flood Scenario Parameters | 5 |
| Building Damage | 6 |
| General Building Stock | |
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| Induced Flood Damage | 8 |
| Debris Generation | |
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| Economic Loss | 9 |
| Building-Related Losses | |
| Appendix A: County Listing for the Region | 10 |
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## General Description of the Region

HAZUS is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of HAZUS is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Nebraska

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 839 square miles and contains 6,550 census blocks. There are over 99 thousand households in the region and has a total population of 250,291 people (2000 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 97,179 buildings in the region with a total building replacement value (excluding contents) of 17,191 million dollars (2006 dollars). Approximately 92.04% of the buildings (and 72.15% of the building value) are associated with residential housing.

# Building Inventory

## General Building Stock

HAZUS estimates that there are 97,179 buildings in the region which have an aggregate total replacement value of 17,191 million (2006 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

**Table 1**
**Building Exposure by Occupancy Type for the Study Region**

| Occupancy | Exposure ($1000) | Percent of Total |
|---|---|---|
| Residential | 12,403,109 | 72.2% |
| Commercial | 3,038,325 | 17.7% |
| Industrial | 800,979 | 4.7% |
| Agricultural | 68,504 | 0.4% |
| Religion | 292,829 | 1.7% |
| Government | 229,113 | 1.3% |
| Education | 357,866 | 2.1% |
| **Total** | **17,190,725** | **100.00%** |

**Table 2**
**Building Exposure by Occupancy Type for the Scenario**

| Occupancy | Exposure ($1000) | Percent of Total |
|---|---|---|
| Residential | 1,126,200 | 51.0% |
| Commercial | 614,180 | 27.8% |
| Industrial | 294,127 | 13.3% |
| Agricultural | 15,489 | 0.7% |
| Religion | 27,570 | 1.2% |
| Government | 43,316 | 2.0% |
| Education | 86,453 | 3.9% |
| **Total** | **2,207,335** | **100.00%** |

## Essential Facility Inventory

For essential facilities, there are 5 hospitals in the region with a total bed capacity of 1,391 beds. There are 97 schools, 19 fire stations, 2 police stations and 1 emergency operation center.

## Flood Scenario Parameters

HAZUS used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

| | |
|---|---|
| **Study Region Name:** | Lincoln_1 |
| **Scenario Name:** | Lincoln2 |
| **Return Period Analyzed:** | 100 |
| **Analysis Options Analyzed:** | 0 |

## General Building Stock Damage

HAZUS estimates that about 924 buildings will be at least moderately damaged. This is over 12% of the total number of buildings in the study case. There are an estimated 234 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the HAZUS Flood technical manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

**Table 3: Expected Building Damage by Occupancy**

| | 1-10 | | 11-20 | | 21-30 | | 31-40 | | 41-50 | | Substantially | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Occupancy** | **Count** | **(%)** | **Count** | **(%)** | **Count** | **(%)** | **Count** | **(%)** | **Count** | **(%)** | **Count** | **(%)** |
| Agriculture | 0 | 0.00 | 1 | 100.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Commercial | 4 | 10.26 | 29 | 74.36 | 5 | 12.82 | 1 | 2.56 | 0 | 0.00 | 0 | 0.00 |
| Education | 1 | 100.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Government | 1 | 33.33 | 1 | 33.33 | 1 | 33.33 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Industrial | 0 | 0.00 | 4 | 44.44 | 4 | 44.44 | 1 | 11.11 | 0 | 0.00 | 0 | 0.00 |
| Religion | 0 | 0.00 | 1 | 100.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Residential | 8 | 0.90 | 48 | 5.43 | 103 | 11.65 | 234 | 26.47 | 257 | 29.07 | 234 | 26.47 |
| **Total** | **14** | | **84** | | **113** | | **236** | | **257** | | **234** | |

**Table 4: Expected Building Damage by Building Type**

| Building Type | 1-10 | | 11-20 | | 21-30 | | 31-40 | | 41-50 | | Substantially | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Count** | **(%)** | **Count** | **(%)** | **Count** | **(%)** | **Count** | **(%)** | **Count** | **(%)** | **Count** | **(%)** |
| Concrete | 4 | 28.57 | 9 | 64.29 | 1 | 7.14 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| ManufHousing | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 72 | 100.00 |
| Masonry | 4 | 4.82 | 14 | 16.87 | 5 | 6.02 | 23 | 27.71 | 23 | 27.71 | 14 | 16.87 |
| Steel | 1 | 5.88 | 12 | 70.59 | 3 | 17.65 | 1 | 5.88 | 0 | 0.00 | 0 | 0.00 |
| Wood | 2 | 0.27 | 45 | 6.11 | 99 | 13.43 | 209 | 28.36 | 234 | 31.75 | 148 | 20.08 |

## Essential Facility Damage

Before the flood analyzed in this study case, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 hospital beds are available in the region.

**Table 5: Expected Damage to Essential Facilities**

| | | # Facilities | | |
|---|---|---|---|---|
| **Classification** | Total | At Least Moderate | At Least Substantial | Loss of Use |
| Fire Stations | 19 | 2 | 0 | 0 |
| Hospitals | 5 | 0 | 0 | 0 |
| Police Stations | 2 | 0 | 0 | 0 |
| Schools | 97 | 5 | 0 | 1 |

If this report displays all zeros or is blank, two possibilities can explain this.

(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

## Induced Flood Damage

### Debris Generation

HAZUS estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 51,223 tons of debris will be generated. Of the total amount, Finishes comprises 40% of the total, Structure comprises 36% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 2,049 truckloads (@25 tons/truck) to remove the debris generated by the flood.

## Social Impact

### Shelter Requirements

HAZUS estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. HAZUS also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 3,614 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 9,153 people (out of a total population of 250,291) will seek temporary shelter in public shelters.

## Economic Loss

The total economic loss estimated for the flood is 547.16 million dollars, which represents 24.79 % of the total replacement value of the scenario buildings.

### Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 541.19 million dollars. 1% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 31.54% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

**Table 6: Building-Related Economic Loss Estimates**

(Millions of dollars)

| Category | Area | Residential | Commercial | Industrial | Others | Total |
|---|---|---|---|---|---|---|
| Building Loss | | | | | | |
| | Building | 95.00 | 52.61 | 35.66 | 6.44 | 189.71 |
| | Content | 77.22 | 138.45 | 79.03 | 32.02 | 326.71 |
| | Inventory | 0.00 | 6.95 | 17.36 | 0.46 | 24.77 |
| | **Subtotal** | **172.22** | **198.00** | **132.05** | **38.92** | **541.19** |
| Business Interruption | | | | | | |
| | Income | 0.01 | 0.85 | 0.01 | 0.06 | 0.94 |
| | Relocation | 0.20 | 0.33 | 0.02 | 0.00 | 0.55 |
| | Rental Income | 0.13 | 0.23 | 0.00 | 0.00 | 0.36 |
| | Wage | 0.02 | 1.04 | 0.03 | 3.04 | 4.12 |
| | **Subtotal** | **0.36** | **2.44** | **0.07** | **3.10** | **5.97** |
| ALL | **Total** | **172.58** | **200.45** | **132.11** | **42.02** | **547.16** |

## Appendix A: County Listing for the Region

Nebraska

- Lancaster

## Appendix B: Regional Population and Building Value Data

| | | Building Value (thousands of dollars) | | |
|---|---|---|---|---|
| | Population | Residential | Non-Residential | Total |
| **Nebraska** | | | | |
| Lancaster | 250,291 | 12,403,109 | 4,787,616 | 17,190,725 |
| **Total** | **250,291** | **12,403,109** | **4,787,616** | **17,190,725** |
| **Total Study Region** | **250,291** | **12,403,109** | **4,787,616** | **17,190,725** |

# Appendix D –
# Worksheets to Assist Community in Review and Updates

**Worksheet # 1: Progress Report**

Progress Report Period:_____ to _____
(Date) (Date)

Project Title: _____ Project ID#: _____

Responsible Agency: _____

Address: _____

City/County: _____

Contact Person: _____ Title: _____

Phone #(s): _____ e-mail address: _____

List Supporting Agencies and Contacts: _____

_____

Total Project Cost: $_____ Anticipated Cost Overrun/Under run: _____

Date of Project Approval: _____ Start date of the project: _____

Anticipated completion date: _____

Description of the Project (include a description of each phase, if applicable, and the time frame for completing each phase).

_____
_____
_____
_____
_____

| Milestones | Complete | Projected Date of Completion |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

**Plan Goal(s)/Objective(s) Addressed:**

Goal: _____

Objective: _____

**Indicator of Success** (e.g., losses avoided as a result of the acquisition program):
*In most cases, you will list losses avoided as the indicator. In cases where it is difficult to quantify the benefits in dollar amounts, you will use other indicators, such as the number of people who now know about mitigation or who are taking mitigation actions to reduce their vulnerability to hazards.*

_____
_____
_____

**Status** *(Please checks pertinent information and provide explanations for items with an asterisk. For completed or canceled projects, see Worksheet #2 — to complete a project evaluation):*

| Project Status | Project Cost Status |
|---|---|
| (1) ☐ Project on schedule | (1) ☐ Cost unchanged |
| (2) ☐ Project completed | (2) ☐ Cost overrun*<br>*explain: _____ |
| (3) ☐ Project delayed*<br>*explain: _____ | (3) ☐ Cost under run*<br>*explain: _____ |
| (4) ☐ Project canceled | |

**Summary of progress on project for this report:**

A. What was accomplished during this reporting period?

B. What obstacles, problems, or delays did you encounter, if any?

C. How was each problem resolved?

**Next Steps:** What is/are the next step(s) to be accomplished over the next reporting period?

**Other comments:**

## Worksheet #2: Evaluating Your Planning Team

*When gearing up for the plan evaluation, the planning team should reassess its composition and ask the following questions:*

| | YES | NO |
|---|---|---|
| **Have there been local staffing changes that would warrant inviting different members to the planning team?**<br>Comments/Proposed Action: | | |
| **Are there organizations that have been invaluable to the planning process or to project implementation that should be represented on the planning team?**<br>Comments/Proposed Action: | | |
| **Are there any representatives of essential organizations who have not fully participated in the planning and implementation of actions? If so, can someone else from this organization commit to the planning team?**<br>Comments/Proposed Action: | | |
| **Are there procedures (e.g., signing of MOAs, commenting on submitted progress reports, distributing meeting minutes, etc.) that can be done more efficiently?**<br>Comments/Proposed Action: | | |
| **Are there ways to gain more diverse and widespread cooperation?**<br>Comments/Proposed Action: | | |
| **Are there different or additional resources (financial, technical, and human) that are now available for mitigation planning?**<br>Comments/Proposed Action: | | |

If the planning team determines the answer to any of these questions is “yes,” some changes may be necessary.

## Worksheet #3: Evaluate Your Project Results

| | |
|---|---|
| Project Name and Number:<br>Project Budget:<br>Project Description:<br>Associated Goal and Objective (s):<br>Indicator of Success (e.g., losses avoided): | *Insert location map*<br>*include before and after photos if appropriate* |

### Was the action implemented?

IF YES ↓

What were the results of the implemented action?

IF NO ↓

Why not?

| | | |
|---|---|---|
| **Was there political support for the action?** | YES | NO |
| **Were enough funds available?** | YES | NO |
| **Were workloads equitably or realistically distributed?** | YES | NO |
| **Was new information discovered about the risks or community that made implementation difficult or no longer sensible?** | YES | NO |
| **Was the estimated time of implementation reasonable?** | YES | NO |
| **Were sufficient resources (for example staff and technical assistance) available?** | YES | NO |

Were the outcomes as expected? **YES** **NO** Additional comments or other outcomes:
If No, please explain:

Did the results achieve the goal and objective (s)? **YES** **NO**
Explain how:

↓

Was the action cost-effective? **YES** **NO**
Explain how or how not:

What were the losses avoided after having completed the project?

If it was a structural project, how did it change the hazard profile?

**Date** _____

**Prepared by:** _____

## Worksheet #4: Revisit Your Risk Assessment

| Risk Assessment Steps | Questions | YES | NO | COMMENTS |
|---|---|---|---|---|
| **Identify hazards** | Are there new hazards that can affect your community? | | | |
| **Profile hazard events** | Are new historical records available? | | | |
| | Are additional maps or new hazard studies available? | | | |
| | Have chances of future events (along with their magnitude, extent, etc.) changed? | | | |
| | Have recent and future development in the community been checked for their effect on hazard areas? | | | |
| **Inventory assets** | Have inventories of existing structures in hazard areas been updated? | | | |
| | Are future developments foreseen and accounted for in the inventories? | | | |
| | Are there any new special high-risk populations? | | | |
| **Estimate losses** | Have loss estimates been updated to account for recent changes? | | | |

If you answered “Yes” to any of the above questions, review your data and update your risk assessment information accordingly

## Worksheet #5: Revise the Plan

### Prepare to update the plan.

**When preparing to update the plan:** **Check the box when addressed ✓**

**1. Gather information, including project evaluation worksheets, progress reports, studies, related plans, etc.**
Comments:

2. Reconvene the planning team, making changes to the team composition as necessary (see results from *Worksheet #2*).
**Comments:**

### Consider the results of the evaluation and new strategies for the future.

**When examining the community consider:** **Check the box when addressed ✓**

1. The results of the planning and outreach efforts.
Comments:

2. The results of the mitigation efforts.
Comments:

3. Shifts in development trends.
**Comments:**

4. Areas affected by recent disasters.
**Comments:**

5. The recent magnitude, location, and type of the most recent hazard or disaster.
**Comments:**

6. New studies or technologies.
**Comments:**

7. Changes in local, state, or federal laws, policies, plans, priorities, or funding.
**Comments:**

8. Changes in the socioeconomic fabric of the community. ☐

**Comments:**

9. Other changing conditions. ☐

Comments:

**Incorporate your findings into the plan.**

**When examining the plan:** **Check the box when addressed ✓**

1. Revisit the risk assessment. ☐

**Comments:**

2. Update your goals and strategies. ☐

**Comments:**

3. Recalculate benefit-cost analyses of projects to prioritize action items. ☐

**Comments:**

**Use the following criteria to evaluate the plan:**

| **Criteria** | **YES** | **NO** | **Solution** |
|---|---|---|---|
| Are the goals still applicable? | | | |
| Have any changes in the state or community made the goals obsolete or irrelevant? | | | |
| Do existing actions need to be reprioritized for implementation? | | | |
| Do the plan's priorities correspond with state priorities? | | | |
| Can actions be implemented with available resources? | | | |

**Comments:**