City of Grand Island

Tuesday, September 23, 2008
Council Session

Item G7

#2008-259 - Approving All-Hazard Mitigation Plan for the City of Grand Island

Staff Contact: Chad Nabity

Council Agenda Memo

From: Chad Nabity, AICP

Meeting: September 23, 2008

Subject: Approving All Hazard Mitigation Plan for the City of Grand Island

Item #'s: G-7

Presenter(s): Chad Nabity, AICP

Background

The Hall County Regional Planning Commission was the recipient of a grant from FEMA through the Nebraska Emergency Management Agency to develop hazard mitigation plans for the member communities. We met in March of 2007 to begin the process and this is the result of that and subsequent meetings and work by the Nebraska Department of Natural Resources, the Army Corps of Engineers and Regional Planning and Emergency Management Staff. This grant paid for the entire plan with staff and volunteer time as a permitted community match. An All-Hazards Mitigation Plan adopted by local governing bodies is required by FEMA.

Discussion

This plan identifies activities that the City of Grand Island could fund that would lessen the impact of hazards on the communities. Grand Island has a history of funding mitigation activities. The city is currently participating with the County and Central Platte NRD in developing a flood diversion project in northwest Grand Island along the Prairie, Silver and Moores Creeks. The Wood River Diversion project is one of the most successful mitigation projects in and around the City. Grand Island Utilities' aggressive tree trimming program prevented a great deal of damage during the 2007 ice storms.

FEMA has reviewed the draft and given it preliminary approval. Adoption of this plan does not commit these communities to the projects outlined but it does give these mitigation projects priority should funding become available from FEMA. Without a plan approved by FEMA the communities would not be eligible for funding for mitigation

activities. Mitigation activity money often becomes available in the aftermath of a declared disaster in an attempt to minimize the impacts of future events.

The Regional Planning Commission held a public hearing at their meeting on September 3rd and passed a resolution approving the plan and recommending approval of the plan to the governing bodies.

Alternatives

It appears that the Council has the following alternatives concerning the issue at hand. The Council may:

1. Move to resolution defining the boundaries
2. Refer the issue to a Committee
3. Postpone the issue to future date
4. Take no action on the issue

Recommendation

It is recommended that the City Council pass the attached resolution, adopting this All-Hazard Mitigation Plan for the City of Grand Island.

Sample Motion

Move to approve the Resolution adopting the All-Hazard Mitigation Plan for the City of Grand Island.

R E S O L U T I O N 2008-259

WHEREAS, a study was prepared by the United States Corps of Engineers, the Nebraska Department of Natural Resources and City Staff for the City of Grand Island, and

WHEREAS, the purpose of the study was to prepare an all-hazards mitigation plan which establishes the framework and also a process to implement and review the plan to reduce hazards as conditions change, and

WHEREAS, a complete mitigation plan shows that a community is addressing its hazards and qualifies the community for mitigation assistance from federal and state agencies, and

WHEREAS, the community has identified mitigation activities that can be engaged in but acknowledges that such activities may be accomplished over time as funding is available

NOW, THEREFORE, BE IT RESOLVED BY THE MAYOR AND COUNCIL OF THE CITY OF GRAND ISLAND, NEBRASKA, that the All Hazards Mitigation Plan for Grand Island attached as Exhibit A is approved and adopted, and the Mayor is hereby authorized to execute the associated plans on behalf of the City of Grand Island.

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Adopted by the City Council of the City of Grand Island, Nebraska, September 23, 2008.

_____
Margaret Hornady, Mayor

Attest:

_____
RaNae Edwards, City Clerk

Exhibit A

Grand Island

	Dam Failure	Drought	Earth-quake	Flood	Summer Storm	Land slide	Winter Storm	Tornado /Wind	Wildfire
Probability	Low	Medium	None	High	High	None	High	High	Low
Extent	Limited	Limited	Unknown	Severe	Severe	Zero	Severe	Severe	Limited
Previous Occurrence	No	Yes	No	Yes	Yes	No	Yes	Yes	No

Probability: Based on history, what is the likelihood this type of event will happen again?
- None, Low, Medium, or High

Extent – If this event were to happen, how extensive could the damage be?
- Zero, Limited, Severe, Full, or Unknown

Previous Occurrence: Is there an historic record of this type of hazard in the community?

The above table shows the input provided at the initial public meeting. Due to the geographical proximity, the following hazard types were not considered due to there being no likelihood of occurring in Nebraska: volcanic eruptions, avalanches, hurricanes, tidal surges, and tsunamis.

In the following sections, only the hazard types which have a significant likelihood of occurring or have a reason to potentially occur are listed. These types are: severe weather (summer and winter), tornado, flood, and drought. Although there is a small risk for earthquakes, wildfires, and landslides, the threat and associated risk for these hazards is not high enough and there are no realistic or feasible mitigation actions which can be taken to reduce the level of risk. The National Climatic Data Center lists no records of wildfire for Hall County. Additionally, the citizens did not rank these hazards high enough to warrant detailed discussion in this plan. This may change in future updates.

Disaster History

Flood

On June 20, 1947, Wood River came up and flooded Stolley State Park. Water was over Highway 2 for one mile. Damage was estimated at $5,000.

On June 10, 1949, $219,000 was caused by Wood River flooding. Woodland and Riverside golf courses recorded significant damage.

The most extensive flood event to impact Hall County resulted from a long period of excessive rainfall in May and June of 1967. From June 7 to 15, more than 10 inches fell, but the main culprit for the flooding was the 3.2 inches which fell on June 13th. The Wood River crested at six feet (3.5 foot flood stage) and was flowing at 25,000 cubic feet per second. Three people were killed, 1800 buildings were flooded, and 11,000 of the City's 28,600 residents were directly

impacted. Prairie Creek, Silver Creek, and Moores Creek flooded 62 residences and 7 businesses on the north side of the City. Total damage in Grand Island was set at $6.25 million ($38.2 million in 2006 dollars). This flood event was a part of the larger Platte River valley flood, which saw total damage at $49,309,015 – of which $40.8 million was private damage ($23 million agricultural damage, $12 million transportation damage, $5 million classified as "urban" damage), and $8.5 million was public damage.

On May 11 and 12, 2005, 7.21 inches of rain fell in a 24-hour period with 7.16 inches of the total falling from 4pm on the 11th to 4am on the 12th. These rainfall totals eclipsed the previous 24-hour rainfall record of 5.88 inches and the previous 12-hour rainfall record of 5.65 inches. Officials from the High Plains Regional Climate Center claimed that this intense rain event was equal to a 100-year storm. An incredible 6.38 inches of rain fell in the six-hour period from 7pm to 1 am. Thirty-six homes were evacuated in Grand Island as flooding was rampant over the west and north part of the city. The city's sewer system handled about 75 million gallons of water, or about 6 times the normal amount during the storm. Many parts of the business and residential districts sustained flood damage as the Prairie, Silver, and Moores Creeks flooded. On the southern end of town, the newly-completed Wood River Diversion project prevented the vast majority of the damage. Without the project, it was estimated that the extent of the 2005 flood would have equaled the 1967 flood.

On July 10, 2006, afternoon and evening thunderstorms produced heavy rains, which caused urban flooding. Property damage was estimated at $20,000.

On July 29, 2007, thunderstorms produced 5.07 inches of rain in Grand Island. This caused flooding in the northwest part of Grand Island with total property damage set at $75,000.

On August 22, 2007, flooding on the south side of town washed a car off the road into a ditch. In addition to the heavy rain, 80 mph wind gusts hail, and brief small tornadoes occurred in south central Nebraska. Damage estimate for Grand Island was placed at $50,000.

As defined by FEMA's repetitive loss list, there is one repetitive flood loss property with a Grand Island address.

Severe Weather

There have been so many instances of severe weather events impacting Grand Island that only the ones with significant damage or unusual weather phenomena are listed below.

August 5, 1995: 80 mph winds caused $100,000 in undisclosed property damage. Hail of 2 inches in diameter also caused more than $1.5 million in property damage.

June 20, 1997: A thunderstorm developed north of Kearney and moved east through Grand Island. Strong winds, over 75 mph, caused property damage in the area set at $40,000.

July 7, 1997: 1-inch hail along with very heavy rain and high winds caused $150,000 in damage.

August 21, 1997: 1-inch hail broke windows and damaged numerous cars. Damage: $100,000.

August 15, 1999: Severe thunderstorms early in the evening left a narrow path of wind damage from south of Kearney to the Grand Island area. Wind gusts of 60 to 80 mph damaged buildings, trees and downed several power lines. In Grand Island, a couple of garages were

damaged; trees uprooted and about 5,000 people were left without electricity for a short time. Total property damage was estimated at $50,000.

April 22, 2001: a microburst near the mall in Grand Island damaged several trees, signs and knocked over one light post. Damage was estimated at $10,000.

May 5, 2002: 3-inch hail devastated an area from Doniphan to east of Grand Island. Total property damage was established as $2 million; however, it is unclear how much of that damage occurred in Grand Island.

June 19, 2002: 70 mph winds tore the roof off the gymnasium at the R-1 school five miles north of Grand Island. Damage estimate: $16,000.

May 4, 2003: Golf ball sized hail in Grand Island caused $250,000 in property damage.

May 13, 2003: Severe thunderstorms formed northwest of Grand Island during the afternoon and evening hours. A sign was destroyed, minor tree damage was reported, and some small sheds were damaged. Damage estimate: $100,000.

April 18, 2004: 60 mph winds broke a light pole at an auto dealership and damaged four vehicles as it fell to the ground. Damage to the vehicles along was estimated at $14,000.

May 16, 2004: 70 mph winds caused $30,000 to trees and power infrastructure.

May 21, 2004: Golf ball sized hail in Grand Island caused $25,000 damage.

May 10, 2005: 70 mph winds near the airport destroyed a construction trailer. Minor damage was reported southeast of town. Damage: $25,000. 1¾ inch hail caused an additional $100,000 in property damage.

May 11/12, 2005: In addition to the intense rain and flooding, the severe storms also brought large hail driven by high winds. Officials estimated that 2800 homes and businesses had damage in Grand Island.

June 15, 2006: There were numerous reports of trees down blocking roads and knocking out power. Some of the trees fell on homes. Damage: $20,000.

June 24, 2006: Penny to golf ball sized hail fell in and around Grand Island, causing $30,000 in property damage.

Tornado

Grand Island has the unfortunate distinction of having been hit with one of Nebraska's worst tornado outbreaks. The outbreak took place on June 3, 1980, and the twisters devastated entire sections of Grand Island – especially the City's northwest and north central residential areas, as well as the southern business district. Depending on the accounts, between 5 and 15 tornadoes between 7:45pm on the 3rd to 1:30am on the 4th were spotted. The National Climatic Data Center reports 13 tornadoes with four of them rated as F1, three as F2, three as F3, and three as F4. The tornadoes killed five people, injured more than 400, and caused $300 million in damage. The destruction covered more than 150 city blocks, including losses to 357 homes, 33 mobile homes, 85 apartments, and 49 businesses. This event has been turned into a book and a television movie (*"Night of the Twisters"*), and was studied by a special team of research scientists, including Professor T. Theodore Fujita himself. This tornado outbreak captivated scientists because the storm included both cyclonic and anticyclonic tornadoes.

On August 5, 1995, an F0 tornado came within five miles west of Grand Island.

On August 4, 1996, a severe thunderstorm produced a brief tornado touchdown southwest of Grand Island. Funnel clouds were also observed just south and east of town.

On May 13, 2003, funnel clouds were reported in the Grand Island area, but no tornado was confirmed.

Drought

NCDC reports two drought events since 1950 for Hall County: in 2000 and 2002. Both of these droughts appear to have been agricultural droughts with the most impact to growing crops. Although Grand Island is situated in an area which has been directly impacted by a drought, there are no indications that the City has ever been materially impacted by a drought.

Likelihood of Future Hazard Events

It is certain that Grand Island will be impacted by severe weather – perhaps as often as each year. In these events, it should be expected to witness large hail, high winds, and intense rain in the summer, and large snowfalls, ice, and bitter wind chills in the winter. Although it is certainly possible, it is less likely that Grand Island will be directly impacted by a tornado.

Past Hazard Mitigation Efforts

National Flood Insurance Program

The City of Grand Island participates and is in good standing in the National Flood Insurance Program (NFIP). The initial identification for the floodplain map for Grand Island was completed on April 5, 1974 and the City became eligible for the Emergency Phase of the NFIP on March 14, 1975. Flood Hazard Boundary Map revisions were incorporated onto the map dated September 3, 1976. The boundary map was converted to a Flood Insurance Rate Map on March 2, 1983, which was also the date that Grand Island became eligible for the Regular Phase of the NFIP. New preliminary Hall County countywide floodplain maps were published on August 31, 2007. It is not possible to tell when the preliminary Hall County maps will become effective.

Wood River Diversion

The Wood River Flood Control Project was dedicated in spring of 2004. The 300-foot wide diversion channel diverts excess water from the Wood River and Warm Slough to the east and into the Platte River. This project provides flood control protection for 1500 homes and businesses. The project was tested by the May 11 and 12, 2005, flood event, when 7.21 inches of rain fell in a 24-hour period. From a hydrological standpoint, this event would have resulted in a flood similar to the devastating 1967 flood; however, the Project functioned as designed, and flood damages were minimal for the protected area. The Central Platte Natural Resources District estimated that the $17 million project paid for itself in this event, less than one year after dedication. The project was sponsored by CPNRD and was funded 42.5% by CPNRD, 35% by City of Grand Island, 11.25% Hall County, and 11.25% Merrick County. The project was constructed by the US Army Corps of Engineers, and the Natural Resources Development Fund (administered by the Nebraska Department of Natural Resources) provided the 60% of the non-federal share of the planning.

Prairie/Silver/Moores Creek Flood Control Project

In May of 2000, the CPNRD and City of Grand Island contracted out to perform a detailed hydrologic analysis of northern and western Grand Island. The analysis also included an evaluation of options for reducing flood damages and to present a preferred alternative. An engineering firm was selected in September of 2005 to provide engineering services for the design and oversight of the flood control project. The flood control project is designed in three phases, expecting to be completed in 2015. Construction of Phase 1 began in January of 2007.

The phases are:

Phase 1 – Silver Creek Low Land Stormwater Detention Cells

The first phase of the project is the construction of four large floodwater detention cells along the Silver Creek channel with a total excavation near 4.5 million cubic yards of earth. The cell design includes the lowering and re-grading of Silver Creek for more then two miles. The detention cells will detain stormwater runoff in excess of the 2-year storm. A 3' x 3' concrete box culvert will be used as the outlet and will release the water from the cells at a rate equal to the 2-year storm. A second 3' x 6' gated box culvert will be used for rapid draw down of the cells. A berm is being placed around the cells, approximately 2 feet above existing ground, to provide sufficient capacity to detain runoff from the 100-year storm with a 1-foot freeboard.

Phase 2 – Basin Divide and Silver/Moores Creek Diversion Channel

A diversion channel that will connect Silver Creek to Moores Creek and a levee that will prevent flood water from flowing from one basin the adjacent basin. The stormwater released from the cells when combined with runoff excess, flows from the Prairie Creek and will cause flooding within the city of Grand Island. This levee will be designed to meet the requirements set forth by FEMA. A diversion channel will be constructed to divert water from Silver Creek to the Moores Creek floodway.

Phase 3 – Upland Dams and Prairie/Silver Creek Channel

A series of upland detention dams and an overflow channel from Prairie Creek to Silver Creek. The exact locations of the detention sites will be finalized in the final design phase of this project. Several sites are available and will be evaluated after geological investigations have been completed. The channel between Prairie and Silver Creek will serve to carry excess flows from Prairie Creek to Silver Creek.

Floodplain Buyouts

The City of Grand Island has acquired and demolished two flood prone properties near the Platte Generating Station.

Prairie Creek Clearing

Although the Prairie Creek Flood Control Project had a local effect, damages could be reduced on Prairie Creek by keeping the channel clear. Projects have been completed from the mouth of Prairie Creek in Merrick County to the Hall-Buffalo county line. Annual maintenance cost to CPNRD is $10,000.

Moores Creek Flood Control Project

Project sponsors of the feasibility study for the flood control on Moores Creek include CPNRD, the City of Grand Island, Merrick County and Hall County. The three-phase project consisted of channel improvements, construction of three detention/retention and wildlife habitat enhancement cells, and construction of waterways and bridges to enable storm runoff. Annual maintenance cost is estimated at $20,000.

Emergency Snow Route

Grand Island has instituted emergency snow routes, which allows the City to remove the snow more quickly and efficiently following a significant snow event. This improves public safety since access to medical care is often needed more frequently as a result of the snowfall. The snow removal plan and maps are available in the local telephone book and online at the City's website.

Tree City USA

Grand Island has been a Tree City USA community since 1987. Being a Tree City USA allows a community to reduce its exposure to falling trees and limbs from high wind, tornado, and ice events. Grand Island also offers a cost sharing program for homeowners who purchase the best types of trees for their boulevard areas and yards.

Vulnerability Assessment

According to the Nebraska Department of Property Assessment and Taxation, the total assessed taxable value for Grand Island in 2007 was $2,215,715,709. Broken out by significant property types, this is:

Residential real property:	$ 1,326,296,441
Commercial real property:	$ 665,277,967
Comm/Ind. personal property:	$ 109,442,265
Industrial real property:	$ 49,777,940
Public service co. total property:	$ 42,670,242
Railroad total personal property:	$ 17,705,107
Agricultural total property:	$ 4,545,747

The entire structure stock is vulnerable to the severe weather, tornado, and drought hazard. This means that, as of 2007 there is $2,215,715,709 in at-risk assets for these hazard types.

For the flood assessment, a software program called HAZUS-MH® was used. HAZUS-MH stands for "Hazards U.S. – Multi-Hazard", and uses default census information to estimate the amount of damage from a flood. In so doing, it generates a basic estimation of the number of structures in the study area and the amount of potential damage. The printout result of the flood model is included at the end of the Grand Island report. There are important disclaimers for using this information as it is generated by computer using data that is not improved from the basic census information – these concerns are outlined below after the flood model summary.

As shown in the report, HAZUS calculates:

Number of Buildings in Grand Island:	20,396
Residential Buildings	18,808
Non-Residential Buildings	1,588

General Building Stock Damage

HAZUS estimates that about 140 buildings will be at least moderately damaged by a flood of a magnitude which inundates the modeled floodplain – this is 6.8% of the total number of buildings in the case study. Of the 140 buildings, 13 will be completely destroyed. More detailed damage figures by occupancy and by building type are given in Table 3 and Table 4 in the HAZUS report at the end of the Grand Island section.

Essential facility damage

HAZUS estimates that there are five fire stations, two hospitals, two police stations, and 25 schools in the study region. Of these 34 essential facilities, four schools are estimated to receive at least moderate damage – with two of these schools losing function.

Debris Generation

HAZUS estimates that 4,337 tons of debris will be generated by a flood. Of this amount, "Finishes" (defined as dry wall, insulation, etc) comprised 81% of the total while "Structural" (wood, brick, etc) comprised 6% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 173 truckloads (at 25 tons/truck) to remove the debris generated by the flood.

Shelter Requirements

HAZUS estimates that 2,359 households will be displaced by the flood. Of these, 6,158 people will seek temporary shelter in public shelters.

Economic Loss

The total economic loss for the flood is $76.61 million, which represents 8.72% of the total replacement value of the buildings in the scenario. The building losses are broken into direct building losses and business interruption losses. HAZUS calculates that direct building losses to be $73.25 million while the remaining $3.36 million is for business interruption. Of the $73.25 million on direct building losses, $20.24 million is for residential and $44.10 million is for commercial as the two largest categories (see Table 6 of printout).

Corps of Engineers Structural Inventory

In the structural inventory completed by the Corps of Engineers, 1045 properties were found to be located in a regulated floodplain in Grand Island's extraterritorial zoning jurisdiction. Of these, 88 were in a Zone A, 42 in a floodway, and 915 in Zone AE. The valuation of these 1045 floodplain properties found by the Corps of Engineers is $94,872,642, or 5.2% of the total valuation of Grand Island and its zoning jurisdiction.

Figure 1 shows the Grand Island census tracts in Hall County which were used in the flood assessment. **Figure 2** shows the floodplain which HAZUS automatically models as a part of its assessment – the darker the shade of blue, the deeper the modeled floodplain.

HAZUS report disclaimers: As shown on HAZUS Figure 2, the Wood River Diversion is not shown as eliminating the floodplain on the south end of town. The above analysis was completed using default data, which uses statistical averages for variables across census tracts.

Also, there are uncertainties inherent in any loss estimation technique. Therefore, there may be a significant difference between modeled results contained in this report and the actual social and economic losses following a flood. More precise results could be completed by inputting user-defined values for the census tracts or the analysis could be run by census blocks, which would reduce – but not eliminate – the estimates used in the model.

Figure 3 shows the critical facilities, as identified by the City. Critical facilities are those structures which will be essential for returning the Village functions to normal after a disaster ("Civic"), are vital for disaster response and sheltering ("Shelter"), and are essential for public health and safety ("Lifeline Utility"). In Grand Island, the 90 critical facilities identified are:

52 emergency shelters
24 schools
5 fire stations
2 police stations
2 medical facilities
1 hospital
1 power plant
1 treatment plant
1 airport
1 bus terminal

The Corps of Engineers structural inventory found the following critical facilities in the floodplain:

Cedar Hollow Public School
Veterans Administration Medical Center
Berean Bible Church
Grand Island Wastewater Treatment Plant
Grand Island Senior High School
Seventh Day Adventist Church
First United Methodist Church
Community Bible Church
Church of Christ
Platte Generation Station

Figure 4 shows the potential ranges of the tornado warning sirens in Grand Island, with the yellow shading being a half-mile from each siren and red one mile from each siren. As shown by the figure, the majority of current development within the Grand Island corporate limits is in the yellow shaded area. It must be recognized, however, that these are outdoor warning sirens which are designed to alert residents who are outside and in close proximity to the sirens. They are not designed to warn persons indoors at-distance, traveling in vehicles, or in noisy environments. In addition, a warning system works best if there are operational redundancies – meaning that it is always safer to have additional sirens in a network in case a siren malfunctions or is destroyed. An additional consideration is that periods during which warning sirens are needed are often noisy in themselves with high wind, intense rain, and hail which all act to reduce peoples' ability to hear the sirens. It is easier to hear a warning for people who are downwind of the siren.

Figure 5 shows the areas of new development which is most likely to occur in the next five to ten years. New residential development is already taking place in the blue highlighted area with road and sewer infrastructure in place. The vulnerability of all development – existing or future – is the same now and will be the same in the future for severe winter storms, severe summer storms, and tornadoes. The only hazard which is able to be modified by human behavior or activity is flooding. However, since there Grand Island is in good standing in the Regular Phase of the National Flood Insurance Program, any future floodplain development will be completed in compliance with the City's floodplain management ordinance.

Mitigation Alternatives

GOALS: 1) Reduce or prevent future damage from natural hazard events,
2) Increase public safety

To address these goals, mitigation alternatives were suggested in the public meeting and prioritized by the Grand Island City Council.

Prioritization
Grand Island prioritized the mitigation alternatives according to the "STAPLE(E)" procedure (Social acceptability, Technical feasibility, Administrative capability of local government, Political acceptability, Legal authority to implement, Economic justification, and Environmental acceptability). In addition, alternatives were prioritized based on the community's goals and planning objectives.

At its discretion, Grand Island officials may choose to not implement any of the proposed mitigation projects at this time with the realization that future events may change this stance as well as the prioritization of projects. Projects sponsored for implementation will follow a public process.

1) Maintain good standing in the National Flood Insurance Program
Objective 1: Continue to regulate development in floodplain areas and adopt the Hall County floodplain maps when they become effective.
Funding sources and potential cost: No funding needed, no cost.

2) Mitigate repetitive loss properties
Objective 2: Reduce future flood insurance payments and reduce flood losses by mitigating repetitive loss properties through acquisition, elevation, or other techniques. Acquisition should be first priority.
Funding sources and potential cost: FEMA's mitigation programs – cost will vary by structure and by mitigation technique used.

3) Reduce flood damages

Objective 3: Reduce impacts of flood and stormwater problems

- Action 3.1: Complete a drainage study. Given the extremely flat topography in the area, drainage will always be a problem – especially for intense warm weather rainfall events. A drainage study is needed in Grand Island to help the City make wise land use decisions, to identify where existing drainage infrastructure is weak, and to identify ways to address these weaknesses. A drainage study has the potential to also identify good flood mitigation projects which could be funded using FEMA's mitigation programs.

Funding sources and potential cost: Central Platte NRD, Community Development Block Grant, City – average cost varies widely on scope and community size

- Action 3.2: The City Council should consider passing a stormwater management ordinance. Such an ordinance would be designed to hold back stormwater on-site from large developments and to reduce erosion. The City of Lincoln has passed a stormwater management ordinance which could be used as a model or guide.

Funding sources and potential cost: Could be implemented using existing City resources.

- Action 3.3: Upgrade culverts which are found to restrict flows from rain events. A drainage study can show which culverts and bridges are undersized and need to be replaced with larger openings. However, a drainage study is not necessary to know there is a problem. A drainageway which drains properly will not have flow impediments which back up water on to adjacent property. However, flow impediments can be placed in the flow path on purpose to direct the flow of water toward a specific area designed to retain excess water during periods of high flows. It must be noted that culvert upgrades may not have a lasting impact if upstream stormwater is not somehow managed.

Funding sources and potential cost: City, NRD, Natural Resources Development Fund. Cost varies greatly by design and scope.

- Action 3.4: Clear ditches to improve channel conveyance capacity to allow flows to move unimpeded to the Platte River.

Funding sources and potential cost: City, CPNRD

- Action 3.5: Create a maintenance plan for the drainage system. If improvements are made to Grand Island's drainage system, it will be important to protect the "current condition" of the drainage so that it does not revert back to problem areas.

Funding sources and potential cost: City. Cost to create a maintenance plan would be none to little; however, the City may need to devote financial resources toward it.

- Action 3.6: Floodproof any critical facility which is prone to flooding.

Funding sources and potential cost: FEMA's mitigation programs, cost would vary by scope and design. 25% non-federal match requirement would be needed – most likely from City.

4) Identify and designate tornado shelters, publicize the locations of all public tornado shelters to increase public awareness with a sign on the building.

Objective 4: Provide emergency shelter(s) to which students or local residents would evacuate in the event of a tornado warning, especially those who live in vulnerable housing.

- Action 4.1: Study existing public buildings to see if they offer adequate tornado shelter. If buildings are found, they should be identified with proper signage so that citizens know where they can go during a tornado warning.

Funding sources: Unknown

- Action 4.2: Create public shelters by retrofitting or new construction. FEMA has retrofitted schools and constructed all-new shelters in several places in the Midwest.

However, most tornadoes occur in late-afternoon to early evening when a school might be closed for the day. Furthermore, it has been reported that public tornado shelters that are left open to the public are not used properly, with vandalism and use by vagrants as problems. At-risk structure types include mobile homes and slab-on-grade construction which has no basement.

- Action 4.3: Consider constructing tornado shelters for vulnerable construction like manufactured home concentrations.

Funding sources and potential cost: FEMA's Pre-Disaster Mitigation program or Hazard Mitigation Grant Program for construction only– cost varies widely based on scope and design

5) Ensure adequate outdoor severe weather warning coverage

Objective 5: Replace the existing tornado sirens which are outdated.

In Hall County, the warning sirens are owned by the communities. There is no funding assistance available from the County for new sirens; however, if the community purchases a warning siren, Hall County Emergency Management can help coordinate the warning system through the central siren warning system located in Grand Island.

There have been significant advances in warning siren technology since the time that many sirens were erected as a result of the Cold War scare in the 1950s and 60s. The old style of warning siren is manual and operates using at least 110 volts – possibly as much as 220 or 240 volts. In addition, these sirens also have no battery backup since it is not economically feasible to purchase backup systems for manual sirens. In the event that severe weather is approaching, a power outage – which is common in severe weather – means that no warning will be sounded. As a result, there could be higher loss of life since a warning would have alerted people within earshot to seek shelter. Newer sirens operate using 12 volts, which makes battery backup possible – in fact, these sirens typically have a backup system already built in. This means that the only option for having a tornado siren with battery backup is the actual purchase of a new siren.

- Action 5.1: Purchase new tornado sirens to replace the older models.

Funding sources and potential cost: City. Estimated cost: $25,000 to $50,000 .

6) Reduce damages caused by downed tree limbs

Objective 6: Reduce the duration or eliminate power outages from severe weather. Overhead power lines are vulnerable to collapse from icing in the cold weather months and from high winds or tree limbs falling on power lines in warm weather months.

- Action 6.1: Initiate a power line burying project.

Funding sources and potential cost: FEMA's Hazard Mitigation Grant Program or Pre-Disaster Mitigation Program could provide up to 75% of the project cost. The remaining cost might be shared with the Public Power District, City, or property owners.

- Action 6.2: Write to the Nebraska Forest Service and request a tree inventory. An inventory is especially helpful in mitigation planning for communities which experience regular tree-related damages. An inventory can identify problem trees and recommend changes to the way a community administer a local tree management program (i.e., through a Tree Board or Park Board). Problematic areas of tree limbs with power lines could be addressed as a priority.

Funding sources and potential cost: Free

7) Ensure adequate severe weather notifications to citizens and critical facilities
   Objective 7: Purchasing or education of a weather radio
   - Action 7.1: Work with the local cable television company to create a cable television interrupt warning system. Such a system would remove the concern over which television or radio station to turn to for weather information and would be a way to inform the majority of the public of impending severe weather.
   - Action 7.2: For public critical facilities, the City should consider purchasing a weather radio to be used in each facility for the rapid dissemination of a severe weather warning.
   - Action 7.3: In noisy manufacturing facilities which may not hear tornado sirens, the City could inform the owners of these facilities of the option that they could purchase a weather radio.
   - Action 7.4: Encourage critical facilities like senior care facilities and hospitals to develop and practice their own emergency sheltering plans.

   Funding sources and potential cost: City of Grand Island, local businesses. Approximate cost about $30 per radio. Plan development would carry no cost other than staff time.

8) Improve the City's capability to communicate in a post-disaster scenario
   Objective 8: Acquire a comprehensive communication system. The current system of cellular telephones depends on having a cell tower network and being able to connect with other emergency responders when cellular traffic will be very high.
   - Action 8.1: Assess the types of communication systems that are available, being used by other counties or communities, and which would fit into the budget. Options might include something like a satellite telephone network with handheld units.
   - Action 8.2: The City and County could have a Ham radio network on standby in case of communication failure.

   Funding sources and potential cost: The most likely funding source for this objective would be Hazard Mitigation Grant Program "set-aside" funds made available to states after a federally-declared disaster. Other funding sources are unknown. Potential cost would vary widely based on system needs, and is therefore also unknown at this time.

9) Prevent or reduce the duration of power outages
   Objective 9: Increase the capability for the City's electric infrastructure to withstand severe weather. Whether for public safety or public welfare, having a function electric system has clear benefits in a post-disaster scenario. These actions would be more effective for more rural transmission and distribution lines which have a longer space between poles than in urban areas.
   - Action 9.1: Install "T2" line, which prevents ice buildup
   - Action 9.2: Periodically in a segment of power line, strengthen a power pole. This will prevent any "cascading" effect of pole failures, which will reduce the time necessary for repairs.
   - Action 9.3: Instead of T2 line, automatic disconnects could be installed on the lines at the poles to prevent the weight of the line from pulling down the poles.

   Funding sources and potential cost: The most likely funding source for this objective would be Hazard Mitigation Grant Program "set-aside" funds made available to states after a

federally-declared disaster. Other funding sources are unknown. Potential cost would vary widely based on system needs, and is therefore also unknown at this time.

GOAL: 3) Increase Public Education

10) Educate the public about natural hazards, preparedness, and mitigation

Objective 10: Initiate or continue natural hazard awareness and education programs

- Action 10.1: Hall County Emergency Management Agency (HCEMA) will continue its current educational programs. HCEMA also completes annual education programs to grade schools each year, reaching approximately 500 to 600 kids. They discuss severe weather and where to go and what to do if there is a tornado warning.
- Action 10.2: HCEMA also participates in the annual Severe Weather Awareness Week by placing articles in the local paper and airing information on the City's local government television station. Educational outreach programs could be expanded to include all hazards and a severe winter weather preparedness program for the fall.
- Action 10.3: HCEMA also participates during the test warning day by using all of our normal procedures as if there were an actual event, including setting off the warning sirens.
- Action 10.4: The City and HCEMA can make educational materials available to the public in the public library and website. Education would include, but not be limited to, how to protect yourself and your property from tornadoes and severe weather, their potential risks to different disaster types, preparedness procedures for their home, more wind-resistant construction design, and hardier types of trees to plant in areas close to homes, power lines, and streets. Free brochures are available through the National Weather Service and American Red Cross.

Funding sources and potential cost: Funding sources are not applicable, cost is free except for work time.

Implementation

To start implementation, determining which projects should be submitted for funding will be based on a FEMA-approved cost-benefit method. This means that proposed projects would need to be reviewed for cost effectiveness with the assistance of state emergency management or floodplain management personnel. Unless otherwise delegated, the Hall County Regional Planning Director will be the person responsible for project administration of any project selected for implementation. FEMA has the authority to approve or deny mitigation projects applied for under their agency's mitigation programs.

Evaluation

In this plan, several potential mitigation projects are identified; however, it is not designed to have an all-inclusive list of projects. It is designed to be a living document which can be adapted to the landscape as conditions change. This means that this plan should be revised and updated as new projects are identified and prioritized and participating communities. There is a requirement to review and update this plan every five years. To do this, communities will follow the same procedure that Hall County will utilize in its mitigation plan updates, which is detailed starting on page 46 of the County portion of this report. There are also evaluation, update, and revision worksheets which have been included in this plan as **Appendix B** to assist with this process.